

**THE ROLE OF WORK CLIMATE AND MOTIVATION IN REACTIONS TO  
NEW INFORMATION TECHNOLOGY**

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## **ABSTRACT**

Despite tremendous investments in information technology (IT), many technological interventions in organizations fail because employees do not fully accept and use IT. The present study explored how two aspects of work climate – perceived organizational support and distributive justice – affect employee reactions to new IT (i.e., usage and attitudes) from a motivational point of view. Self-determination theory was used to understand how different motivational styles, varying in degree of self-determination, mediate the relationship between work climate and reactions to new IT. Results showed that perceived organizational support and distributive justice were associated to intrinsic and identified motivation to use the IT, and also to enjoyment and acceptance of the IT. Intrinsic and extrinsic motivation were both associated with IT usage, but IT usage was associated with enjoyment and acceptance only when people were intrinsically motivated. Intrinsic motivation also mediated the effects of support and justice on enjoyment and acceptance. Moreover, intrinsically motivated users were less likely to use a paper-based appointment booking alternative than those who were not. Implications for managing IT implementations and training are discussed.

**Keywords:** Self-determination theory, information technology, perceived organizational support, motivation, IT acceptance and use, enjoyment.

## 1. INTRODUCTION

According to a recent report by Forrester Research, businesses and governments in the US were expected to spend \$568 billion on information technology in 2010 while global IT spending was expected to exceed \$1.6 trillion the same year (Business Wire, 2010). Yet, many technologies are not used maximally or optimally by employees, resulting in wasted time and money (Venkatesh, Brown, Maruping & Bala, 2008). Davis (1989) argued that IT can substantially improve employee job performance, but that such improvements are hindered by employees' unwillingness to use IT. Despite decades of research, the identification of the conditions leading to optimal IT use remains of paramount importance (Benbasat & Barki, 2007). More than twenty years of research in information systems (IS) has yielded many theoretical models to understand IT usage (see Venkatesh, Morris, Davis & Davis, 2003, for a review). In these models, IT usage is largely explained by beliefs and attitudes that employees hold about the technology. Examples include Davis' (1989) Technology Acceptance Model (TAM), which focuses on beliefs and attitudes about the technology itself (i.e., perceived ease of use, perceived usefulness), Fishbein and Ajzen's (1975) Theory of Reasoned Action (which includes attitude and subjective norm), Ajzen's (1991) Theory of Planned Behavior (which adds perceived control), Rogers' (1983) Innovation Diffusion Theory (which focuses on relative advantage, ease of use, image, visibility, compatibility, results and voluntariness), and subsequent hybrid models.

Though a few studies have examined employee motivation in relation to acceptance and usage of new IT (Davis, Bagozzi, & Warshaw, 1992; Greg, Chen, Grover, & Stewart, 1992; Venkatesh, 2000; Venkatesh & Speier, 1999, 2000), most of the motivational frameworks that were used could be improved both in terms of how to conceptualize and assess motivation and in terms of its place in the models. The goal of the present study was to accomplish just that.

The present study examined employee motivation through the lens of Self-determination theory (Deci & Ryan, 1985; 2000), and investigated the relationship between motivation and various employee reactions to the introduction of new IT. Users' intention to continue to use an IT have been said to be determined by their satisfaction with its use (Bhattacharjee, 2001). Following Deci, Eghrari, Patrick, and Leone (1994), we chose to examine the relation between employee motivation with IT enjoyment, acceptance of, change and usage. As little is known about the determinants of extrinsic and intrinsic motivation for using IT (Venkatesh & Speier, 1999), we also investigated perceived organizational support and distributive justice as potentially related to employee motivation.

### **1.1 Motivation in IS Research**

Motivational theory has been said to complement the organizational innovation and IS literatures, providing a rich context for future research in this domain (Howard & Mendelow, 1991). By far the most popular motivational model in the IS literature, the technology acceptance model (Davis, 1989; Davis, Bagozzi & Warshaw, 1989) proposes perceived ease of use and perceived usefulness as the main predictors of technology acceptance. Davis, Bagozzi and Warshaw (1992) specified that perceived ease of use and perceived usefulness represent the "extrinsic" side of motivation to accept technology, while enjoyment of the technology represents the "intrinsic" side of motivation. These authors examined the separate effects of intrinsic and extrinsic motivation related to computer usage and found both to be key drivers of an individual's behavioral intention to use IT. Other research concurs. Webster and Martocchio's (1992) model of microcomputer playfulness suggests that people high on playfulness (i.e., intrinsic motivation) learn more quickly because they experiment more with the technology. Venkatesh (1999) later found that a game-based training program, aimed at increasing intrinsic

motivation, led to higher user perceptions of ease of use and higher acceptance of IT compared to training based on a traditional method. This parallels education findings showing that intrinsically motivated learners do better on complex and creative tasks and are better able to recall learned information in the long-term (see Deci & Ryan, 2008 for a review).

Venkatesh, Speier and Morris (2002) found that intrinsic motivation predicted perceived ease of use, which in turn predicted perceived usefulness. These do not fit with previous assertions by Davis et al. (1992) that perceived ease of use was an extrinsic motivator. Instead, it seems that what was supposed to trigger intrinsic motivation or enjoyment also enhanced the “extrinsic” motivator. Thus, factors, such as perceived ease of use and enjoyment, supposed to respectively affect intrinsic and extrinsic motivation do not seem to fit into clean motivational categories. Historically, operationalizations of intrinsic and extrinsic motivation in IT research have been somewhat crude and could be improved. Recent studies (e.g., Chen and Jang, 2010; Roca and Gagne, 2008; Wang et al., 2011) have relied on self-determination theory (Deci & Ryan, 1985, 2000) as a framework to operationalize intrinsic and extrinsic motivation to use new IT. We believe that this framework cleans up the motivational constructs, and allows for better explanations and predictions regarding how to promote IT motivation.

## **1.2 Self-Determination Theory**

Self-determination theory (SDT; Deci & Ryan, 1985, 2000) proposes that different types of motivation, varying in degree of self-determination, underlie human behavior. The theory proposes intrinsic and extrinsic motivation, as well as amotivation (i.e., lack of motivation) as three main types of motivation. Moreover, the theory expands the concept of extrinsic motivation by theorizing that there are self-determined and controlled types of extrinsic motivations.

*Amotivation* is the state of lacking an intention to act, and is the least self-determined form of motivation. Amotivation results when an individual does not value an activity, does not feel competent to perform it, or does not believe that it will yield a desired outcome. An amotivated person is neither intrinsically or extrinsically motivated, and is unlikely to engage in the target behavior (e.g., using an IT; Ryan & Deci, 2000). *Intrinsic motivation* is when one does something for its own sake, for its enjoyment (Deci & Ryan, 1985). For example, an employee might use an IT because she finds that it is fun to work with it. *Extrinsic motivation* refers to engaging in an activity for instrumental reasons, such as obtaining a reward or avoiding a punishment. Beyond this simple dichotomy, SDT expands the concept of extrinsic motivation by theorizing that a process of internalization, a process by which a behavioral regulation is taken in by a person, explains how extrinsic motivation can become autonomously regulated (Ryan, 1995). The most controlled form of extrinsic motivation, *external regulation*, represents behavioral engagement based on obtain a contingent reward or avoid a punishment. For example, an employee might use a new IT because her manager has threatened to fire her if she does not use it to get her work done. In contrast, *identified regulation* is an autonomous and internalized type of extrinsic motivation, where a person engages in an activity because the activity is personally meaningful and valued. For example, an employee might use a new IT because she finds it useful to get her work done. Even though a behavior motivated through identification is volitional, like it is with intrinsic motivation, its purpose is to achieve an outcome that is separable from the behavior. So the motivation is still extrinsic, but autonomous. Though research has shown that both identified and intrinsic motivation generally yield positive performance outcomes, it happens that they lead to different outcomes (Koestner & Losier, 2002). Thus, it is useful to have both concepts available to predict behavioral outcomes.

We argue that the concepts of perceived ease of use and perceived usefulness resemble identified extrinsic motivation, whereas playfulness resembles intrinsic motivation (Davis et al., 1992). Thus, past research on these extrinsic and intrinsic forms of motivation to use an IT, as they have been labeled, have been limited to the study of autonomous forms of motivation. Over three decades of research have shown that autonomous forms of motivation (i.e., identified regulation and intrinsic motivation) yield more positive outcomes than external regulation (Deci & Ryan, 2008; Ryan & Deci 2000). In management (see Gagné & Deci, 2005 for a review), research has shown that autonomous forms of motivation are associated with better performance and attitudinal outcomes than controlled motivation: increased job satisfaction, performance evaluations, persistence, involvement, organizational commitment, acceptance of organizational change, and psychological well-being (Baard et al., 2004; Deci et al., 2001; Gagné, Chemolli, Forest & Koestner, 2008; Gagné, Koestner & Zuckerman, 2000; Ilardi, Leone, Kasser & Ryan, 1993; Kasser, Davey & Ryan, 1992). It is thus not surprising that the TAM factors have yielded positive IT usage outcomes. One study so far has used the SDT framework to find that autonomous motivation predicted perceived usefulness and perceived ease of use more strongly than external regulation (Malhotra, Galleta & Kirsch, 2008). Moreover, perceived usefulness mediated the link between autonomous motivation and attitude toward the IT, and that attitude mediated the link between autonomous motivation and intention. The present study will test if indeed autonomous motivation to use a new IT is positively related to IT usage, while controlled motivation is negatively related to it.

Motivation is typically measured by asking people why they engage in an activity (e.g., why do you use the IT), and by providing reasons that reflect the different types motivation that people rate on a Likert scale. We typically find a pattern of correlations between the different types of motivation (Ryan & Connell, 1989) that reflects the degree of self-determination of the

motivation, such that variables deemed more similar will be more highly positively correlated than those that are more discrepant. For example, intrinsic motivation typically displays a positive correlation with identified regulation and a low correlation with external regulation; amotivation displays a positive correlation with external regulation and a low correlation with identified regulation; and intrinsic motivation displays a negative correlation with amotivation.

Self-determination theory does not propose a developmental continuum underlying the different types of motivation (Ryan & Deci, 2000), so an individual does not have to proceed through each type to attain the more self-determined forms of motivation. Instead, adoption of a motivational orientation will depend greatly on that individual's previous experiences with similar activities, in similar environments. The setting in which the activity is to take place will greatly influence motivation; whether the task has the potential to be interesting, whether key people support and let the employee explore freely with the activity, whether contingent rewards are used, and so on.

SDT proposes that contexts that satisfying three basic psychological needs for competence, autonomy and relatedness are likely to lead to internalization of extrinsic motivation and to intrinsic motivation (Deci & Ryan, 2000). By fostering feelings of competence through optimal challenge and relevant feedback, by removing external pressure and instead supporting a person's interest, and by offering a warm interpersonal environment through open communication and teamwork, employees will be more likely to adopt identified or intrinsic motivational styles. These conditions help people find meaning in job tasks so that they will engage in them when free of external pressure, perform better, and feel less stressed (Baard Deci & Ryan, 2004; Deci et al, 2001). A recent study showed that the satisfaction of psychological needs predicted e-learning continuance intentions (Roca & Gagne, 2008). In the present study, we studied the effects of work climate by operationalizing need satisfaction in



terms well-known to management researchers, namely perceived organizational support and distributive justice.

### **1.3 Perceived organizational support**

Eisenberger, Huntington, Hutchison and Sowa (1986) defined perceived organizational support (POS) as global beliefs developed by employees “concerning the extent to which the organization values their contributions and cares about their well-being” (p. 501). They suggested that POS is influenced by a variety of factors, such as organizational rewards in the form of praise, money, promotions, and influence, all given by the organization to employees as a way of communicating to employees that they are valued. The way organizations react to employees’ mistakes, suggestions, and performance is another way of communicating worth (Wayne, Shore, Bommer, & Tetrick, 2002). In over 70 empirical studies (Rhoades & Eisenberger, 2002), POS has been associated with increases in many positive employee outcomes: effort to fulfill organizational goals (through an increased effort-outcome expectancy), affective commitment, positive mood, job satisfaction, conscientiousness in carrying out conventional job responsibilities and innovation on behalf of the organization (Eisenberger, Fasolo, & Davis-LaMastro, 1990), attendance, loyalty, performance, and organizational citizenship behavior (Shore & Wayne, 1993; Wayne et al., 2002). POS was also associated with decreased turnover intentions and decreased job strain (Rhoades & Eisenberger, 2002). To our knowledge, the effect of POS on acceptance of IT change has not yet been examined, nor has it been directly linked to motivation, although it is often assumed to be related to it.

### **1.4 Distributive justice**

Price and Mueller (1986) define distributive justice as “the degree to which rewards and punishments are related to performance inputs” (p. 122). This definition of distributive justice is based on equity theory (Adams, 1963), which suggests that a person will judge a situation as equitable when her effort to outcome ratio is equal to that of another person. Thus, distributive justice does not refer to the quantity of rewards and punishments dispensed by the organization, but rather to the equity of the rewards divided among the employees. Distributive justice has been shown to be significantly and positively related to POS (Wayne et al., 2002), pay satisfaction, and general job satisfaction (DeConinck et al., 1996). Low distributive justice has been associated with employee theft (Greenberg, 1990). To our knowledge, distributive justice has never been linked to acceptance of IT change, nor has it been studied in the context of intrinsic and extrinsic motivation, although equity theory is itself often considered to be a motivational theory. Although the present study do not test the processes through which distributive justice might be related to higher autonomous motivation, we speculate that if it is related, it will be due to one of two reasons. Either because distributive justice provides the environmental structure necessary for directing behavior towards goal attainment (Koestner et al., 1984), or because it implies that rewards are provided based on competence, and so it provides information on one’s competence, which has been associated with increased intrinsic motivation (Fisher, 1978). However, it is also possible that reward contingencies are linked to decreased autonomous motivation because they are experienced as controlling the person’s behavior at work (Deci, Koestner, & Ryan, 1999).

## **1.5 Overview and Hypotheses**

The present study investigated the relations between work climate, motivation to use IT, and behavioral and attitudinal reactions to the introduction of new IT. Work climate was

operationalized as perceived organizational support and distributive justice. Motivation to use IT was operationalized using the different types of motivation and included the following subscales: amotivation, external regulation, identification, and intrinsic motivation. Employee reactions to IT change were operationalized with a self-reported behavioral measure of IT usage, and the following attitudinal measures: enjoyment, and change acceptance. Enjoyment is defined as having fun when engaging in an activity and finding it interesting and was found to be positively related to intention to use a new IT (Hwang, 2010). Change acceptance is defined as being open to change and viewing change as positive. Three hypotheses were tested.

*H1a:* Perceived organizational support and distributive justice should both be positively related to intrinsic motivation and identification, and negatively related to external regulation and amotivation.

*H1b:* Intrinsic motivation and identification should be positively related to, while external regulation and amotivation should be negatively related to, enjoyment and acceptance of IT change.

Since it is likely that employees will use the IT (as it was mandatory), either because they enjoy it, find it useful, or feel pressured to use it, we expect the following pattern:

*H1c:* IT usage should be positively related to intrinsic motivation, identification, and external regulation, and negatively related to amotivation.

However, we argue that IT usage will only be related to enjoyment and acceptance of change when people have autonomous motivation to use it. In a laboratory setting, Deci, Eghrari, Patrick and Leone (1994) found that people whose needs were satisfied evidenced higher correlations between attitude and behavior (working on a task and enjoying it) than those whose needs were not satisfied. Hence,

*H2*: IT usage will be positively correlated to enjoyment and acceptance of change when people have high autonomous motivation to use the IT.

The third hypothesis states that work climate variables should be related to employee reactions to the new IT. Motivation to use IT should mediate the relationship between the work climate and reaction variables.

*H3a*: Perceived organizational support should be positively related to enjoyment, change acceptance, and usage. Autonomous motivation should mediate these relationships.

*H3b*: Distributive justice should be positively related to enjoyment, change acceptance, and usage. Autonomous motivation should mediate these relationships.

## **2. METHOD**

### **2.1 Setting and IT**

The study took place in each of five partner hospitals (henceforth referred to as Hospitals A through E) in a large Canadian city. Having merged together into one health care organization several years earlier (referred to as the Hospital Center), each hospital was located at a physically distinct site in the city. The Hospital Center had over 9900 employees; 1700 physicians, dentists, and residents; and 1400 employees at affiliated organizations. The 9900 employees included 1500 professional and technical employees, 2900 nurses, and 4400 clerical and auxiliary employees. The Hospital Center had a combined operating budget of close to five hundred million dollars, and 980 000 ambulatory visits annually. One of the five hospitals, Hospital C, specialized in the health care of children.

The IT under study was a patient scheduling and appointment management system. Approximately three million appointments were booked every year at the hospital center. Operating in both English and French, the Windows-based information system allowed users to

book appointments and search for a specific appointment through several methods. It allowed for cross-booking between hospitals and departments, was operational 24 hours / 7 days a week, and was used to record clinic visit attendance, create waiting and confirmation lists, and statistical reports. Some employees used the system as “view-only” users to check reports and appointment schedules only, others were considered “users”, and still others were “super-users” as they used the more advanced features of the system. All users underwent a mandatory training program of up to three days, depending on their user-level.

The implementation lasted three years and began in Hospital C. The implementation was done on a department-by-department basis. Consequently, by the start of data collection, the system had been implemented in the vast majority of the departments of the five hospitals. However, some employees had only recently begun using the system and others had not yet had the system implemented in their departments.

Prior to the IT implementation, appointment scheduling was largely not computerized or centralized, and appointments were mostly scheduled using a paper appointment book in each separate hospital department or clinic. At Hospitals A and B, approximately 40% of employees used paper appointment books, and the remaining 60% used several different and older department-based information systems. At Hospital C, 33% of employees used paper appointment books, while the remaining 67% used an IS installed in the 1980s. At Hospital D, all appointments were scheduled on paper. At Hospital E, all appointments were scheduled using a single older IS. Some employee resistance was reported, particularly at Hospital B: some employees still used paper appointment books in conjunction with, or instead of, the new system.

## **2.2 Participants and Procedure**

A total of 699 bilingual questionnaires were sent out in sealed envelopes to all users of the system by internal mail as follows: 148 users at Hospital A, 252 users at Hospital B, 224

users at Hospital C, 33 users at Hospital D, and 42 users at Hospital E. Employees were asked to seal their completed questionnaire and return it in the enclosed pre-addressed envelope to the Associate Director of Information Services of the Hospital Center via internal mail, who then forwarded the sealed envelopes to the research team. Confidentiality and anonymity was assured on the cover letter, and questionnaires were colour-coded to ascertain hospital source. A reminder letter was distributed three weeks after the questionnaire was sent to thank those who had already completed it, and to urge others to do the same.

### **2.3 Measures**

*Perceived Organizational Support.* We adapted Eisenberger et al.'s (1986) short 17-item version, where users rated judgments and organizational actions that benefit or harm the employee on a 1 (strongly disagree) to 7 (strongly agree) Likert scale.

*Distributive Justice.* We adapted Sorensen (1985) 6-item version of Price and Mueller's (1986) Distributive Justice Index, which assesses the extent to which employees have been fairly rewarded given their job responsibilities, experience, effort, good performance, training, and stresses and strains of their job, on a 1 (Rewards are not distributed at all fairly) to 5 (Rewards are very fairly distributed) Likert scale.

*Motivation to use IT.* The Situational Motivation Scale (SIMS; Guay, Vallerand, & Blanchard, 2000) was adapted to measure users' reasons to use the IT. The SIMS measures 4 types of motivation with 4 items each on a 1 (Strongly disagree) to 7 (Strongly agree) Likert scale (see Appendix I). Subscale scores were calculated by averaging item answers.

*Enjoyment.* Enjoyment when using the IT was measured on a 1 (Not at all true) to 7 (Very true) Likert scale with 6 items adapted from Ryan (1982), who designed them to assess participants' subjective experience related to a target activity in a laboratory setting.

*Acceptance of IT change.* Miller, Johnson, and Grau's (1994) 8-item measure of employee willingness to support organizational change and positive affect toward change was adapted to pertain to IT change, and was measured on a 1 (Strongly disagree) to 7 (Strongly agree) Likert scale.

*IT Use.* Following Lucas and Spitler (1999), we developed a 15-item self-report scale of system use that measured the extent of IT usage and the diversity of functions used, ranging from simple or routine (e.g. *booking appointments*), to intermediate (*searching*), to advanced (*managing and generating appointments, sessions, schedules, and templates*). Each function was broken down into its component actions as shown in Appendix B. Users were asked to indicate the extent to which they used each feature using a Likert-type scale ranging from 0 (never) to 6 (on every occasion). If they did not have access to the feature, they could respond "not applicable", which was coded as missing data (this explains the drop of respondents from 336 to 297 for the regression analyses). Component scores were summed to calculate usage level scores. Therefore, a higher score indicated a higher level of system use. Reports on this measure were positively correlated with self-reported number of appointments booked per week; number of appointments booked using the system (versus using a paper appointment book) and whether users consider themselves to be mild or heavy users of the system.

*Control variables.* The following user characteristics and demographic information were recorded for each user to potentially be used as control variables in the analyses: amount of training, job type (e.g., clerical employee, nurse, technician, professional), whether users were employed before the implementation, self-reported average number of appointments booked per week, user-level (i.e. view-only user, user, or super-user), prior use of computer, prior use of the Windows operating system, organizational tenure, age, gender, full-time/part-time employment status, and education level.

### 3. RESULTS

#### 3.1 Demographic Characteristics

A total of 336 completed questionnaires were received out of a sample size of 699 system users for a response rate of 48%. Two hundred and fifty-six system users (76%) indicated that they were employed in their current job before the IT implementation took place in their department, so the other 80 were not included in any further analyses since they did not experience a change in IT. Of those 256 questionnaires, 27% were received from Hospital A, 28% from Hospital B, 34% from Hospital C, 5% from Hospital D, and 6% from Hospital E. Respondents who were hired after the IT change had higher perceived organizational support ( $M = 4.24$ ) and autonomous motivation ( $M = 7.16$ ) scores than those who were hired before the IT change ( $M$ 's = 3.80 and 3.73, respectively),  $F(1, 324) = 10.19, p < 0.01$ ,  $F(1, 321) = 8.59, p < 0.01$ , respectively.

Ninety-four percent of users were women. Forty-one percent were between the ages of 35 and 44, while 21% were under 35 years of age, and 38% were over 44 years of age. Sixteen percent of employees had completed high school, 50% had completed junior college, 19% had completed an undergraduate degree, 7% had completed a graduate degree, and 5% had a professional designation, while 3% did not provide this information. Seventy-five percent of employees answered the questionnaire in English. Seventy percent held a clerical or administrative job, 12% were nurses, 8% technicians, and 7% multi-disciplinary professionals (dietitians, social workers, etc.), while 3% did not provide this information. Eighty-one percent of the respondents were full-time employees. Average organizational tenure was 14.75 years.

Users had been using the system, on average, for just over a year and a half (21.05 months). Overall, system users booked an average of 55.45 appointments per week, and reported



that they “almost always” booked these appointments using the new system ( $M = 4.35$ ). In terms of usage levels, 19% were view-only users, 44% were users, and 33% were super-users, while 4% did not indicate their user-level. View-only users did not book appointments, but only consulted the appointment lists. Users booked an average of 37.22 appointments per week, while super users booked an average of 105.95 appointments per week. One would normally expect users of such an information system not to additionally schedule appointments using a paper-based appointment book. In fact, 23% of users indicated that they still used a paper-based appointment book, and they were evenly distributed between users and super-users.

Prior to the IT change, 92% of the users had used a computer, and 84% had used the Windows operating system. Based on information provided by the Hospital Center, users were asked to indicate whether they had received half a day, one day, or three days of training. Despite this, 4% of users reported receiving no system training, 4% reported received less than one hour of training, 25% received half a day of training, 35% received one day of training, and 28% received three days of training, while 5% did not provide this information.

### **3.2 Control Variables**

We analyzed which of the control variables were related to the study variables to determine which to control for in the regression analyses. One-way ANOVAs revealed significant mean differences for user-level in distributive justice,  $F(2, 219) = 4.04, p < 0.05$ , enjoyment,  $F(2, 235) = 5.02, p < 0.01$ , and system usage,  $F(2, 321) = 139.43, p < 0.001$ , such that super-users had lower scores on distributive justice ( $M = 2.37$ ), and higher scores on enjoyment ( $M = 4.97$ ), and usage ( $M = 40.12$ ) than view-only users ( $M$ 's = 2.70, 2.65, and 6.06, respectively) and regular users ( $M$ 's = 2.81, 2.40, and 12.30, respectively). Thus, user-level was used as a control variable (dummy coded) in the regression analyses. There were significant mean differences for job type in perceived organizational support,  $F(3, 235) = 3.46, p < 0.05$ ,

distributive justice,  $F(3, 217) = 6.31, p < 0.001$ , and IT usage,  $F(3, 309) = 17.82, p < 0.001$ . However, since non-clerical workers were mostly view-only users, job type differences were largely subsumed in the user-levels, so only the latter was controlled for in the regression analyses. Average number of appointments booked per week with the system was negatively correlated with distributive justice,  $r = -0.18, p < 0.05$ , acceptance of IT change,  $r = -0.14, p < 0.05$ , and positively related to IT usage,  $r = 0.44, p < 0.001$ . However, because this variable is confounded with user-level, we did not control for it. One-way ANOVAs also revealed significant mean differences for hospital site in distributive justice,  $F(4, 225) = 3.35, p < 0.01$ , acceptance of IT change,  $F(4, 237) = 2.48, p < 0.05$ , and IT usage,  $F(4, 319) = 4.96, p < 0.01$ . Thus, hospital site was used as a control variable (dummy coded) in the regression analyses.

Months of system usage was significantly positively correlated with acceptance of IT change,  $r = 0.18, p < 0.01$ , and IT usage,  $r = 0.16, p < 0.01$ . However, a one-way ANOVA revealed that respondents from the Hospital C had been using the system for much longer ( $M = 32.38$  months) than respondents at other hospitals ( $M = 16.26$  months),  $F(4, 204) = 19.96, p < 0.001$ , so length of usage is confounded with hospital site, which is already controlled for. There were significant mean differences in IT usage based on the language in which the questionnaire was completed,  $F(1, 322) = 20.62, p < 0.001$ , such that French respondents had lower scores ( $M = 20.58$ ) than English respondents ( $M = 32.10$ ). However, since the French respondents were mostly located in two of the hospitals, this variable is confounded with hospital site, which is already controlled for. Full-time/part-time status, hours of training, average number of appointments, frequency of system use, whether employees had used a computer or Windows before the IT change, organizational tenure, education, gender, and age were unrelated to the study variables. In summary, two control variables were used in the regression analyses: user-level, and hospital site.

### 3.3 Correlational Analyses

Table 1 presents the means, standard deviations, reliabilities, and the correlation matrix of all study variables. Perceived organizational support and distributive justice were highly positively correlated with each other. A factor analysis again revealed two clear factors, so the variables represent distinct constructs. Enjoyment was positively related to acceptance of IT change, and both were related to IT usage, which was surprisingly negatively related to distributive justice. POS and distributive justice were both positively related to enjoyment and acceptance of IT change. POS and distributive justice were positive related to autonomous forms of motivation, and negatively related to controlled motivation and amotivation, supporting H1a. Autonomous forms of motivation were positively related to enjoyment and acceptance of IT change, while external regulation and amotivation were negatively related to them, supporting H1b. IT usage was positively related to both intrinsic motivation and external regulation, but unrelated to identified regulation and amotivation, so *H1c* was partly supported.

To test H2, we split the employees into two groups: based on a median split, we categorized people into low versus high autonomous motivation (the average of intrinsic and identified motivation). We computed correlations between the attitudinal reactions and usage for each group, and found that autonomously motivated employees' IT usage score was more highly correlated with the attitudinal measures ( $n = 175$ ; enjoyment,  $r = 0.27$ ,  $p < 0.001$ , acceptance,  $r = 0.23$ ,  $p < 0.01$ ) than for less autonomously motivated employees ( $n = 142$ ; enjoyment,  $r = -0.15$ , *ns*, acceptance,  $r = -0.12$ , *ns*). We repeated these analyses splitting the sample into low and high external regulation. Again, we found that employees with low external regulation evidenced positive relations between the extent of their IT usage and their enjoyment ( $n = 154$ ,  $r = .26$ ,  $p < .001$ ) and acceptance of the IT ( $r = .24$ ,  $p < .01$ ) while those with high external regulation did not evidence enjoyment and acceptance when using the IT ( $n = 164$ , enjoyment,  $r = .08$ , *ns*,

acceptance,  $r = .03$ , *ns*). Since we found that IT usage was positively related to both intrinsic motivation and external regulation, we now find they do so with different experiences, and H2 was thus fully supported.

### 3.4 Regression Analyses

Regression analyses were performed following Baron and Kenny's (1986) three-step approach to test for mediation. Each regression was conducted with the maximum number of cases available. Consequently, the number of cases varies across regression analyses, from a minimum of 192 to a maximum of 230 cases. Dummy codes for hospital site and user-level were entered first, followed by the predictor variables in a second step, and followed by motivation in a third step (when examining reactions to IT)<sup>1</sup>. First, regression analyses were performed to examine the relationship between the predictor variables and intrinsic motivation. Control variables accounted for 5% of the variance in intrinsic motivation. Perceived organizational support was positively related to intrinsic motivation,  $\beta = 0.18$ ,  $p < 0.001$ , and so was distributive justice,  $\beta = 0.14$ ,  $p < 0.001$ ,  $\Delta R^2 = 0.07$ . These results demonstrate that the first link to show mediation by intrinsic motivation was established. This regression was repeated with identified regulation, but none of the variables predicted it. Therefore, identified motivation cannot be used as a mediator. The regression was repeated once again on external regulation. Control variables accounted for 15% of the variance in intrinsic motivation. Perceived organizational support was negatively related to intrinsic motivation,  $\beta = -0.20$ ,  $p < 0.01$ , but distributive justice was not,  $\beta = 0.03$ ,  $ns$ ,  $\Delta R^2 = 0.05$ . A final regression tested the predictors on amotivation, but none of the variables were significant. These results demonstrate that the first link to show mediation by intrinsic motivation was established, but was also possible for external regulation (in the opposite direction).

*Enjoyment.* Control variables accounted for 6% of the variance in enjoyment. Perceived organizational support was positively related to enjoyment,  $\beta = 0.18$ ,  $p < 0.01$ , but distributive

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<sup>1</sup> We also conducted analyses on all outcome variables to examine interaction effects between the control and the predictor variables, and none of the interactions were significant.

justice was not,  $\beta = 0.13$ , *ns*,  $\Delta R^2 = 0.07$ . The addition of external regulation and intrinsic motivation accounted for an additional 55% of the variance in enjoyment, respectively, and was highly significant for intrinsic motivation,  $\beta = 0.76$ ,  $p < 0.001$ , but was not for external regulation,  $\beta = -0.07$ , *ns*. Perceived organizational support became a non-significant predictor,  $\beta = 0.03$ , *ns*, while distributive justice dropped to  $\beta = 0.02$ , *ns*. Thus, intrinsic motivation mediated the relation between perceived organizational support and enjoyment when using the IT (Sobel test = 2.52,  $p < 0.01$ ), which supported H3a, but not H3b.

*Acceptance of IT change.* Control variables accounted for 4% of the variance in acceptance. Perceived organizational support was positively related to acceptance,  $\beta = 0.14$ ,  $p < 0.05$ , but distributive justice was not,  $\beta = 0.06$ , *ns*,  $\Delta R^2 = 0.03$ . The addition of external regulation and intrinsic motivation accounted for an additional 38% of the variance in acceptance, respectively, and was highly significant for intrinsic motivation,  $\beta = 0.63$ ,  $p < 0.001$ , but was not for external regulation,  $\beta = -0.07$ , *ns*. Perceived organizational support became a non-significant predictor,  $\beta = 0.04$ , *ns*, while distributive justice dropped to  $\beta = -0.04$ , *ns*. Thus, intrinsic motivation mediated the relation between perceived organizational support and acceptance of the IT (Sobel test = 2.49,  $p < 0.05$ ), which supported H3a, but not H3b.

*IT usage.* Control variables accounted for 40% of the variance in usage. Neither perceived organizational support,  $\beta = 0.02$ , *ns*, nor distributive justice,  $\beta = -0.09$ , *ns*,  $\Delta R^2 = 0.01$ , were related to usage. The addition of external regulation and intrinsic motivation accounted for an additional 1% of the variance in usage, respectively, and was significant for intrinsic motivation,  $\beta = 0.11$ ,  $p < 0.05$ , but was not for external regulation,  $\beta = -0.03$ , *ns*. Thus, intrinsic motivation was related to IT usage, but not because it was related to POS or distributive justice, and H3 was not supported for this outcome variable.

### **3.5 Post-Hoc Analyses: Usage of Paper-Based Appointment Books**

The acceptance of the new IT can be explored through an additional avenue: whether people are still using paper-based appointment books in addition to the new IT, or when they stopped using them. Since none of the control variables were related to the usage of a paper-based appointment book or when employees stopped using them, we did not control for any in the following analyses. Independent samples t-tests were conducted to compare motivation means for those who were still using appointment books and those who were not. Only means on intrinsic motivation differed significantly between the two groups,  $t(306) = 2.11, p < 0.05$ , such that those who were still using appointment books reported lower intrinsic motivation ( $M = 4.07$ ) than those who were not ( $M = 4.44$ ). A binary logistic regression entering POS and distributive justice in block 1 and intrinsic motivation and external regulation in block 2. Results revealed that POS and distributive justice did not significantly improve classification of paper-based appointment book usage, but intrinsic motivation did (at 73.9%),  $\chi^2(2) = 10.91, p < 0.01, B = -0.36, p < 0.001$ . Thus, the climate variables did not influence paper-based appointment book usage, but motivation to use the IT did, such that intrinsic motivation was associated with lower usage.

#### **4. DISCUSSION**

The present study aimed to test whether the work climate is related to acceptance and usage of newly implanted information technology. Using self-determination theory, the mediational role of work motivation was examined. This study makes four contributions to current knowledge of IT acceptance and usage. First, it applies to the IS domain a sound theory of motivation that is already commonly used in other domains, including management, health, educational, sport, organizational, and social psychology (Deci & Ryan, 2008). Second, it led to the development of a scale to measure motivation to use a new IT. Third, it shows that the work

climate is related to the motivation to use a new IT, and to behavioral and attitudinal reactions to new IT. Fourth, it shows how different types of motivation lead to different experiences when using a new IT.

Specifically, results showed that perceived organizational support and distributive justice were both related to increased autonomous motivation for using a new IT. POS and justice were both related to acceptance and enjoyment of the IT, but not to IT usage. Intrinsic motivation was found to mediate the effects of POS on attitudes, such that when employees felt that their organization valued and respected them, they enjoyed using the system more, and they were more inclined to accept the new IT. Interestingly, although IT usage was positively related to enjoyment and acceptance, and was related to intrinsic motivation to use the system, POS and justice did not predict it. Therefore, the intrinsic motivation that is associated to usage may be promoted by other organizational factors that were not studied in the present study.

The extent of usage was related to intrinsic motivation and to external regulation. However, only people with high autonomous motivation and those with low external regulation used the system willingly and with enjoyment. These results concur with laboratory results showing that when people's psychological needs are satisfied, their behavior and affect are more attuned than when their needs are not supported (Deci, Eghrari, Patrick, & Leone, 1994). As past research has shown that enjoyment is related to task persistence (Sheldon & Elliot, 1999), it is likely that autonomously motivated employees are more likely to persist in using the system and perhaps use more challenging system features compared to those who are externally regulated. A longitudinal study could help test these ideas regarding the possible long term effects of autonomous motivation on IT usage. Finally, we found that users who were more intrinsically motivated were less likely to continue using a paper-based appointment book in conjunction with



the new IT. Thus, it is possible that intrinsic motivation helps people wholeheartedly accept and feel comfortable with a drastic change such as switching from paper to computer usage.

#### **4.1 Limitations**

The cross-sectional design of our study coupled with a potential for single method bias precluded causal interpretations of our results. Following Podsakoff, Mackenzie, Lee and Podsakoff (2003), we tried to limit the threat of common method bias by ensuring anonymity to the respondents, assuring them that there were “no right or wrong” answers, requesting that each question be answered as honestly as possible, and providing no incentive for participating in the study.

We must also take into account the fact that over 70% of our respondents were women, and research has shown that there may be significant gender differences in IT related perceptions, beliefs, and use; women are more affected by the perceived ease of use of the system, while men are more affected by its perceived usefulness (Venkatesh & Morris, 2000). We do not believe that these particular differences affected our results but we still suggest that future research revisit this issue with more gender-balanced samples.

Third, the new IT that was the focus of this research was a core system at the Hospital Center. As such, it affected a wide range of employees. Some were older senior employees who had never before used a computer. Prior to the use of this IT, some employees managed appointments using other systems, while others scheduled appointments using a paper-based appointment book. We noted that age, tenure, prior use of computers, and prior use of the Windows operating system were not related to employee reactions to the new IT. It is possible however, that other individual characteristics, such as computer anxiety (Beaudry & Pinsonneault, 2010; Compeau, Higgins, & Huff, 1999; McInerney, Marsh, & McInerney, 1999), may have an effect on reactions to new IT that should be explored in future studies. We must

also acknowledge that we adapted a measure IT usage to fit the IT system under study and that there could have been other ways to measure IT usage in the present study. This could possibly affect the results. Our model accounted for only 16% of the variance in IT use, while previous results in this field typically account for 25-50% of the variance in IT usage (Venkatesh et al., 2003). This difference may be due to the fact that we did not have an elaborate model, but only examined a few of the TPB and TAM variables. In the future, one should test if the addition of subjective norms as an independent variable would change the results we obtained or even interact with autonomous motivation.

Furthermore, whether IT use is mandatory or not may moderate the results we found. Brown et al. (2002) showed that TAM variables do not predict equally well for mandatory versus non-mandatory IT. Employees in the present study did not have much choice about using the IT or not, although the extent to which employees used it did vary. In a situation where employees have more choice (e.g., having a choice between using one of two email systems), we may find even stronger results for autonomous motivation. Future research should therefore test our hypotheses in contexts where IT use is voluntary. In particular, the effect of the different types of motivation could differ in a voluntary context. Indeed, previous research shows that enjoyment seems to play a larger role when use is voluntary, whereas perceived usefulness plays a larger role in when use is mandatory (Atkinson & Kydd, 1997; Childers, Carr, Peck & Carson, 2001; Moon & Kim, 2001).

Finally, some respondents indicated that it is not their hospital or organization that cared about their satisfaction at work and provided them with feedback and support; rather it is their department or supervisor, and they would have answered differently on the POS scale had they been asked about their supervisor instead of the organization. Future studies might want to

examine the role of perceived supervisor support (Eisenberger, Stinglhamber, Vandenberghe, Sucharski, & Rhoades, 2002) in addition to perceived organizational support.

#### **4.2 Implications for research and practice**

Hospital Centers, in comparison with other organizations, are under increased constraints, both financial and practical, when trying to improve their organizational work climates. For example, whereas a private organization may be at liberty to close complete departments to have all employees participate in a training program, such a course of action would not be possible at a hospital. Nevertheless, there are a number of measures that can be taken within these constraints to improve the acceptance of a new IT. One such measure might be to make training more enjoyable, perhaps by making it game-based (Venkatesh, 1999), which could help increase intrinsic motivation. Another measure would be to increase perceived organizational support and distributive justice through open communication, equitable reward distribution, and valuing of employees. This would improve attitudes toward the new IT. The organizational change and the IT literature identify management support as a key factor affecting the success of an IT change (Applebaum & Wohl, 2000; Gagné et al., 2000; Igarria & Tan, 1997).

Despite considerable organizational investments in IT, if employees are not motivated to use these systems, the return on investment will be low. The Hospital Center where we conducted this study was unlikely to reap all the expected benefits from its IT investment mainly because many employees were not autonomously motivated to use it. Reasons for not wanting to use the system can be numerous, from feeling incompetent to not wanting to change working habits. Our findings suggest that adequate training and talking positively about the virtues of an IT is not enough to ensure employees will use it. Organizations must ensure that their employees are autonomously motivated to use it. SDT suggests ways to encourage this motivation. For instance, the job characteristics model can provide some ideas on how to design systems that are

motivational (Hackman & Oldham, 1980; Morgeson & Humphrey, 2006; Moore & Benbasat, 1991). Such designs have been shown to increase autonomous work motivation (Gagné, Senécal & Koestner, 1997; Millette & Gagné, 2008) as well as adoption of innovations (Moore & Benbasat, 1991).

Second, organizations have everything to gain by paying attention to internal practices that are likely to affect employee autonomous motivation during implementation. SDT also proposes that motivational orientations are influenced by the satisfaction of three psychological needs for autonomy, competence, and relatedness, which could be studied in the IT context as further explanatory mechanisms (e.g., Deci & Ryan, 2000). Therefore, SDT has the potential to become a new framework that can enhance our understanding of how to motivate IT usage. We believe that SDT can further contribute to our knowledge of IT acceptance, for example, by studying the impact of different motives on infusion, routinization, and continued use (Burton-Jones & Straub, 2006; Chin, Gopal, Salisbury, 1997; Jaspersen, Carter, & Zmud, 2005), as they have been shown to influence persistence in other fields (Millette & Gagné, 2008; Sheldon & Elliot, 1998). This may complement TAM-derived models, which have been shown to be limited in their predictive power on these indicators of IT acceptance (Jones, Sundaram & Chin, 2002).

Through adequate training and positive feedback, we can ensure that people feel competent enough to use the IT. When the organization takes time to explain why the IT is implemented and the expected benefits for them, in addition to acknowledging reactions that employees may have toward this change (i.e., showing empathy) and making them participate in the change effort, people are more likely to feel autonomous (Deci, Eghrari, Patrick & Leone, 1994). When people get social support and are part of a team, it makes them feel related, which has also been shown to influence autonomous motivation (Richer & Vallerand, 1998). These three psychological feelings have been heavily related to the adoption of autonomous motivation

across different contexts (Deci & Ryan, 2008). Finally, the measurement tools we adapted for the present study (attitude, motivation to use an IT, and IT use) can prove useful for future research. Further research is required to check their validity in other contexts and with different IT.

## 5. CONCLUSION

The results of the present study concur with Greg and colleagues' (1992) assertion that motivation to use a system is related to IT acceptance, use, and satisfaction. We found that a positive work climate can have positive effects on attitudinal reactions to new IT through its effect on motivation, and that motivation also has effects on behavioral reactions. Self-determination theory offers a differentiated view of motivation that allows for a finer grained analysis of motivational factors influencing IT acceptance and usage compared to previous models, and provides an elaborated framework to study factors that will influence this motivation.

As the role of IT in today's organizations continues to increase in importance, organizations implementing new IT stand to benefit greatly from investigations into these critical success factors. As organizations have high expectations with regards to their IT investments, the results of our studies suggest that these expectations can be better realized when, through a supportive and equitable work environment, individual users accept the change, and fully use the system. Our results therefore concur with and expand on those of prior studies (e.g. Agarwal & Prasad, 1997; Beaudry & Pinsonneault, 2005; Lucas & Spittler, 1999), that in order for any IT to increase organizations' performance, it first has to be fully accepted and properly used by individual employees. We hope this study will trigger further research in this promising area as many important questions remain unanswered. In that sense, mandatory use of IT is not always

equal to being externally regulated. Mandatory use is indeed likely to lead to external regulation if no internalization of its value occurs, but could be regulated through identification if internalization of its value occurs. This internalization is more likely to occur if the IT is presented with good training, a good rationale for its implementation, and employee participation (e.g., Deci, Eghrari, Patrick & Leone, 1994). We thus argue that examining employees' motives for using an IT constitutes an improvement over simply categorizing the IT as voluntary or mandatory (Venkatesh et al, 2003).

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## 8. APPENDIX A: Measure of Motivation

*Why do you use the system?*

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Identification	Because it is a useful system.
External	Because I am supposed to use it.
Intrinsic	Because it is pleasant to work with this system.
Identified	Because I think that this system helps me do my work.
External	Because I am required to use it.
Amotivation	I use this system but I am not sure if it is worth it.
Intrinsic	Because this system is fun to use.
External	Because the hospital doesn't give me any choice.
Amotivation	I don't know; I don't see what the system brings me.
Intrinsic	Because I enjoy using the system.
Identified	Because I believe that this system is important to do my job.
Amotivation	I use the system, but it is not useful to me and I would not use it if I had a choice.

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## 9. APPENDIX B: Measure of IT usage

*My use of the Appointment Assistant system:* Please indicate to what extent you use the following features of the *Appointment Assistant* system using the following scale.

### *Booking Appointments*

---

I book: Appointments using the “requested delay” option.

Appointments using the “start at a given date” option.

Appointments using the “patient preferences” option, e.g. certain days , &/or times.

---

### *Searching*

---

I search for patients: By name.

By phonetic search.

By medicare number.

By birth date.

By main phone number.

---

### *Managing & generating*

---

I create new single clinic days.

I use the “edit session” function to modify the structure of individual clinic days.

I create new templates.

I modify existing templates.

I create new schedules for particular clinics.

I modify existing schedules.

I generate sessions (i.e. create a series of dates for the clinics).

---



Table 1. Means, Standard Deviations, Reliabilities and Correlation Matrix.

	<i>M</i>	<i>SD</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
1. POS	3.90	1.08	.93								
2. Distributive justice	2.66	1.01	.56***	.96							
3. Intrinsic motivation	4.34	1.39	.23**	.19**	.88						
4. Identified regulation	5.31	1.24	.18**	.13*	.69***	.83					
5. External regulation	5.27	1.55	-.26**	-.13*	-.31***	-.25***	.82				
6. Amotivation	2.78	1.50	-.18*	-.15*	-.55***	-.78***	.31***	.87			
7. Enjoyment	4.61	1.43	.22***	.18**	.80***	.70***	-.30***	-.62***	.93		
8. Acceptance of IT	5.32	1.10	.16*	.13*	.61***	.75***	-.24***	-.70***	.71***	.91	
9. IT usage	29.01	20.85	-.08	-.16**	.15*	.01	.15*	-.06	.15**	.11*	.89

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Note: POS = Perceived organizational support.

## 10. AUTHOR INFORMATION

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