Empirical Study of Coping Strategies for Computer-Related Technostress of Chinese Employees*

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Abstract: Technostress is defined as “any negative impact on attitudes, thoughts, behaviors, or body psychology caused directly or indirectly by technology”. With the rapid diffusion and penetration of information and communication technology, computer-related technostress attracts more and more attention from academic and professional fields. Based on the analysis of the inhibitors of the computer-related technostress, this paper proposes a conceptual framework of the impacts of inhibitors on computer-related technostress. Then a survey was conducted, data was processed and analyzed using SPSS and LISREL. The result shows that an improved training utility in computer technology, efficient technology-end-user help-desk will help to alleviate computer-related technostress.

Key words: technostress; computer technology; coping strategy

Introduction

With the rapid development of information and communication technology (ICT), the related applications have penetrated in almost every aspects of society. According to a survey conducted in January 2005 by the China Internet Network Information Center (CNNIC), 94 million Chinese users frequently accessed the Internet, an increase of 7 millions compared with only half year ago, which corresponds to an 8% increase. The number is 151.6 times more than the first survey conducted in October 1997, i.e., 0.62 million Internet users[1]. These data indicate that the applications of ICT are rapidly developing in China.

While providing great convenience and improved communication efficiency, the applications of ICT also bring about many negative impacts on the nature of work and life for people relying on ICT. For example, many enterprise employees perceived that they could not control computer-related technologies which update frequently in routine work. They were perplexed by such complicated technologies surrounding their work and life. Whatever top-level management or general employees, they were enduring stresses from fast technology advancement. A study conducted by two psychologists, Weil and Rosen, indicated that 50% to 60% of people disclosed hesitation in adopting new technologies; 30% to 40% of people rejected new technology introduction. The study also proposed a paradox, that is, advanced modern technologies are supposed to liberate people from difficulties originally, but people always perceive them to be slaves, rather than masters, of these technologies.

Since 1980s, the field of computer-related technostress has been explored extensively. Most of the researches focused on various causes, measurements, and alleviating strategies of computer-related technostress, especially experienced by librarians. The intention of these studies is not to oppose modern technology adoption, but to find out effective ways to alleviate technostress and make technology better fit our society.

This paper focuses on the coping strategies of computer-related technostress. Based on existing
researches and related literature, we propose a framework of the impact of coping strategies on computer-related technostress and related hypotheses, which are validated by an empirical study.

1 Literature

The term “technostress” has been in use firstly since 1984, when psychologist Craig Brod published his book, Technostress: The Human Cost of the Computer Revolution. He defined technostress as “a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner. It manifests itself in two distinct and related ways: in the struggle to accept computer technology, and in the more specialized form of over-identification with computer technology.” Weil and Rosen expanded the definition of technostress to include “any negative impact on attitudes, thoughts, behaviors or psychology caused directly or indirectly by technology.” Computer-related technostress is also labeled by researchers with various terms like technophobia, cyberphobia, computerphobia, computer anxiety, computer stress, negative computer attitudes, and the like.

In summary, we define technostress as a reflection of one’s discomposure, fear, tenseness, and anxiety when one is learning and using computer technology directly or indirectly, which ultimately ends in psychological and emotional repulsion and prevents one from further learning or using computer technology.

The causes and the manifestations of computer-related technostress are multifold. For instance, Bloom states that the scarcity of computer ability and successful experience are two major reasons resulting in computer-related technostress. Computer training is often impeded by such fears as breaking the machine, looking stupid, or losing control. Doronina pointed out that computer anxiety was distinguished into separate categories; the fear of breaking the computer in some way, being perceived as ignorant or inept, anxiety of new technology and mathematics, various health threats. In addition, there are various fears concerning new and unfamiliar technologies.

The existing researches identify four components of technostress: work overload, individual life invasion, high complexity of technology, and occupational crisis. Ragu-Nathan et al. developed a questionnaire for measuring the extent of technostress perceived by people, which was adopted in this research.

There have been many existing researches on the coping strategies of technostress. Monat and Lazarus proposed several coping strategies which consist of human behavior and the degree of perception towards things. These strategies can decrease, overcome, and endure the compulsive requests. They classified the strategies into two major categories: emotion-oriented strategies and problem-oriented strategies. Problem-oriented coping refers to the improvement efforts of the troubled worker/environment relationship by changing technology. For example, by seeking information about what to do, by holding back from impulsive and premature actions, and by confronting the person or persons responsible for one’s difficulty. The typical examples of this type of coping method are training and education. Emotion-oriented coping refers to the change of thoughts and behaviors in order to relief mental stress. This type of strategy tends to alleviate technostress, that is, to improve the feelings of subjects, without the intention to change the threat and destructive situation.

Weil and Rosen developed a human-centered model to introduce new technology, which starts from human and integrates technology and machine into the work place. The model is divided into 12 independent aspects.

Although the above aspects of human-centered model are unable to resolve every problem of technostress in organization, they are helpful to reduce much technology stress in enterprises. According to literatures and relevant researches, we can summarize the coping strategies as shown in Table 1.

2 Hypothesis

The current research uses the Technostress Questionnaire developed by Ragu-Nathan et al. The questionnaire was first translated from English to Chinese by the authors of this paper. In order to ensure that the translated version of the questionnaire is adaptable to the Chinese settings and that the validity and the reliability of the original English version are still maintained, a pilot study was conducted to reassess the reliability and validity of the measures. Then, after a preliminary confirmatory factor analysis was done, we revised the questionnaire repeatedly and confirmed the final version of the questionnaire.

The first section of the questionnaire describes typical situations where the use of computer technology can potentially create technostress. According to the result of confirmatory factor analysis, we obtained four factors:
Techno-overload such as higher workload, faster work pace, or change of work habit caused by new technology;

Techno-invasion such as personal life and privacy invaded by new technology, e.g., employees spend less time with family or sacrifice holidays to learn new technology;

Techno-complexity such as the inability to learn or deal with the complexity of new technology;

Techno-insecurity such as technology inducing job insecurity, e.g., fears of being replaced by more skilled people and the constant push to update technical skills.

The third section of the questionnaire describes typical ways in which the use of technology is facilitated in an organization. An exploration factor analysis was conducted and three factors emerged.

The conditions of training and learning For example, organization provides better end-user training before the introduction of new technology. (Question item X203, corresponds to the first strategy shown in Table 1, which belongs to problem-oriented strategy.)

Employees’ participation Enterprise encourages employees to participate in the introduction of new technology. For example, end-users are consulted before introduction of new technology. (Question item X212, corresponds to the 11th strategy shown in Table 1, which belongs to emotion-oriented strategy.)

Computer-related technology has become an indispensable part of modern enterprise. Enterprise cannot retreat from technology, what is more, new advanced technologies appear everyday. However, technostress in work place will inevitably impact organization’s efficiency. For example, an organization which cannot cope with computer-related technostress properly may be puzzled by higher rate of absence and separation. Craig Brod has ever warned that the ways of technology introduction of most enterprises actually “make for the generation of technostress.” Consequently, the most important problem is how to avoid and reduce computer-related technostress in the process of new technology introduction. If an enterprise took appropriate plans and acceptable methods, technology could realize its potential, making the enterprise more mighty and successful. At the same time, the important resource of
enterprise, and the mental and emotional health of employees, is protected. This paper intends to answer the following two questions: First, are the impacts of these coping strategies on different technostress factors effective? Second, does certain correlation exist among technostress creators? Based on the coping strategies of previous studies, we propose a conceptual model and hypotheses about the impact of coping strategies on computer-related technostress, trying to explore and answer the two questions.

Training helps relieve technostress by reducing anxiety. For example, a mandatory 12-h course (automation skills training, AST) designed to show new employees how to use technology and how important technology is to both libraries and users. The assessment of the series has been overwhelmingly positive\(^9\). The training of job skill can improve employees’ capability and self-confidence\(^10\). Reducing anxiety and improving self-confidence could make employees feel better in their job. Therefore, we propose the following hypothesis.

- **Hypothesis H\(_1\)**: the good conditions of training and learning new technology that the enterprise provides for employees will reduce their work load.
- **Hypothesis H\(_2\)**: the good conditions of training and learning new technology that the enterprise provides for employees can reduce the complexity of new technology perceived by employees.

Workplace support has been discussed to reduce job stressors and burnout through several mechanisms\(^11\). Supportive communication (particularly informational support) can serve to reduce uncertainty\(^12\) and hence reduce role ambiguity. When enterprises introduce new technology, technology support center could exert the same function which is helpful to settle the problem of new technology and enhance employees’ confidence. This leads to the following hypothesis.

- **Hypothesis H\(_3\)**: technology support center can decrease employees’ work load.
- **Hypothesis H\(_4\)**: technology support center will reduce the complexity of new technology perceived by employees.
- **Hypothesis H\(_5\)**: technology support center will decrease the insecurity of new technology perceived by employees.

Previous studies argued about the relationship between participative management and stress. Jackson\(^13\) found that participation had a negative effect on perceived job stress. A solution which has become increasingly popular for dealing with resistance to change is to get the people involved in “participation” while making the change\(^14\). As mentioned above, enterprises should consider the suggestion of employees in the process of technology selection and design. Participative management belongs to emotion-oriented coping. This strategy makes employees feel respected. Hence, the feeling of insecurity will be relieved. Therefore, we provide the following hypothesis.

- **Hypothesis H\(_6\)**: employees’ participation before introduction of new technology will reduce the complexity of new technology perceived by employees.
- **Hypothesis H\(_7\)**: employees’ participation before introduction of new technology will reduce the insecurity of new technology perceived by employees.

From the above analysis, we propose a conceptual framework and related hypotheses about the impact of coping strategies on computer-related technostress as shown in Fig. 1.

![Fig. 1 Impact of coping strategy on computer-related technostress](image-url)
3 Research Method

We distributed the questionnaires to countrywide corporation managers by e-mail or postal service, after previous contact and communication, and the completed surveys were returned in a month. The survey was distributed to a random sample of 1462 employees in 86 Chinese companies in Xi’an, Shenzhen, Chengdu, Taiyuan, Beijing, Shijiazhuang, and Shanghai. A total of 1029 usable questionnaires were completed with a 70.38% response rate. We checked these returned questionnaires, dismissed the invalid ones and obtained 951 valid questionnaires which were used to do the following analysis.

The questionnaire was divided into ten sections. From section 1 to section 9, a 5-point type scale (Likert-type scale) was used, with 1 indicating strongly disagree and 5 indicating strongly agree. Respondents were asked to circle the appropriate number to indicate the extent to which he/she agreed or disagreed with each statement. We also included perceptive questions about levels of individual productivity and various demographic variables in section 10.

Among the respondents, 34.3% are female, 58.5% are male and 2.3% did not report; 35.8% are younger than 26, 46% are from 26 to 35, 11.5% are over 36, and 1.8% did not report; 28.5% are junior college, 47.9% are bachelor, 13.7% are master, and 3.6% are did not report.

Then the confirmatory factor analysis was conducted with varimax by principal components. The factor analysis and reliability scores are shown in Table 2 and Table 3, respectively.

In most instances, researchers tend to use a cutoff of 0.3 or 0.4 for what they consider meaningful loading[15]. All factor loadings in our paper are higher than 0.4. The reliability scores mostly meet or exceed the minimum 0.7 criteria[16].

<table>
<thead>
<tr>
<th>Factors</th>
<th>Items</th>
<th>Description</th>
<th>Loading</th>
<th>α</th>
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</thead>
<tbody>
<tr>
<td>F11: Techno-overload</td>
<td>X101 I am forced by this technology to work much faster.</td>
<td>0.765</td>
<td></td>
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<tr>
<td></td>
<td>X102 I am forced by this technology to do more work than I can handle.</td>
<td>0.652</td>
<td>0.6298</td>
<td></td>
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<tr>
<td></td>
<td>X103 I am forced by this technology to work with very tight time schedules.</td>
<td>0.711</td>
<td></td>
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<tr>
<td>F12: Techno-invasion</td>
<td>X104 I am forced to change my work habits to adapt to new technologies.</td>
<td>0.461</td>
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<td></td>
<td>X105 I have a higher workload because of increased technology complexity.</td>
<td>0.536</td>
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<td></td>
<td>X106 I have to spend a lot of time everyday reading an overwhelming amount of e-mail messages.</td>
<td>0.600</td>
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<td>X107 I have to work harder because of delays from hardware, software, and network problems.</td>
<td>0.646 0.7978</td>
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<td>X108 I spend less time with my family due to this technology.</td>
<td>0.700</td>
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<td></td>
<td>X109 I have to be in touch with my work even during my vacation due to the technology.</td>
<td>0.724</td>
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<td></td>
<td>X110 I have to sacrifice my vacation and weekend time to keep current on new technologies.</td>
<td>0.574</td>
<td></td>
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<td></td>
<td>X111 I feel that my personal life has been invaded by this technology.</td>
<td>0.600</td>
<td></td>
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<td>F13: Techno-complexity</td>
<td>X112 I do not know enough about this technology to handle my job satisfactorily.</td>
<td>0.675</td>
<td></td>
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<td></td>
<td>X113 I need a long time to understand and use new technologies.</td>
<td>0.614</td>
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<td></td>
<td>X114 I do not find enough time to study and upgrade my technology skills.</td>
<td>0.623</td>
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<td>X115 I find new recruits to this organization know more about computer technology than I do.</td>
<td>0.603 0.7677</td>
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<td>X116 I often find it too complex for me to understand and use new technologies.</td>
<td>0.663</td>
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<td>X117 I feel constant threat to my job security due to new technologies.</td>
<td>0.549</td>
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<td></td>
<td>X119 I am threatened by co-workers with newer technology skills.</td>
<td>0.482</td>
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<tr>
<td>F14: Techno-insecurity</td>
<td>X120 I do not share my knowledge with my co-workers for fear of being replaced.</td>
<td>0.851 0.7924</td>
<td></td>
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<tr>
<td></td>
<td>X121 I feel there is less sharing of knowledge among co-workers for fearing of being replaced.</td>
<td>0.813</td>
<td></td>
<td></td>
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</tbody>
</table>

Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser normalization.
Reliability analysis method: Alpha.
### Table 3 Factor analysis and reliability score of coping strategies

<table>
<thead>
<tr>
<th>Factors</th>
<th>Items</th>
<th>Description</th>
<th>Loading α</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>F21: The condition of training and learning</td>
<td>X203 Our organization provides good end-user training before the introduction of new technology.</td>
<td></td>
<td>0.829</td>
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<td></td>
<td>X204 Our organization fosters a good relationship between IT department and end-users.</td>
<td></td>
<td>0.732</td>
<td>0.7430</td>
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<tr>
<td></td>
<td>X205 Our organization provides clear documentation to end users on using new technologies.</td>
<td></td>
<td>0.685</td>
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<td>F22: Technology support center</td>
<td>X206 Our end-user help-desk does a good job of answering questions regarding technology.</td>
<td></td>
<td>0.752</td>
<td></td>
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<tr>
<td></td>
<td>X207 Our end-user help-desk is well staffed by knowledgeable individuals.</td>
<td></td>
<td>0.732</td>
<td>0.7910</td>
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<tr>
<td></td>
<td>X208 Our end-user help-desk is easily accessible.</td>
<td></td>
<td>0.762</td>
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<tr>
<td></td>
<td>X209 Our end-user help-desk is responsive to end-user requests.</td>
<td></td>
<td>0.734</td>
<td></td>
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<tr>
<td>F23: Employees’ participation</td>
<td>X211 Our end users are rewarded for using new technologies.</td>
<td></td>
<td>0.759</td>
<td></td>
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<tr>
<td></td>
<td>X212 Our end-users are consulted before introduction of new technology.</td>
<td></td>
<td>0.807</td>
<td>0.7433</td>
</tr>
<tr>
<td></td>
<td>X213 Our end-users are involved in technology change and/or implementation.</td>
<td></td>
<td>0.752</td>
<td></td>
</tr>
</tbody>
</table>

Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser normalization.
Reliability analysis method: Alpha.

## 4 Results and Analysis

Structural equation modeling (SEM), which is the compound of path analysis and factor analysis, has more outstanding advantages than traditional regression analysis. It can deal with multi-independents and allow of latent variables composed of several exogenous and estimate the fit statistics of the overall model \(^{17}\).

Therefore, the research uses LISREL8.2 as the statistical tool, which is a software for structural equation modeling. The result of overall model fitness supports the conceptual model, with a goodness of fit index (GFI) of 0.91; an adjusted goodness of fit index (AGFI) of 0.88; a root mean square error of approximation (RMSEA) of 0.061; a chi-square of 1263 (\( \chi^2/df = 4.51 \)); a comparative fit index (CFI) of 0.85; a normed incremental fit index (NFI) of 0.82. The path coefficient of the SEM model is shown Fig. 2.

![Fig. 2 Path coefficient of SEM](image)

The path coefficient \( \gamma \) is a basic validate which displays the correlation between different latent variables.

Hypothesis \( H_1 \) predicts that the good conditions of training and learning new technology enterprise provide for employees will reduce their workload. However, contrary to the prediction, the relationship between the good condition of training and learning new technology and employees’ work load was significantly positive (\( \gamma = 0.11 \)). Hypothesis \( H_2 \), which predicts that the good conditions of training and learning new technology enterprise provides for employees can reduce the
complexity of new technology perceived by them, was partially supported. The good conditions of training and learning new technology are negatively correlated to the extent of invading individual life and privacy. But it is not significant.

Hypothesis H1, which states that technology support center can decrease employees’ workload, was not supported from the result of path analysis. Hypothesis H2 predicts that technology support center will reduce the complexity of new technology perceived by them. According to the path coefficient, enterprise build technology support center is significantly negative to the complexity of new technology. So, it was strongly supported. Hypothesis H3, which states that technology support center will decrease the insecurity of new technology perceived by them, was also strongly supported.

Hypothesis H4, which states that employees’ participation in the process of the introduction of new technology will reduce the complexity of new technology perceived by them, was not supported. Hypothesis H5, which states that employees’ participation in the process of the introduction of new technology will reduce the insecurity of new technology perceived by them, was also not supported.

This research also tested the relationship between the technostress creators. We can see from Fig. 1, the impact of techno-complexity on techno-overloading, techno-invasion, and techno-insecurity (β) is 0.27, 0.32, and 0.30, respectively. The impact of techno-overloading on techno-invasion (β) is 0.42. Therefore, we can conclude that techno-overload could increase techno-invasion; the techno-complexity could increase techno-invasion; the techno-complexity could increase techno-insecurity; the techno-complexity could increase techno-overload.

The reason why Hypothesis H1 was not supported can be explained as follows. Employees always need to take much more time to learn new technology. However, their routine work and task did not decrease at all. So, during a short period, training and learning activities may increase employees’ work load and perceived stress. From the long run, the good conditions of training and learning new technology make employees learn new technology easily and more efficiently. In the current research, Hypothesis H1, was supported which states that the complexity of new technology will increase employees’ work load. Therefore, the good conditions of training and learning new technology enterprise provides for employees are not helpless for decreasing their work load. We can conclude that the good conditions of training and learning new technology that the enterprise provides for employees cannot reduce their work load directly. But it can indirectly reduce their work load by decreasing the complexity of new technology. Thus, it can relieve employees’ computer-related technostress.

The reason why Hypothesis H3 has not been supported can be explained as follows. The relationship between technology support center and employees’ work load is positive. When computer system in work place encounters troubles, the busy employees such as tellers of a bank office may have a rest for a while. If technology support center resolves the problem in a few minutes, employees have to resume their routine work. So, they may perceive an increase of work load from the psychological perspective. However, technology support center which is efficient and professional can help employees to learn new technology and resolve problems in time. Thus, the routine works become much easier. Employees also perceive a decrease of work load from the long-run. Therefore, technology support center may indirectly reduce employees’ work loading and alleviate their computer-related technostress.

We can also provide an explanation for the rejection of Hypothesis H4 and Hypothesis H1. Coch and French conducted a systematic research on the phenomenon that people resist to change[18]. They found that introducing a participation mechanism could notably decrease people’s resistance to change. However, contrary to the research, participation mechanism does not depress the complexity and insecurity of new technology perceived by the employees. It could be resulted from the reluctance of employees to be involved in the introduction of new technology but were forced to do so. Locke and Schweiger identified an additional dimension of participative management, which varies from forced participation to voluntary participation[19]. The distinction between forced and voluntary participation is important for understanding the affective context in which participation occurs. The attitudes of both management and non-management personnel may be more antagonistic than when participation in decision making is practiced voluntarily. Consequently, in order to alleviate computer-related technostress in the process of introduction, it should be recommended that voluntary participation is more productive.

5 Conclusions

Based on the summaries of the typical situations of
potential technostress and all kinds of coping strategies, the paper proposed a framework of the impact of coping strategies on computer-related technostress among Chinese employees and tested 11 hypotheses by SEM. We reached three main conclusions from the study. First, the good conditions of training and learning enterprises provide for employees can decrease the complexity of new technology, and alleviate computer-related technostress. Secondly, technology support center can decrease the complexity of new technology, and alleviate computer-related technostress. Thirdly, technology support center can decrease the insecurity of new technology, and alleviate computer-related technostress.

This paper contributes to the field of technostress by providing a conceptual framework of the relationship of technostress and stressors and a refined instrument of computer-related technostress. The paper also provides several validated coping strategies of computer-related technostress to professionals. By using the coping strategies efficiently, it is hopeful that the adoption of computer-related applications will be more productive, and employees’ job efficiency will be increased and enterprise’ competition advantages be enhanced.

One limitation of our study is that the scope of sample, which may lead to excessive convergence in zones and demographic variables. The second limitation is that we did not consider the impact of gender, age, and education level, which may moderate the findings of the paper. For example, the receptivity of new technology among employees with different education levels varies. So, they may have different perceptions under completely similar environment. Finally, an important limitation is that this study has not separated computer-related technostress from job stress effectively.

Research about computer-related technostress in Chinese enterprises is a new and growing field. Further researches on the differences of computer-related technostress are called for, such as the differences across industries, organizations, and individuals.

References


