Advancement, voluntary turnover and women in IT: 
A cognitive study of work–family conflict

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Received 27 March 2005; received in revised form 27 October 2006; accepted 7 November 2006
Available online 2 January 2007

Abstract

We used quality of work life theory and the causal mapping method to evoke the concepts and linkages of women’s cognitions about work–family conflict in order to better understand the issues contributing to advancement barriers and voluntary turnover of women in IT. The major concepts (Managing Family Responsibilities, Work Stress, Work Schedule Flexibility, and Job Qualities) were found to not only impact each other but also were key factors influencing women’s advancement opportunities and voluntary turnover. Organizations may use these insights to mitigate voluntary turnover and increase workforce diversity by addressing female IT professionals’ concerns regarding work–family conflict issues.

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Keywords: Gender and information technology; Work–family conflict; Glass ceiling; Turnover; Cognition; Causal mapping

1. Introduction

Studies since the late 1970s have suggested that information technology (IT) professionals exhibit characteristics that differ from those in other professions. In a frequently cited study, Couger and Zawacki [19] surveyed more than 1600 data processing employees. Their findings indicated that these individuals showed a significantly higher need for challenging work but a significantly lower need for social interaction. More recently, Wynekoop and Walz [78] compared personality characteristics of IT professionals to population norms and found that IT professionals were more ambitious, logical, and conservative. Research has found that members of the IT workforce possess unique attitudes, interests, sense of identity, and work consciousness [57].

Furthermore, the work setting faced by IT professionals has some unique features. The IT environment is characterized by work practices that often include long hours, late nights, after-hour meetings, on-call duty, and a continual state of ‘rush’ or crisis [1]. It is characterized by rapid technological change, with new technical skills appearing and others becoming obsolete.

IT is also different from other traditionally male-dominated occupational fields like accounting and medicine where female participation is rising, whereas the number of women in the IT field is declining [5,10]. This has triggered discussions on how to retain IT employees with particular focus on how workplace
conditions may impose barriers to women’s advancement (often known as the glass ceiling) and lead them to leave their employer [42]. It is widely recognized that female participation in the computing disciplines needs to be encouraged [71] not only in terms of gender balance, but also as a means of meeting current and future demands for qualified employees.

Our study examined female IT professionals’ cognitions about balancing work and family issues within the context of advancement and voluntary turnover. By focusing on how women in the IT field balance work and family we can further assist gender sensitive research and funding organizations in their search for ways to increase diversity and retain non-traditional workers. Our study was initiated to answer two questions:

(a) How do women in IT perceive the interaction of work and family responsibilities? and
(b) If there is an interaction, how do these women see it affecting advancement and voluntary turnover?

2. Previous research

2.1. Gender in the information technology workplace

Prior research on gender in the IT workplace has centered on four themes:

(a) Gender differences in the use of technology, such as the perception and frequency of email use [26]; technology adoption and usage intentions [73]; the impact of Internet usage on the salary gap [28]; and motivation to telecommute [11].

(b) Career orientations and voluntary turnover intentions [37] and strategies employed by successful female IT professionals [58].

(c) Comparative studies that offer insights into cultural or workplace differences of status, stress, voluntary turnover intentions and salary in Australia and New Zealand [70,74], the United Kingdom [61], Singapore [69], Germany [56], and Finland [72].

(d) Workplace conditions of women in IT, including discriminatory practices that reinforce work practices and job segregation [77]. Impediments to the advancement of women and established discriminatory practices have, of course, existed in other fields and it seems that women in IT positions encounter similar barriers, obstacles to advancement, lack of quality mentoring, and lack of choice assignments. As a consequence, women tend to receive lower salaries, are seen as having less favorable promotion chances, and are filling fewer management positions [38].

Several authors (e.g., [13,32]) have focused on identifying workplace conditions that constitute organizational barriers, and may explain women’s reluctance to enter or remain in the IT workforce. Ahuja proposed a set of barriers to the advancement of women in IT including social factors (e.g., anxiety and limited self-efficacy), structural factors (e.g., occupational culture and lack of role models), and work–family conflict (which has only recently been addressed).

2.2. Quality of work life and work–family conflict

Quality of work life is defined as satisfying an employee’s needs via the resources, activities and outcomes that arise from involvement in the workplace [66], and has been found to influence intention to quit [15,43]. There are several different perspectives of quality of work life [46]. The spillover model [39] suggests that satisfaction experienced in one domain (e.g., work) may have a positive or negative effect on other domain(s) (e.g., family life) and vice versa [67]. Consistent with this model, work–family conflict is defined as an individual’s cognitions about how work and family roles exert incompatible pressures [21]. In other disciplines such conflicts have been identified as a source of stress [8,24,54] and can affect organizations in terms of the lost time, reduced productivity [41], and eventually voluntary turnover [25,63] of employees.

Researchers have also found that an individual’s quality of work life is influenced by his or her work experience and future career expectations [16,34]. Work–family conflict may also negatively affect career advancement [59,68]. In their study of female bank managers Liff and Ward [44] found that the women’s colleagues and bosses did not see senior management as an appropriate objective for them. These messages were conveyed by negative comments about women who had been promoted, and via the assumption that all women would want to have children and give them priority over work.

3. Method

3.1. Overview

In our study, we use a rich qualitative method and a cognitive perspective in measuring the concepts and linkages regarding work and family, in order to
understand how the workplace issues women perceive interact and influence voluntary turnover and perceived promotion opportunities. Causal mapping is a collection of techniques that allows a researcher to capture the cognitions of an individual [36], or group [12,22], by evoking the concepts from the participants, and the structure of the cause and effect relationships into which the participants placed them [7,53]. We used causal mapping to study the cognitive representations about women by eliciting perceptions of the issues they face and casting them into structural representations. The approach was consistent with the procedure detailed elsewhere [4,55].

3.2. Data collection

Our data source was six focus groups totaling 39 women employed in the IT field at a Fortune 500 manufacturing organization. Narratives were gathered from the respondents through open-ended focus group interviews.

3.2.1. Sample

The focal organization employs more than 120,000 people in 22 states and countries. The IT department serves 8500 people located at corporate headquarters. All participants are at corporate headquarters in the mid-south region of the United States, thus although the organization was a multinational, this was not reflected in the ethnicity of our respondents. The total number of employees in the IT department was 300, and there were 73 female IT employees. The sample consisted of 39 of these women, a 53% response rate. Our sample size while small was consistent with the sample sizes in other qualitative studies (e.g., [2,31]), and met accepted key features in qualitative research sampling criteria [20,51].

The company’s human resources director sent information about the study to all of the organization’s female IT employees. She then contacted the potential participants and assigned them to the focus groups. We admit that the grouping of the subjects might have influenced the group dynamics if informal leaders within each group had led a discussion. However, by having two researchers present in each meeting we sought to minimize this problem by drawing out quieter participants and redirecting the discussion if any one participant appeared to be taking control.

The majority of participants had only worked in IT for the focal company (49%) or for the focal company and one previous employer (31%). The “average” participant had worked in IT for 8 years, with 54% having worked in IT for 5 years or less. Various job titles were represented; the most frequently given were programmer, programmer/analyst, project leader, senior business analyst, and senior programmer analyst. See Table 1 for a complete listing of all participants’ titles. Only 15% were self-identified managers, and they supervised between 3 and 11 employees. Some of the women were single, some had grown children, some had babies or were pregnant, and some were in the middle of parenting. Thus, the data evoked in the interviews were the salient and intertwined concepts generated by a heterogeneous group of women working in the IT field.

3.2.2. Focus groups

Narratives were gathered during six 1 h long focus group meetings held in workplace conference rooms over a 2-week period with between four and eight women in each group. This arrangement allowed us to interact face-to-face with the women and elicit their views on the workplace issues they faced. The focus group format is designed to allow respondents to build on one another’s comments [76].

Our procedure consisted of open-ended questions with probes [62]. The 39 women discussed several questions of relevance to our study; for example, one

<table>
<thead>
<tr>
<th>Job title</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>1</td>
</tr>
<tr>
<td>Associate Programmer</td>
<td>1</td>
</tr>
<tr>
<td>Database Analyst</td>
<td>1</td>
</tr>
<tr>
<td>Data Entry Clerk</td>
<td>1</td>
</tr>
<tr>
<td>Enterprise Reporting Group</td>
<td>1</td>
</tr>
<tr>
<td>IS Procurement</td>
<td>1</td>
</tr>
<tr>
<td>Programmer</td>
<td>4</td>
</tr>
<tr>
<td>Programmer/Analyst</td>
<td>4</td>
</tr>
<tr>
<td>Project Coordinator</td>
<td>1</td>
</tr>
<tr>
<td>Project Leader</td>
<td>3</td>
</tr>
<tr>
<td>Repairs Field Personnel</td>
<td>1</td>
</tr>
<tr>
<td>Sales</td>
<td>1</td>
</tr>
<tr>
<td>Senior Business Analyst</td>
<td>2</td>
</tr>
<tr>
<td>Senior Programmer/Analyst</td>
<td>2</td>
</tr>
<tr>
<td>Senior Project Leader</td>
<td>1</td>
</tr>
<tr>
<td>Supervisor</td>
<td>1</td>
</tr>
<tr>
<td>Systems Administrator</td>
<td>1</td>
</tr>
<tr>
<td>Technical Writer</td>
<td>1</td>
</tr>
<tr>
<td>Undeclared</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
</tr>
</tbody>
</table>

1 We would like to thank an anonymous reviewer for this insightful comment.
question was: “What challenges do you think women in IT face that their male peers do not?” All questions put to the groups focused on work aspects; no questions asked about family or leisure activities (see Appendix A for the interview guide). The themes related to work–family conflict were generated by the respondents. Based on the answers to a question, follow up probes were asked to elicit details of the respondents’ experiences. Audiotapes made during the meetings were transcribed, resulting in between 14 and 22 pages per session.

3.3. Deriving revealed causal maps

The first task in deriving the maps was to identify the causal (cause–effect) statements from the transcripts. These statements are identified through the use of key words (such as because or so). Due to differences in the authors’ backgrounds, all four of us independently coded each interview text. Once each author coded the texts, comparisons were made for agreement and disagreement. Where disagreement occurred, the discrepancies were resolved through discussion; thus the authors’ biases were neutralized. The causal statements were then separated into cause and effect phrases which were used to construct raw causal maps.

In a separate process, the relevant concepts were identified (using the participants’ statements). One researcher read all the transcripts and inductively generated a list of preliminary coding categories, then the other authors read the material to verify their face validity and assess the parsimony and coverage of the categories. Scott’s pi [65] was calculated using 3 of the 6 transcripts and 11 of the coding categories. It estimates the reliability of the coding process; i.e., whether the reviewers agreed on the categories more often than they would if they had been randomly selecting concepts. A heuristic for content analysis is to require a reliability coefficient of 0.90 or more when using Holsti’s formula, and approximately 0.75 or more when using pi or alpha [35]. For our study, Scott’s pi ranged from 0.72 to 0.77 between the coders, indicating an acceptable level of reliability.

Congruent with studies in the management and IT literature [29,30], and to reinforce conceptual validity, the groupings were examined for theoretical and logical relevance, and placed into categories to create a coding scheme. Once the coding scheme was completed, the causal statements for each respondent were placed into the appropriate categories. Using the categories in place of the cause and effect phrases in the raw maps, the causal maps were developed. A causal map was developed for each of the six focus groups. The six maps were then aggregated by adding together the concepts and linkages of each causal map [52]. The union of all concepts and linkages from the individual maps were placed on the final aggregate map.

As the concepts emerged from the participants, the point of redundancy represented the point at which further data collection would not provide additional concepts [27]. The point of redundancy was computed by aggregating the concepts mentioned by each participant. No new concepts were elicited from the sixth focus group, so redundancy was reached by the fifth focus group interview eliciting a total of 63 concepts. This suggested that the sample of six focus groups (39 women) was sufficient to capture all of the relevant concepts in the sample.

After the maps had been developed, the next task was to analyze the maps based on past research using this method [23]. There are two aspects of analyzing a causal map: its content and structure. The content analysis consists of identifying and defining the concepts contained in the domain under study. The structural analysis consists of analyzing the linkages between the concepts. The measures used in the structural analysis are from social network analysis and include the adjacency and reachability matrices, and centrality measures. See [60] for details of the measures used.

Reachability is an indicator of the total strength of the connection between concepts. The higher the reachability, the greater the strength of the connection (direct effect) and/or the greater the number of paths that can be used to connect the concepts (indirect effects) [64]. Reachability is reported on the linkage between the nodes on the revealed causal map. The first step in calculating the reachability matrix is to develop an adjacency matrix which captures the direct relationships between two concepts. We were interested in the occurrence and strength of the relationship so the adjacency matrix we used contained values between 0 and 22 (in each cell). Centrality is a measure of the relative importance of a concept or how involved it is in the cognitive structure. It is a ratio of the sum of the linkages involving the concept divided by the total linkages in the matrix [40].

4. Results

4.1. Concepts and linkages

There were 12 major concepts that constituted the cognitive structure of the issues in the workplace. Each
Table 2
Concept level classification scheme

<table>
<thead>
<tr>
<th>Concept</th>
<th>Definition</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actions the company can take</td>
<td>Actions the company can take to solve problems, increase performance</td>
<td>Stagnant management holders are moved out; So they look for you to have physical ties, emotional ties to the area</td>
</tr>
<tr>
<td>Barriers: promotion</td>
<td>Problems being promoted or lack of opportunities for promotion</td>
<td>I don’t have a chance at promotion; Then you just can’t go any further</td>
</tr>
<tr>
<td>Company comparisons</td>
<td>References to other companies, comparison to other companies</td>
<td>At X [different company] all, not all, most of the majority of the management are women</td>
</tr>
<tr>
<td>Managing family responsibilities</td>
<td>Care for family members (children, home, spouse)</td>
<td>I do have to go get my kids; If the family is more important</td>
</tr>
<tr>
<td>Work schedule flexibility</td>
<td>Flexibility; give and take; come and go when needed; reduced work schedule</td>
<td>If you need to leave and do some personal business; I wanted to work part-time and still get some pay during that time</td>
</tr>
<tr>
<td>Job qualities</td>
<td>Qualities, skills needed for job</td>
<td>If you are willing to put hours in; If you go to night classes and learn it</td>
</tr>
<tr>
<td>Lack of control</td>
<td>This is how things are, You can’t change it</td>
<td>You can’t change it; It was out of my control</td>
</tr>
<tr>
<td>My situation is different</td>
<td>Cannot relate to what “everyone else” is experiencing</td>
<td>She was in a different circumstance; X and I have special work schedules</td>
</tr>
<tr>
<td>Reasons left: job characteristics</td>
<td>Left job because bored, stressed, project ambiguity</td>
<td>They like the challenge; They like better opportunities; I was bored silly; I was on call 24 h a day 7 days a week and got calls in the middle of the night</td>
</tr>
<tr>
<td>Result of own decision</td>
<td>People are responsible for their own decisions; women make decisions about family</td>
<td>I personally have made that decision; She just wanted a more low-keyed approach to life</td>
</tr>
<tr>
<td>Work stress</td>
<td>Challenges of stress</td>
<td>There was just so much stuff going on; Things were more competitive; Working way too many hours</td>
</tr>
<tr>
<td>Turnover</td>
<td>Turnover, leaving organization</td>
<td>Most of the women had left way before 15–20 years; I had folks that worked with me leave; I left, I just quit</td>
</tr>
</tbody>
</table>

is included in Table 2 and the overall causal map is presented in Fig. 1. The arrows indicate the causal relationships (linkages) between two concepts with the arrow initiating from the cause concept and pointing toward the effect concept.

For our study, the reachability ranged from 0 to 0.10 and a 0.05 reachability cutoff was used to improve map readability. The criterion was used to focus on the most central concepts of the work–family conflict issue. The concepts with the highest average reachability were Barriers: Promotion, Work Schedule Flexibility, Result of Own Decision, and Turnover. These are the most reachable through direct and/or indirect paths. See Fig. 1 for reachability values. For ease of understanding, we provided the same information in Table 3. Here, the cause concept is listed in the row and the effect concept in the column.

Looking at Fig. 1, the Reasons Left: Job Characteristics, Company Comparisons, and My Situation is Different concepts were the cause concepts because all arrows involving them emanated from them. The Actions the Company Can Take, Barriers: Promotion, Result of Own Decision, Lack of Control, and Turnover concepts were effect concepts because all arrows involving them pointed to them. Also advancement barriers were not a strong reason for leaving as shown by the lack of a connection between Barriers: Promotion and Turnover.

The concepts with the highest centrality were Barriers: Promotion at 1.015, Turnover at 0.940, Managing Family Responsibilities and Job Qualities both at 0.789, and Work Stress and Work Schedule Flexibility both at 0.752. The higher centrality numbers suggest that in this context these concepts played a more prominent role in workplace issues than, for example, My Situation is Different (0.301) (see Table 4).

4.2. Loops

After the maps have been constructed patterns of linkages emerge. In the systems dynamics literature, a loop is defined as a closed path of linkages between concepts that can begin and end with a concept [45,49]. The concepts within a loop directly influence each other and the direction of the relationship is indicated. A
The relationship between two concepts is said to be positive if an increase in the cause concept is accompanied by an increase in the effect concept. Conversely, a relationship is said to be negative if an increase in the cause is accompanied by a decrease in the effect. In our study, the causal statements were directionally coded (positive, negative, or neutral) independently by all four authors. Comparisons were made for agreement and disagreement, and discrepancies were resolved through discussion.

Table 3
Reachability matrix for aggregated concept level causal map

<table>
<thead>
<tr>
<th>Construct</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Actions the company can take</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>B. Barriers: promotion</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>C. Company comparisons</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>–</td>
</tr>
<tr>
<td>D. Job qualities</td>
<td>0.05</td>
<td>0.07</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.05</td>
</tr>
<tr>
<td>E. Lack of control</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>F. Managing family responsibilities</td>
<td>0.06</td>
<td>0.09</td>
<td>0.05</td>
<td>0.05</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.07</td>
</tr>
<tr>
<td>G. My situation is different</td>
<td>–</td>
<td>0.05</td>
<td>–</td>
<td>0.05</td>
<td>–</td>
<td>–</td>
<td>0.05</td>
<td>–</td>
<td>0.06</td>
<td>0.05</td>
<td>0.05</td>
<td>–</td>
</tr>
<tr>
<td>H. Reasons left: job characteristics</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>–</td>
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<td>–</td>
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<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>I. Result of own decision</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>J. Turnover</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>K. Work schedule flexibility</td>
<td>–</td>
<td>0.06</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.07</td>
<td>–</td>
<td>–</td>
<td>0.05</td>
</tr>
<tr>
<td>L. Work stress</td>
<td>0.05</td>
<td>0.08</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.05</td>
<td>–</td>
<td>–</td>
<td>0.08</td>
<td>0.08</td>
<td>0.08</td>
<td>–</td>
</tr>
</tbody>
</table>

Note: 0.05 was used as the reachability cutoff.

Fig. 1. Concept Level Causal Map. Note: Reachability values appear on the linkages as close to the arrowhead as possible.
Loops with an even number of negative relationships or no negative relationships are known as positive, deviation amplifying, reinforcing, or ‘vicious cycles’ [75]; an increase [decrease] in the value of one variable will lead to increases [decreases] in the other variables. A system that contains a vicious cycle will continue until it is destroyed or some dramatic change occurs to break the cycle. In contrast, loops with an odd number of negative relationships are known as negative, deviation dampening, deviation counteracting, or balancing cycles [48].

When analyzing the maps it was discovered that three loops resulted from the participants’ responses, all with positive components, resulting in deviation amplifying loops, or vicious cycles. These three loops together created a system. Each element in the loops was strongly linked to voluntary turnover (and promotional barriers). The loop system is represented in Fig. 2.

The first loop occurred between Managing Family Responsibilities, Work Schedule Flexibility, and Work Stress (see Fig. 3A). The Managing Family Responsibilities concept contained statements addressing children, family, being a mother and sharing responsibilities with a spouse (although this was not necessarily equal). The Managing Family Responsibilities concept was so labeled because the participants focused on how they managed their family responsibilities (not on the pressure of balancing the roles). A work–family conflict concept did not appear on the map because the number of statements that addressed work interfering with family and family interfering with work did not reach the threshold needed to appear on the map.

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![Fig. 2. Work–family conflict system causal map.](image-url)
The Work Schedule Flexibility concept contained two themes: reduced work hours (i.e., part-time work) and flexibility in time at work. Within this concept many of the respondents focused on flextime. The women did not want to work less hours, but to work when needed and also deal with family concerns as needed. The Work Stress concept contained statements about multiple responsibilities at work, competition, working long hours, deadlines, and the amount of pressure felt on the job. The second loop occurred between Managing Family Responsibilities, Job Qualities, and Work Stress (see Fig. 3B). The Job Qualities concept contained statements that addressed learning, using one’s intelligence, challenge, putting forth effort, and self-reliance. The third loop occurred between Managing Family Responsibilities, Job Qualities, Work Schedule Flexibility, and Work Stress (see Fig. 3C).

5. Discussion

Women in IT perceive the interaction of work and family as an interconnected system of loops constituted by the concepts of family (Managing Family Responsibilities), work (Job Qualities), stress (Work Stress), and time (Work Schedule Flexibility). The women appear to perceive the interaction between work and family as directly and indirectly impacting both advancement opportunities and voluntary turnover.

In the first loop we saw that strong direct and indirect linkages emerged between Managing Family Responsibilities, Work Stress, and Work Schedule Flexibility. Managing Family Responsibilities deals with issues in the women’s home life (e.g., sick children, adequate daycare, sharing responsibilities with a spouse) while Work Stress primarily dealt with issues in the workplace (e.g., meeting deadlines, working overtime). Work Schedule Flexibility was the bridge between the work and family roles and involved issues such as being able to arrange work schedules and taking time off work for personal business. Flexible work schedules have been associated with higher organizational commitment and job satisfaction for women [64], and consistent with our findings lower stress [3], and lower work–family conflict [33].

Although a flexible schedule provides many benefits, there could also be drawbacks in terms of promotion opportunities. Researchers have found that participants perceived female employees with flexible or reduced work schedules as having less job-career dedication, less advancement motivation, and higher likelihood of turnover [18]. MacDermid et al. [47] found that the women managers interviewed felt they had lost some promotion opportunities because of using a reduced work schedule. This negative repercussion of using a flexible work schedule was consistent with the findings of our study.

One avenue that may ease the stress of work–family conflict for women (flextime) may not really be an option if the woman is looking to advance within the organization. As one woman stated,
In IT everybody tends to work long hours at times, weekends, work late, but there is no policy that allows us to take time off to make up for any of that... so you almost feel should I ask for it?

These work practices are a part of the IT occupational culture that may be particularly demanding and present work related stress for women. The tension created by the need for a flexible work schedule can adversely impact a woman’s promotional opportunities and lead to voluntary turnover.

As the family responsibilities women face increase, so might the importance of the IT job qualities, as can be seen in Loops 2 and 3. Job Qualities contained statements that addressed learning, using intelligence, putting forth effort and time, and self-reliance. The IT field is project-oriented with rapid technology changes that make skills quickly obsolete, and require IT workers to frequently re-skill. A willingness to acquire diverse skills is an important success factor for a woman working in IT; e.g., the linkage we found between Job Qualities and Barriers: Promotion. Many of the Job Qualities comments dealt with actions to improve skill sets to further a career. Women face the fear of their skills becoming obsolete, causing work related stress, which interacts with the challenges of managing family responsibilities. The importance or attractiveness of IT job qualities also places an increased importance on the need for flexibility in a woman’s schedule. From the maps found in our study, there is a vicious cycle in which work stress plays a major role in the work–family conflict for women in IT.

5.1. Limitations

The comments of the women in our study were made about work in one organizational context and may not apply to others or to all women. Our goal was to gather contextualized knowledge from women in the IT department and construct a domain specific mental model. Another limitation is the female-only respondent pool, although we believed that having only women participants was not a weakness. However, we do not know that the issues are unique to women. One final limitation concerns the causal mapping method employed here. The coder may impute his or her own assumptions into the coding. As with any such project a large number of coding choices were made, and these could alter the analysis and results [14]. To reduce this potential bias, we used multiple raters (across disciplines) at every stage of the process. We believe that the method was applicable for this study and appropriately applied.

6. Implications and conclusion

Our study demonstrated the value of causal mapping in exploring cognition and provided some new insights. One insight was provided by identifying the vicious cycles women face when dealing with the tensions between family responsibilities and the unique job qualities required in an IT position. One of the unique job qualities is the need for continual learning (IT Job Qualities), which while often desired by IT professionals, can place additional stress on the individual. As seen in this study, this stress may heighten work–family conflicts experienced by women in IT. Organizations may want to look at their current training and educational programs within the context of re-tooling IT workers. Are women at a disadvantage due to work schedules or extended leave? An emphasis on flexible training options (e.g., self-paced training, online training, and paired learning) may meet the women’s re-tooling needs, improve advancement opportunities, and ultimately decrease voluntary turnover intentions.

Contrary to management literature which has found that work-role characteristics exerted a stronger influence on work–family conflict than pressures originating from the family-role (e.g. [6,9,17]), in our study the women’s causal statements indicated that family responsibilities did not cause stress; only work responsibilities did. One explanation for our finding is that for the women in this study if family responsibilities interfere with work roles, it is somewhat expected and manageable; whereas if work roles interfere with family responsibilities it is more problematic and stressful. A flexible work schedule was one option available to the women in this study to attenuate this stress. An interesting aspect mentioned by the women was the lack of consistency across the focal organization. Senior executives may want to standardize policies across the organization on various forms of flexible work schedules and publicize these policies to combat potential equity concerns. Even with an official policy regarding flexible work schedules, women in IT recognize that they must make difficult choices. Work practices, such as long hours, late nights, and on-call duty are one part of the IT occupational culture [50] that may present work related stress for women; especially if a woman has family responsibilities. Organizations might mitigate voluntary turnover intentions and increase diversity by addressing female IT professionals’ concerns regarding work–family conflict issues.
Acknowledgement

The authors would like to thank Manju Ahuja, Kay M. Nelson, and the participants of the 2004 SIGIS Cognitive Research Workshop for their helpful comments on earlier versions of this paper. The authors would also like to acknowledge the Information Technology Research Institute at the University of Arkansas for assistance in the funding of this project.

Appendix A

Focus group questions:

1. Think back to why you left other IT positions in the past and what your colleagues told you when they decided to leave an organization. What was going on in the organization you were working in that may have caused either you or your friends to decide to leave the organization?

2. Do you think women in the IT workplace face different or more barriers than men? Please explain.

3. What challenges do you think women in IT face that their male peers do not? Please explain.

4. If you were in charge, what kind of changes would you make in your organization to better retain and promote women?

5. What experiences have you had or what have you heard from others that organizations are doing that you think are especially effective in retaining female IT employees?

References


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