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EFFECTS OF ICT CONNECTEDNESS, PERMEABILITY, FLEXIBILITY, AND NEGATIVE SPILLOVERS ON BURNOUT AND JOB AND FAMILY SATISFACTION

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Abstract: *This study investigates the effects of information and communication technologies (ICTs), permeability, flexibility, and spillovers of work into home and home into work on job burnout and job and family satisfaction. Results from a random sample of 612 office workers show that individuals who reported being satisfied with their jobs tended to feel that the Internet could help them accomplish work-related tasks, that traditional media could help them relax after work, and had a highly permeable boundary between their home domain and a highly flexible work environment. On the other hand, people who experienced low job satisfaction faced high work spillovers into home life and high burnout. The findings underscore that the connectedness of ICTs is not the main issue for assessing the consequences associated with ICTs. Rather, individual control over what passes through the boundaries shapes the consequences people experience.*

Keywords: *ICT connectedness, permeability, flexibility, negative spillovers, job burnout, job and family satisfaction.*

INTRODUCTION

Information and communication technologies (ICTs)—the combination of computer, telecommunication, and media technologies—are entrenched in our everyday lives; their convergence creates a powerful force. Research has demonstrated that ICTs can be used to bring work home and home to work. Rakow and Navarro (1993) found that mobile phones allow women to remain available to their families even as they work. Employees have used office technologies to manage personal affairs at work, such as sending personal e-mail, socializing on Facebook, surfing the Internet, completing e-banking, and playing games (Leung, 2004; Sproull, 2000). Scholars have argued that the use of ICTs increases the permeability and flexibility of work–family boundaries (e.g., Haddon & Silverstone, 2000; Lewis & Cooper, 1999; Valcour & Hunter, 2005) because the ubiquitous nature of many ICTs

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allows multiple ways of access (e.g., calling, texting, and twittering) to individuals anywhere, anytime, which makes us more "connected" than ever before.

In previous studies, researchers have argued that blurred work–family boundaries are potentially harmful for workers and families because ICTs promote overwork (Galinsky, Kim, & Bond, 2001; Leung, 2004; Weil & Rosen, 1997), continual interruptions (Ventura, 1995), accelerated family life (Daly, 1996), and possibly isolation (Kraut et al., 1998; Sproull, 2000). Conversely, others have found that ICTs help work arrangements and allow flexibility, thereby reducing tension between work and family, by providing a permeable work and family environment (Hill, Hawkins, Ferris, & Weitzman, 2001; Valcour & Hunter, 2005). Mankin, Cohen, and Bikson (1996) defined the "boundaryless organization" as an organizational form with "flat hierarchies, … flexible, reconfigurable information infrastructures made up of interconnected webs" (p. 241). They also proposed that "offices and work spaces can be characterized by where workers actually generate, process, and communicate information, whether at home or at work, rather than by the location of the building" (p. 241). In recent years, the increased instances of paid work being conducted in a home or mobile workspace rather than a central location have had a significant impact on both workers and workplaces. Technological advances in ICTs, and perhaps economic pressures, have changed the structure and culture of work: Employment such as telework affects organizations, employees, and families. In this study I intentionally avoid narrowly focusing on the teleworking and telecommuting concepts because they generally refer to work located some distance from a regular, main office site—often performed with the help of ICTs—or defined as any form of substituting ICTs for work-related travel (Nilles, 1998), and thus may or may not involve implications for the home life. Rather, my focus encompasses teleworkers, telecommuters, and all other workers who use any form of ICTs to facilitate a permeable and flexible work arrangement, both at work and at home. Thus, the goal of this research is to examine the effects of ICTs in the workplace and at home. In particular, I investigate the effects of ICTs, permeability, flexibility, and spillovers of work into home and home into work on job burnout and job and family satisfaction.

THEORETICAL FRAMEWORKS

ICT Connectedness (ICTC)

Comparable to the Internet connectedness concept proposed by Loges and Jung (2001), I conceptualize that ICT connectedness (ICTC) is a multidimensional construct that can be applied to portray the importance of ICTs in a person's everyday life, especially in influencing the work environment's permeability and flexibility both at work and at home. ICTC reflects a multilevel and contextual approach to assessing the relationship between individuals and ICTs. As Jung, Qiu, and Kim (2001) suggested, if only traditional time use measures were used to assess Internet connectedness, the construct would not capture or adequately depict the full context. Partly because of the limitation of time-based measures (e.g., hours of Internet use per day), which ignore the importance of other contexts such as goals or functions, Jung et al. (2001) developed a measure called the Internet connectedness index (ICI) based on media system dependency theory (Ball-Rokeach, 1998; Loges & Jung, 2001). The ICI encompasses a number of conventional measures, such as time and history,

yet also goes beyond to capture the Internet's scope, goal, intensity, and centrality in a person's life (Jung et al., 2001; Leung, 2010).

In line with the ICI, I propose that ICTC also comprises three dimensions: (a) scope and intensity, (b) centrality and goal, and (c) breadth of ICT use at home. The scope and intensity dimension of ICTC includes the range of on-line applications (e.g., e-mail, IM, chat, blogs, Web surfing, and on-line news) a person uses and the amount of time he/she spends on these activities to assist with office work at home. In addition to on-line technologies, uses of traditional media for working at home (i.e., whether people's jobs require them to read a newspaper, watch TV, or view TV news programs) were also included to provide a composite picture of the extent to which on-line and off-line ICTs are connected with someone's working life.

The centrality and goal dimension of ICTC refers to the subjective evaluation of how the Internet and mobile phones are impacting people's lives, and the extent to which they would miss these two technologies if they disappeared. For some, both the Internet and mobile phone are central in their work because their jobs require some level of Internet and mobile phone connectedness. Others might feel that their life would be happier than it is now without these tools because their job does not depend on them, and without them they would be unavailable and not feel obligated to their boss after work (Leung, 2004; Leung & Lee, 2005). Furthermore, to provide a full picture of the functions and dependency of some ICTs, especially the Internet, I also added the range of personal goals a person seeks to meet through the Internet connection (such as to accomplish work-related tasks, to ask other people for advice, and to provide immediate access to other people anywhere and anytime).

The breadth of ICTs in the home dimension of ICTC reflects the access to and use of other related information technologies and accessories (e.g., 3G mobile Internet access, broadband access, and other office technologies available at home, such as facsimile machines, photocopiers, and scanners). By considering this wide range of ICTs in various contexts to the three dimensions, I believe that ICTC is a well-conceived, multidimensional construct that provides a complete picture of a person's overall relationship to ICTs. With its multiple indicators, I believe that the ICTC index (ICTCI) enables a deep appreciation of the different relationships people have with ICTs that can blur the boundaries between work and family.

Permeability

Permeability refers to the extent to which a boundary allows the psychological or behavioral aspects of one domain to enter another (Ashforth, Kreiner, & Fugate, 2000; Clark, 2000; Hall & Richter, 1988; Pleck, 1977). In other words, permeability means that someone is physically located in one domain, but psychologically or behaviorally involved in another role (Ashforth et al., 2000; Pleck, 1977). Furthermore, some scholars have argued that using communication technologies increases the permeability of work–family boundaries (Haddon & Silverstone, 2000; Lewis & Cooper, 1999; Valcour & Hunter, 2005) because these technologies provide additional ways to access individuals anytime and anywhere. Valcour and Hunter also suggested that the increased permeability of the boundaries between work and nonwork domains is doubtlessly linked to ICTs because of the spatial, temporal, and psychological overlap of work and family roles. Thus, as shown in Figure 1, it is reasonable to expect that

H_1: The more people perceive their lives are connected to/through ICTs, the more they feel their work and family roles are permeable.

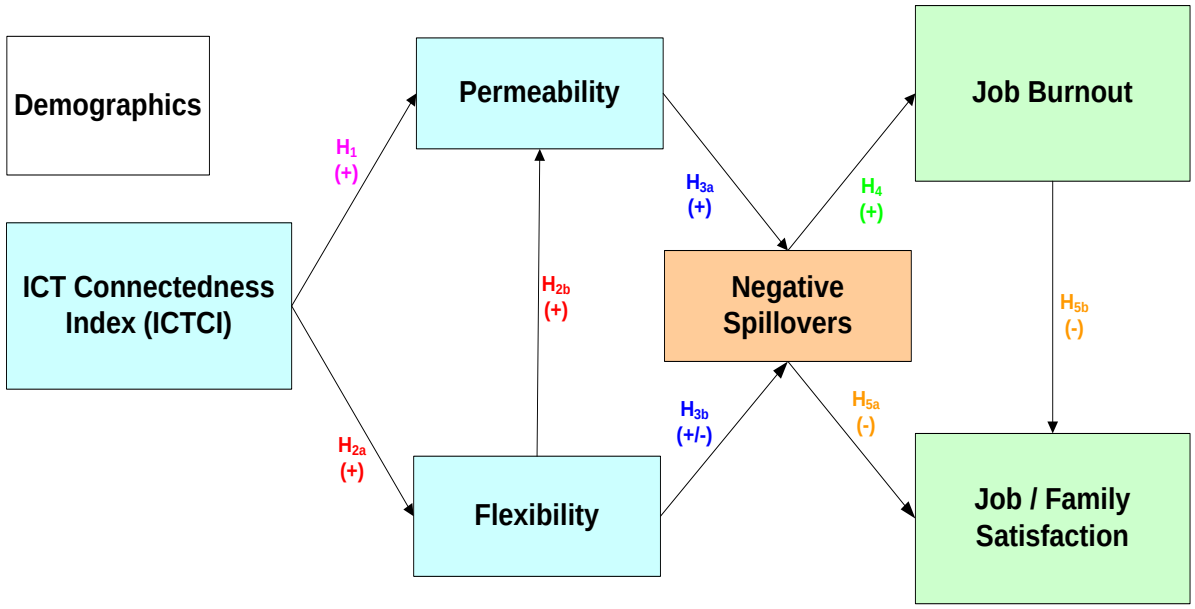

Figure 1. Effects of ICT connectedness, permeability, flexibility, and negative spillovers on job burnout and job/family satisfaction.

Flexibility

Flexibility involves the malleability of the boundary between two or more role domains, which is the ability of a role domain such as *professor* to expand or contract to accommodate the demands of another role domain such as *parent*, and vice versa (Ashforth et al., 2000; Clark, 2000; Hall & Richter, 1988; Pleck, 1977). Scholars also have argued that the use of technology has the potential to support work arrangements that enhance flexibility, thereby reducing conflicts between work and family (Hill et al., 2001; Valcour & Hunter, 2005).

Previous studies have shown that the extent of integration or segmentation in the role domains is indicated primarily by two characteristics: permeability and flexibility. Permeability at work reflects the customary situation at work that reveals how often family matters cross the boundary into the office, and vice versa; flexibility at work generally refers to a corporate culture that reflects the lack of rigidity of company policy in allowing, for example, family matters to be taken care of at work. When two or more domains are highly flexible and permeable with respect to one another, they are said to be integrated. Conversely, highly segmented roles have inflexible and impermeable boundaries (Desrochers, Hilton, & Larwood, 2005). Using a sample of IBM employees working from virtual, home-based, and traditional office settings, Hill, Ferris, and Martinson (2003) found that a technologically mobile virtual office gives people more flexibility than traditional office workers have to meet both work and family needs. Therefore, it is logical to believe that

H_{2a}: The more people perceive their lives are connected to/through ICTs, the more they will feel their jobs are flexible at work and at home.

H_{2b}: The more people feel their jobs are flexible at work and at home, the more permeable they will perceive their work and family roles to be.

Spillover Theory

Spillover theory proposes that there is a relationship between work and home environments such that work patterns and experiences in one domain are carried over into the other through a permeable boundary (Zedeck, 1992). The direction of influence generally is assumed to be from work to home, but empirical research demonstrates that spillover occurs in both directions (Frone, 2003; Roehling, Moen, & Batt, 2003). Therefore, it is possible that increased boundary permeability can let in both negative and positive behaviors and emotions (Grzywacz & Marks, 2000). Past studies have also shown that negative forms of spillover are linked to problematic outcomes. For example, negative work-to-family spillover predicts family dissatisfaction, whereas negative family-to-work spillover predicts work dissatisfaction. Negative spillover in both directions is linked to high distress (Frone, 2003). In this research, the focus is primarily on negative spillover effects.

Other research has shown interesting results with respect to permeability and flexibility. Clark (2002a) found that permeability and flexibility might have positive connotations for participants, such as openness, when applied to the work border, but negative connotations, such as defenselessness to invasion, when applied to the home border. Thus, home border permeability might be more likely to allow work to disrupt home life than work border permeability would allow home life to disrupt work. Therefore, with respect to the negative connotation, I hypothesize that

H_{3a}: The more permeable people feel the boundaries between their work and family roles are, the more negative spillovers they will experience within their home.

However, flexibility in both the work and home domains may bring more and sometimes less negative spillovers. Because no definitive conclusion can be found in previous studies, I raise the following hypothesis and ask a research question:

H_{3b}: There will be a significant relationship between flexibility and negative spillovers both into home and into work.

RQ_1: In what way(s) can demographics, dimensions of ICTC, perceived permeability, and flexibility predict negative spillovers into home and into work?

Job Burnout

During the 1970s, the concept of burnout emerged in the United States. It referred to work-related mental exhaustion (Ossebaard, 2000). In some studies, job burnout has been defined as the result of constant or repeated emotional pressure associated with intense involvement with people or work over long periods of time, and exacerbated by ICTs, which provide users the capability to multitask (Dowler, 2005; Hayes & Weathington, 2007; Lee & Akhtar, 2007; Moore, 2000; Pines, 1993). The operational definition used most widely in job burnout research is a three-component model that defines job burnout as a psychological syndrome of emotional exhaustion, cynicism, and decreased professional self-efficacy (Maslach & Jackson, 1986).

Because ICTs can both facilitate work and promote overwork, I propose,

H_4: The more negative spillover people experience, the more often they will feel job burnout.

RQ_2: To what extent can demographics, components of ICTC, perceived permeability and flexibility, and negative spillover influence job burnout?

Job and Family Satisfaction

Job satisfaction is the extent to which employees are satisfied or dissatisfied with their jobs. Accordingly, Spector (1997) suggested that job satisfaction is a general or global affective reaction that individuals have about their job. Previous studies have revealed that both family and work-related factors are associated with job satisfaction. Any conflict that arises from family and work factors leads to stress, resulting in negative consequences such as job and family dissatisfaction (Dowler, 2005; Duxbury & Higgins, 1991; Hayes & Weathington, 2007).

In a study in which the work–family border theory was tested, Clark (2002a) examined work–family conflict, satisfaction at home and at work, and functioning at home and at work. In multiple regression analyses, Clark found that the greater the home border's flexibility and the greater the work border's permeability, the greater the communication at home about work. The study also indicated that the home border's permeability reduces work–family balance because having little or no cross-border communication was associated with low work satisfaction and low adaptive functioning in both work and family domains. Furthermore, bivariate correlation analysis showed that home border permeability was associated with work–family conflict.

In a subsequent study, Clark (2002b) investigated which combination of flexibility and permeability would best help employees balance work and family. The lowest levels of work–family conflict were found in those who had high flexibility but low permeability. Findings from a study by Rau and Hyland (2002) suggest that the links among high flexibility, low permeability, and low work–family conflict might be related to employees' work–family preferences. Based on Ashforth et al.'s (2000) version of boundary theory, they posited that applicants' preferences for jobs offering flextime or telecommuting would depend on current levels of work–family conflict. Thus, this study predicts that

H_{5a}: The more negative spillover into work and into home people experience, the less satisfied they will be with their job and family.

H_{5b}: The more job burnout people experience, the less satisfied they will be with their job and family.

RQ_3: To what extent can demographics, components of ICTC, perceived permeability and flexibility, negative spillover, and job burnout influence (a) job satisfaction and (b) family satisfaction?

METHOD

Sample and Sampling

Data for this study were collected via a telephone survey[1] from a probability sample of 1,041 full-time office workers in Hong Kong whose jobs required the use of the Internet. Telephone numbers were drawn from the most recent edition of the territory telephone directory. The

Chinese-language survey instrument was pilot tested before the actual fieldwork, which was conducted December 17–27, 2007, with native Chinese speakers. I subsequently translated the texts into English for this publication. The response rate was 58.8%, with a total of 612 complete interviews. The sample consisted of 55.2% females and averaged 36.16 years of age (*SD* = 10.08). Over half of all respondents (61.3%) had a median annual household income of less than US$40,000.[2] Slightly more than half (52.6%) of the respondents were high school graduates; the rest were university graduates. In terms of occupation, 54% were managers, administrators, or professionals; 21% were in clerical positions; and 13% were in sales or services.

Measures

ICT Connectedness Index (ICTCI)

As Table 1 shows, the ICT Connectedness Index (ICTCI) used in this study is an adaptation of the nine-item index used by Jung et al. (2001) for the ICI concept. The ICTCI consists of three dimensions: scope and intensity, centrality and goals, and breadth of ICTs at home.

The *scope and intensity* dimension included the activity scope, activity intensity, and use of traditional media for working at home. The scope of activities was measured by asking respondents "Besides e-mail, do you use IM, chat rooms, blogs, Web surfing, and on-line news to do office work at home?" with 0 = *no* and 1 = *yes* on each activity. The total number of responses represents the breadth of participation, and was recoded: Choosing none of the activities was coded as 1 and choosing one or more activities was coded as 2. Activity intensity asked, "How often do you use the following ICTs (e-mails, IM, chat rooms, blogs, Web surfing, and on-line news)?" on a four-point scale with 1 = *never*, 2 = *seldom*, 3 = *sometimes*, and 4 = *often*. Data ranged from 6 to 24 points. To correct the negative skew in responses, activity intensity was recoded: Responses of 6–8 became 1, responses of 9–13 became 2, and responses of 14–24 became 3. Finally, respondents were asked, "Does your job require you to use the following traditional media at home: reading a newspaper, watching TV, and watching TV news?" with 1 = *no* and 2 = *yes* for each of the items. Data ranged from 3–6 points.

The *centrality and goal* dimension consisted of questions assessing the degree to which certain media were connected to the participants' lives, and how much they depended on these media. Regarding the centrality of two key communication technologies, respondents were asked, "Imagine that you woke up tomorrow to find that your mobile telephone had vanished. How much would you miss being able to use it?" The respondents answered on a 10-point scale, with 1 = *wouldn't miss it at all* and 10 = *miss it extremely*. The distribution of responses to this question was skewed such that the responses were collapsed into four categories, with original responses of 0–1 recoded as 1, responses of 2–5 as 2, 6–8 as 3, and 9–10 as 4. The same question was asked about the Internet, using the same 10-point scale. Again, the responses were collapsed into four categories, but with responses of 0–2 recoded as 1, 3–5 as 2, 6–8 as 3, and 9–10 as 4. Goal scope assessed six aims pursued in on-line activities by asking, "How helpful is the Internet for you in achieving the following goals: to accomplish work-related tasks, to find out what is going on in society, to express your views, to ask people for advice, to provide immediate access to others anywhere and anytime, and to carry out family responsibilities while at work?" The scale indicated 1 = *not helpful at all* to 4 = *very helpful*. Correcting for the positive skew in responses to this question, responses of 6–12 were recoded as 1, 13–18 as 2, and 19–24 as 3.

Table 1. Dimensions in the ICTC Index (ICTCI).

Theoretical Dimensions	Mean	SD	Alpha
Scope and Intensity			
1. Activity scope[a]	7.84	4.55	.78
2. Activity intensity[b]	7.78	2.90	.77
3. Use of traditional media to work at home[c]	3.96	5.13	.90
Centrality and Goal			
4. Mobile phone dependence[d]	9.55	2.18	--
5. Internet dependence[e]	8.19	2.76	--
6. Goal scope[f]	8.02	2.60	.81
Breadth of ICT at Home			
7. 3G mobile Internet access[g]	Yes=46.2%	--	--
8. Broadband access[h]	Yes=97.7%	--	--
9. Office technologies[i]	7.53	2.92	.68

Notes. This nine-item ICTCI scale has an overall mean of 7.3, *SD* = 1.29, and reliability alpha = .71; *N* = 612

[a] Besides e-mail, do you use IM, chat rooms, blogs, web surfing, and on-line news to do office work at home? 0 = *no* and 1 = *yes*.

[b] How often do you use the following ICTs (e-mail, IM, chat rooms, blogs, web surfing, and on-line news) to do office work at home? 1 = *never*, 2 = *seldom*, 3 = *sometimes*, and 4 = *often*.

[c] Does your job require you to use the following traditional media at home: reading a newspaper, watching TV, and watching TV news? 0 = *no* and 1 = *yes.*

[d] Imagine that you woke up tomorrow to find that your mobile phone had vanished. How much would you miss being able to use it? 1 = *wouldn't miss it at all* and 10 = *miss it extremely*.

[e] Imagine that you woke up tomorrow to find that the Internet had vanished. How much would you miss being able to go on-line? 1 = *wouldn't miss it at all* and 10 = *miss it extremely*.

[f] How helpful is the Internet for you for achieving the following goals (e.g., to accomplish work-related tasks, to ask people for advice, and to provide immediate access to others anywhere, anytime)? 1 = *not helpful at all* and 5 = *very helpful*.

[g] Do you own a 3G mobile phone? 0 = *no* (means 2 or 2.5G) and 1 = *yes*.

[h] Do you have broadband Internet access at home? 0 = *no* and 1 = *yes*.

[I] Do you have the following office technologies at home: facsimile machine, photocopier, and scanner? 0 = *no* and 1 = *yes*.

The final dimension of ICTCI is *breadth of ICTs at home*. Three questions were designed to assess whether the respondents had access to a mobile phone and broadband Internet access to facilitate their work at home. The first question was "Do you have Internet access via a 3G mobile phone?" with 0 = *no* (i.e., using 2 or 2.5G) and 1 = yes; and "Do you have broadband Internet access at home?" with 1 = *no* and 2 = *yes*. Finally, the respondents were asked if they had office technologies to assist their work at home: "Do you have the following office technologies at home: facsimile machine, photocopier, and scanner?" with 0 = *no* and 1 = *yes*. Data ranged from 0–3.

I followed Jung et al. (2001) by multiplying each variable in this study by a value to create a common factor of 12. For instance, activity intensity, a three-point scale, was multiplied by four, whereas broadband Internet access, a dichotomous scale, was multiplied by six. Thus, an ICTCI for each respondent was created by summing the multiple of 12 of all nine items and

taking an average, resulting in a range from 1–12. Table 1 shows the mean, standard deviation, and reliability alpha for the multiple-item measures of ICTCI.

Permeability

The permeability of the work domain to family was assessed with the following four items (α = .73) from Clark (2002a), using a four-point scale with 1 = *never* and 4 = *always*: (a) "My family contacts me while I am at work"; (b) "I have family-related items at my workplace"; (c) "I think about my family members when I am at work"; and (d) "I stop in the middle of my work to address a family concern." Similarly worded items (α = .83) measured the family domain's permeability to work, for example, "I receive work-related calls while I am at home"; and "I stop in the middle of my home activities to address a work concern."

Flexibility

Flexibility of the border around work was measured using the following three items (α = .69) adopted from Clark (2002a), also using a four-point scale with 1 = *never* and 4 = *always*: "I can arrive at and depart from work when I want"; "I can easily take a day off work when I want to"; and "My employer lets me perform nonwork projects during spare time at work." Flexibility of the border around family was measured by these similar items (α = .75): "I can arrive at and depart from home when I want"; "I can easily work an extra day when I want to"; and "My family lets me perform work projects during spare time at home."

Spillover

Two separate measures tap two distinct negative forms (or consequences) of spillovers: *work spillover into home* and *family spillover into work*. These measures are abbreviated forms of a similar three-item measure used in the National Survey of Midlife Development in the United States (Dilworth, 2004). The work spillover into home component (α = .72) measures the extent to which a person's job leaves that person feeling "too tired to do the things that need attention at home"; "You wish you had more time to do things for your family"; and "Your job keeps you away from your family too much." Meanwhile, the family spillover into work measure (α = .77) captures the extent to which "worries and problems at home cause you to spend less time at work than you need or want to"; "personal and family worries and problems distract you when you are at work"; and "activities and chores at home prevent you from getting the amount of sleep you need to do your job well."

Job burnout

The job burnout scale (α = .83) measures the extent to which "you feel physically drained when you get home from work"; "you feel emotionally drained when you get home from work"; "you feel you have to rush to get everything done each day"; and "you feel you don't have enough time for yourself." These items were measured using a four-point scale with 1 = *never* and 4 = *always*.

Job and family satisfaction

A five-item scale that measures an individual's satisfaction with his or her job was used (Smilkstein, 1978; Smilkstein, Ashwork, & Montano, 1982). Respondents were asked, on a five-point scale with 1 = *strongly disagree* and 5 = *strongly agree*, whether "they get a lot of satisfaction from carrying out their responsibilities at work"; "they find their activities at work to be personally meaningful"; "their activities at work are rewarding in and of themselves"; "they love what they do at work"; and "they frequently think of quitting their job (reverse coded)." Family satisfaction was measured by items similar to these, except the one about quitting their job. The reliability alphas of these two measures were high, at .86 and .84, respectively.

HYPOTHESES TESTING AND RESULTS

H_1 encompasses the hypothesis that the more people perceive that their lives are connected to ICTs, the more they feel that their work and family roles are permeable. The results presented in Table 2 reveal that ICTCI is positively and significantly related to permeability at work ($r = .19$, $p < .001$) and at home ($r = .43$, $p < .001$). This suggests that the use of ICTs might blur the work–family boundaries, with both positive and negative consequences for working people. Therefore, the results fully support H_1. Similarly, flexibility at work ($r = .14$, $p < .01$) and at home ($r = .17$, $p < .001$) were significantly linked to ICTCI. This demonstrates that the more workers feel that they are connected to ICTs, the fewer conflicts they feel between work and family. Thus, H_{2a} received full support. In the same way, the results in Table 2 show that relationships between permeability and flexibility at work ($r = .23$, $p < .001$) and at home ($r = .11$, $p < .01$) were significantly linked. Likewise, permeability at home was also significantly related to flexibility at work ($r = .20$, $p < .001$) and at home ($r = .28$, $p < .001$). As expected, these results also support H_{2b}. This indicates that the more flexibility workers have both at work and at home, the more permeable they will perceive the boundaries between their work and family roles.

In $H_{3a,}$ I hypothesized that the more permeable people feel the boundaries at home between their work and family roles are, the more negative spillovers they will experience into their home. The results in Table 2 support this hypothesis because permeability at work was significantly linked to negative work spillover into home ($r = .24$, $p < .001$) and negative family spillover into work ($r = .42$, $p < .001$). In the same way, permeability at home was significantly linked to negative work spillover into home ($r = .37$, $p < .001$) and negative family spillover into work ($r = .30$, $p < .001$). Therefore, H_{3a} received strong support.

Results in Table 2 also show that the relationship between flexibility at work and work spillover into home was significant but negative ($r = -.09$, $p < .05$). However, no significant relationship was found between flexibility at work and family spillover into work. On the other hand, flexibility at home was significantly and positively linked to work spillover into home ($r = .15$, $p < .001$), but was not associated with family spillover into work. This suggests that the more flexibility people have at work, the less often work will spill over into their home. In contrast, the greater the flexibility at home, the more work spills over into home. Thus, H_{3b} was partly supported.

I proposed in H_4 that the more negative spillover people experience, the more often they will feel job burnout. This hypothesis also was fully supported because the relationships between job

Table 2. Correlation of ICTCI and Other Variables.

	2	3	4	5	6	7	8	9	10
1. ICTCI	.19***	.43***	.14**	.17***	.16***	.11**	.11*	.28***	.21***
2. Permeability at work		.37***	.23***	.11**	.24***	.42***	.24***	.10*	.10*
3. Permeability at home			.20***	.28***	.37***	.30***	.34***	.19***	.09*
4. Flexibility at work				.18***	-.09*	-.06	-.11**	.27***	.09*
5, Flexibility at home					.15***	.02	.18***	.09*	.13**
6. Work spillover into home						.52***	.50***	-.14**	.01
7. Family spillover into work							.42***	-.11**	-.01
8. Job burnout								-.18***	-.02
9. Job satisfaction									.32***
10.Family satisfaction									

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; $N = 612$

burnout and negative work spillovers into home ($r = .50$, $p < .001$) and family spillover into work ($r = .42$, $p < .001$) were found to be positive and significant.

Furthermore, H_{5a} stated that the more negative spillovers (in either direction) people experienced, the less satisfied they would be with their job and family. The results in Table 2 partially support this hypothesis, in that the more dissatisfied people were with their job, the more work spillover they experienced at home ($r = -.14$, $p < .01$) and the more family spillover they experienced at work ($r = -.11$, $p < .01$). However, no significant relationship was found between family satisfaction and work spillover at home or family spillover at work. Therefore, H_{5a} was only partially supported. As expected, the data also revealed that work satisfaction was significantly and negatively linked to job burnout ($r = -.18$, $p < .001$). In contrast, family satisfaction was not. This partially supports the notion, as hypothesized in H_{5b}, that job burnout directly affects work satisfaction, but not necessarily how happy the respondents were at home.

Predicting Negative Spillovers

To capture how specific contextual factors in the multidimensional construct ICTC can explain dependent variables such as negative spillovers, job burnout, and job and family satisfaction, the nine items measured in the ICTCI were used as individual predictors in a series of regression analyses. The results in Table 3 show that work spillover into home was significantly predicted, in order of beta weight, by permeability at home ($\beta = .29$, $p < .001$), hours worked ($\beta = .23$, $p < .001$), permeability at work ($\beta = .15$, $p < .01$), family income ($\beta = -.15$, $p < .01$), flexibility at work ($\beta = -.12$, $p < .01$), and broadband access ($\beta = .10$, $p < .05$). This indicates that individuals experiencing high negative spillovers from work into home tended to have a low family income, long work hours, and broadband access at home, and feel high permeability in the boundaries between their work and family roles and low flexibility in their workplace. Similarly, the results in Table 3 also reveal that negative family spillover into work was significantly related to permeability at work ($\beta = .42$, $p < .001$) and at home ($\beta = .20$, $p < .001$), flexibility at work

Table 3. Regression Analyses of Negative Spillovers and Job Burnout.

	Negative Spillovers		Job Burnout
	Work spillover into home	Family spillover into work	
	β	β	β
Demographics			
Gender (male = 1)	-.02	.10*	-.10*
Age	-.03	-.06	-.19***
Education	.08	.02	.03
Family income	-.15**	-.11*	.01
Occupation (managerial = 1)	.05	.02	.02
Work hours	.23***	.01	.09*
ICTC			
Activity scope	.04	.02	.01
Activity intensity	.03	.04	-.07
Use of traditional media to work at home	-.00	.01	.05
Mobile phone dependency	-.04	.06	.00
Internet dependency	.03	-.08	.03
Goal scope	.02	-.14**	-.05
Mobile phone (1 = 3G; 0 = 2 or 2.5G)	-.02	.06	-.10*
Broadband Internet access	.10*	-.05	.01
Office technologies	-.02	-.02	-.04
Permeability			
At work domain	.15**	.42***	.11*
At home domain	.29***	.20***	.21***
Flexibility			
At work domain	-.12**	-.18***	-.11*
At home domain	.06	.02	.07
Negative Spillovers			
Work spillover into home	--	--	.30***
Family spillover into work	--	--	.14**
R^2	.27	.29	.42
Adjusted R^2	.23	.26	.40
F	8.03***	9.94***	14.78***

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; $N = 612$

(β = -.18, $p < .001$), goal scope (β = -.14, $p < .01$), family income (β = -.11, $p < .05$), and gender (β = .10, $p < .05$). This suggests that people suffering from high family spillover into work tended to be male, have low family income and highly permeable boundaries between their work and family roles both at work and at home, work in a rigid work environment, and feel that the Internet did not help them to accomplish work-related tasks. The results also show that individuals getting burned out in their job tended to be those with high negative spillovers from work into home (β = .30, $p < .001$) and from home into work (β = .14, $p < .01$), with high permeable role boundaries at home (β = .21, $p < .001$) and work (β = .11, $p < .05$), and with little

flexibility at work (β = -.11, $p < .05$). They tended to be young (β = -.19, $p < .001$) and female (β = .10, $p < .05$), and to have anything but a 3G mobile phone access (β = -.10, $p < .05$). This means that the more people find that their job often keeps them away from their family and leaves them feeling tired, and the more family worries and problems distract them at work, the more they will feel burnout. These equations explained 23–40% of the total variance.

Predicting Job and Family Satisfaction

Demographically, as shown in Table 4, job satisfaction was found significantly linked to age (β = .13, $p < .01$), family income (β = .13, $p < .05$), and working hours (β = -.11, $p < .05$). In terms of ICTC, the more people felt that the Internet could help them accomplish work-related tasks (β = .17, $p < .001$) and used traditional media to relax after work (β = .10, $p < .05$), the higher the job satisfaction they reported. High job satisfaction was also related to a highly permeable home boundary (β = .14, $p < .05$) and a highly flexible work environment (β = .11, $p < .05$). As expected, people experiencing low job satisfaction were facing a lot of work spillover into their home (β = -.13, $p < .05$) and a high degree of job burnout (β = -.17, $p < .01$). As for family satisfaction, goal scope (β = .22, $p < .001$) and Internet dependency (β = .15, $p < .01$) were the two most powerful predictors. This means that the more central the Internet was to their lives and the more they valued its usefulness to their work, the more satisfied they were with their family. Furthermore, people who were satisfied with their family tended to be older (β = .20, $p < .001$), with an impermeable boundary that kept work from spilling over into their home (β = -.11, $p < .05$), and high flexibility to deal with work-related tasks at home (β = .11, $p < .05$).

DISCUSSION AND CONCLUSIONS

The current study was built upon studies by Loges and Jung (2001) and Jung et al. (2001), which linked the ICI concept to the digital divide and inequality. Accordingly, I reported on the development of a modified measure called ICTC. This new measure employs a comparable taxonomy of multi-theoretical dimensions conceptualizing the importance of ICTs, especially the Internet, in a person's life in a broad context beyond traditional dichotomous adoption and time- and need-based measures. I believe that this new measure is more complete than previous measures because it includes additional indicators such as Internet access via 3G mobile phones and broadband, reflecting the increasingly ubiquitous Internet.

The results elucidate the role that ICTC can play in influencing negative spillovers, burnout, and job and family satisfaction among a sample of office workers. At the bivariate level, the evidence from this study suggests that increased ICTC is associated with increases in all other variables. In fact, I hypothesized and confirmed that ICTC is as important as other factors, such as demographics, permeability, and flexibility, in predicting the negative spillovers of work into home and home into work, job burnout, and job and family satisfaction. At the multivariate level, ICTC predictors, such as broadband and Internet-enabled mobile phone access, goal scope, use of traditional media, and Internet dependency, had significant effects on all of the dependent variables tested in the parallel regression analyses. The regression results also show that negative spillovers and burnout were especially and heavily associated with the permeability and flexibility of the work–family borders. In particular, these results indicate that high permeability at work and

Table 4. Regression Analyses of Job and Family Satisfaction.

	Job Satisfaction	Family Satisfaction
	β	β
Demographics		
Gender (male = 1)	-.04	-.02
Age	.13**	.20***
Education	-.02	-.03
Family income	.13*	-.08
Occupation (managerial = 1)	-.04	.05
Work hours	-.11*	-.04
ICTC		
Activity intensity	.05	.01
Activity scope	.01	.05
Use of traditional media to work at home	.10*	-.07
Mobile phone dependency	-.00	.02
Internet dependency	.01	.15**
Goal scope	.17***	.22***
Mobile phone (1 = 3G; 0 = 2 or 2.5G)	.03	.09
Broadband Internet access	-.01	-.06
Office technologies	.07	.06
Permeability		
At work domain	.00	.08
At home domain	.14*	-.11*
Flexibility		
At work domain	.11*	-.01
At home domain	.03	.11*
Negative Spillovers		
Work spillover into home	-.13*	.09
Family spillover into work	-.01	-.02
Job burnout	-.17**	-.04
R^2	.24	.15
Adjusted R^2	.22	.11
F	6.65***	3.10***

Note. *** $p < .001$; ** $p < .01$; * $p < .05$; $N = 612$

at home, and low flexibility at work, rather than ICTC, are much stronger influences in increasing negative spillover. The findings here underscore that ICT connectedness may not be the main issue when assessing the consequences associated with ICT use; rather, individual control over what passes through the work–home boundaries shapes the consequences people experience. Incorporating measures of individual control over how ICTs are used might be a fruitful direction for future research.

It is interesting to note that broadband Internet access predicted work spillover into homes. This suggests that people are under the impression that with broadband, they could do their work later, when they get home, because broadband at home is as efficient as the

network in their office. The results also show that ownership of a mobile phone was an important predictor of job burnout because with a mobile phone, workers are in constant touch with their family and office; this could mean that their job is no longer 9-to-5 but, instead, a 24/7 obligation to their supervisors. Furthermore, people whose Internet use is not motivated by their desire to accomplish work-related tasks, get advice, and take care of family affairs while at work, but instead is, for example, for entertainment or socialization, tend to have a lot of negative spillover from home to work. Consequently, such Internet use, compared to other uses, might diminish the Internet's power to get things done at home, just like at the office.

The data also indicate that individuals becoming burned out with their job tended to be young females with mobile phone access, a high level of negative spillovers from work into home and from home into work, highly permeable role boundaries between work and home, and little flexibility at work. This might be because female workers retain primary responsibility for household and family matters (e.g., child care and domestic duties within the home), which can lead to frustration, stress, and feelings of failure for them (Christensen, 1988; Costello, 1988).

Regression analysis identified nine predictors to explain job satisfaction. Compared to other employees, employees satisfied with their job tended to be older, have a high family income, work fewer hours, and feel that the Internet could help them accomplish work-related tasks and that traditional media could help them relax after work. More importantly, people who were satisfied with their job tended to have a highly permeable boundary at home and a highly flexible work environment. On the contrary, people experiencing low job satisfaction were facing considerable work spillover into their home and a high level of burnout. The positive result in the multivariate context between permeability at home and satisfaction at work seems to conflict with Clark's (2002a) finding that high permeability reduces satisfaction. This may be due to the fact that impermeable boundary at home may protect quality family time from being invaded by work-related matters, but having little or no cross-border communication at home will create work-family conflict and subsequently job dissatisfaction.

As for family satisfaction, the more central the Internet was to the respondents' lives and the more they valued its usefulness in their work, the more satisfied they were with their family. Furthermore, people who were satisfied with their family tended to be older, to have an impermeable boundary to prevent work from penetrating into their home, and to be highly flexible to deal with work-related tasks at home. These findings confirm the notion by Clark (2002b) that the best combination of flexibility and permeability that would lead to the lowest levels of work-family conflict is an environment that has high flexibility but low permeability. Moreover, this finding is also in line with Rau and Hyland's (2002) argument that flextime allows for a flexible but impermeable boundary, so it should be valued by those with considerable work–family conflict because flexibility helps them to cope with work–family conflict, whereas permeability aggravates conflict.

It is also worth noting that boundary permeability in the home domain predicting job satisfaction was positive, but it was negatively correlated with family satisfaction. This finding supports Clark's (2002a) study, which found that the permeability of home borders might have been more likely to allow work to disrupt home life than the permeability of work borders allowing home life to disrupt work.

The present study enlightens researchers and practitioners regarding job burnout and job dissatisfaction but, like any study, it has inherent limitations. The study utilized cross-sectional data, and therefore cannot confirm the direction of causality implied in the

regression model. Although this and prior research have supported the directions of the individual relationships posited in this study, I encourage future research using longitudinal data to test the model as a whole in cross-cultural and cross-generational settings. Because there was a small skew of the sample toward managers and administrators, future studies should include a more balanced group of workers. To further improve the multi-item ICTCI scale, future study should also include specific work related applications of social media (e.g., Facebook, blogs, Twitter, Linkedln, and Dropbox) to examine their impacts on spillovers, job burnout, and job satisfaction.

These findings have implications for practice particularly within the IT fields. The high demand for talented information workers in today's labor market makes retaining valued IT professionals a crucial concern for many organizations. Therefore, effective management that contributes to job and family satisfaction, and to retaining valued information workers, is imperative. Intervention at the managerial level should identify the best combination of permeability and flexibility, which are the root causes of negative spillovers of work into home and home into work. These spillovers will subsequently affect the causes of workers' burnout, job dissatisfaction, and even possible resignations. Interventions tailored to this group of workers should include such things as crisis intervention, stress management, family relations, and family counseling, to work effectively with these sampled office workers.

ENDNOTES

1. Computer-assisted telephone interviewing (CATI) technique was used. It was not an automated, prerecorded voice, push-button responses technology.
2. A US$40,000 annual family income is approximately HKD26,000 a month. This means that over 60% of the sample were in the upper lower class.

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