Technostress: a research about computer self-efficacy, internet attitude and computer anxiety

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Abstract: The research gathered 77 teachers’ responses about their own perceived computer-expertise, computer self-efficacy, Internet attitude and computer-anxiety. A multiple regression analysis showed that low computer self-efficacy predicts anxiety toward computers, whereas this is not the case of low computer-expertise or low Internet attitude. Hence, psychological treatments should aid computer-anxious people to modify their negative perceptions toward computers and to discover the profitable potentialities of technologies, more than increasing their effective computer expertise or feelings toward the Internet.

Key words: Technostress, Computer self-efficacy, Computer anxiety

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Introduction

The present paper focused on technostress, which is an emergent psychological disorder experienced by individuals when they interact with technologies (Brod, 1984). Specifically, techno-stressed people affirm to have negative attitudes, thoughts and feelings toward technologies and present also physical and psychological symptoms when they manage directly or indirectly hi-tech products (Weil & Rosen, 1995). Basically, researchers have refereed to technostress using labels such as computer-anxiety or computer-phobia, which stress peculiar forms of technostress related to being uncomfortable with computers usage (Weil & Rosen, 1995). However, meta-analysis on this topic – e.g., technostress – has suggested that all the previous terms rely on the same significance (Chua, Chen, & Wong, 1999). As follows, in the present paper we will use the terms computer-anxiety and technostress as synonyms.

In general, computer-anxiety represents a sort of aversion, fear, apprehension, hostility or resistance toward computers (Anderson, 1996; Gackenbach, 1998; Glass & Knight, 1988; Jay, 1981; Lee, 1986; Meier, 1985; Maurer & Simonson, 1984; Rosen & Maguire, 1990). More appropriately, computer-anxiety have been recently described as a negative emotional state that a person experienced when he/she is using a computer (Bozionelos, 2001; Simonson, Maurer, Montag-Torardi, & Whitaker, 1987). Hence, it represents more a state than a trait anxiety (Cambre & Cook, 1987; Chua et al, 1999), which is characterized by the following behavioral and cognitive symptoms: 1) excessive caution with computers; 2) avoidance of computers; 3) negative remarks about computers; 4) attempts to cut short the necessary use of computers (Mahar, Henderson, & Deane, 1997). Sometimes, typical stress physiological reactions (e.g., sweaty palms, dizziness, shortness of breath) could be also associated with computer-anxiety (Hemby, 1998; Lalomia & Sidowski, 1993; Weil, Rosen & Wulgater, 1990). All the above-mentioned behavioral, cognitive and physiological responses arise not only when the subject interacts with computers but also when he/she thinks a future use of it or he/she looks at others manage a computer (Dyck, Gee & Smither, 1998; Rosen & Weil, 1995). Factorial studies have evidenced that computer-anxiety is a multi-componential dimension (Lloyd & Gressard 1984; Beckers, & Schmidt, 2001). Recently Beckers and Schmidt (2001) have proposed a factorial model based on the following six factors: computer literacy (or computer-expertise), computer self-efficacy,
physical arousal caused by computers, affective feelings about computers, and beliefs both about the beneficial effects of computers and about their dehumanizing aspects. Authors assigned an important role both to computer-expertise and to computer-self-efficacy. Specifically, they argued that computer-anxiety depend basically by these two psychological dimensions that mutually influence both the physical arousal and the positive or negative beliefs about computers (Beckers & Schmidt, 2001; Rosen & Weil, 1995). Similar outcomes have been showed also by correlation studies that reported negative associations of computer anxiety among with computer-expertise, defined as the ability in using a computer or program software such as word-processing, programming languages or operative systems (Gos, 1996; Mahar et al., 1997; Brosnan, 1998; Chua et al., 1999; Bonzielos, 2001) and with computer self-efficacy, described as the individual perceptions about their own ability in using a computer or in performing a task using specific software (Hill, Smith & Mann, 1987; Compeau & Higgins, 1995; Wilfong, 2006). Even though a significant body of research about computer-anxiety exists, the results of most studies are inconsistent as regard the causal interrelationships between the psychological variables that influenced computer-anxiety (Maurer, 1994). Indeed, computer anxiety has been described both as an antecedent of negative attitudes toward technologies or of low computer-self-efficacy levels (Thatcher & Perrewé, 2002), and as a consequence of low computer-self-efficacy levels (Marakas, Johnson, & Palmer, 2000), or of demographical variables such as gender and age (Hemby, 1998; Cooper, 2006), or of personality factors (Brown, Deng, Poole, & Forducy, 2005). Other researches have showed correlations also between computer-anxiety and Internet attitude, which represents the positive/negative attitude toward the Internet. Specifically, people with positive attitudes toward the Internet are also less anxious toward computers (Al-Khaldi & Al-Jabri, 1998; Anderson, 1996; Ayersman, 1996; Harrison & Rainer, 1992; Kay, 1998; Mitra, 1998; Pancer, George, & Gebotys, 1992; Sam, Othman, e Nordin, 2005). But also in this case, no results are reported by the literature about the causal relationships between computer-anxiety and positive or negative Internet attitudes.

Moreover, such controversial panorama about cognitive precursors of computer-anxiety is problematic also because the authors involved populations with different genders and ages in the above-mentioned empirical researches. Then, some authors suggested that adults rather than young people have a lower level of computer self-efficacy (Baack, Brown and Brown, 1991); on the contrary, other researchers showed that younger people rather than adults have a lower level of computer self-efficacy and of computer-anxiety (Klein, Knupfer, and Crooks, 1993). Similarly, studies made on educational contexts, on one hand have demonstrated that students requested to solve computer-mediated tasks reported very high level of anxiety toward computers (Marcoulides, 1988; Harrington, McElroy, & Morrow, 1987; Wirier & Bellando, 1989). On the other hand, researchers have shown that teachers are more anxious than students because they were usually asked to solve technical difficulties related to computer-mediated tasks (McKinnon & Nolan, 1989).

Starting from this divisive state of art, the purpose of this study was to analyze the causal relationships of computer-anxiety among with computer-expertise, computer self-efficacy and Internet attitude in a population of Italian teachers. We started from the assumption that computer-anxiety is a kind of state anxiety, which is influenced more by cognitive variables as negative self-efficacy believes or Internet attitude than by low computer-expertise. Then we would test the hypothesis that low levels of computer self-efficacy and Internet attitude would predict high levels of computer-anxiety. We were interested in exploring cognitive precursors of computer-anxiety in order both to perform useful training programs for teachers involved in computer-mediated projects and to design adequate psychological treatments for prevent the emergence of computer-anxiety.

Methods

Participants
77 teachers (29M; 48F), aged between 28 and 61 years old (mean age 43yr; SD= 9), were casually selected by different primary schools of Palermo. All they volunteered to participate to the research.

Materials and procedures
After registering personal data (e.g., gender, age, instruction, occupation), participants filled the following self-report questionnaires:
- Computer-Expertise Questionnaire developed by Chifari, Ottaviano, D’Amico and Cardaci (2000) – it is an 11-item scale that measures the individuals’ technological expertise toward computers and the Internet. Subjects were required to indicate their level of know-how toward computers, the number of software they known, the owning of a personal computer and its usage at home, at work, at school/university, the familiarity with the Internet, the Internet time usage per day. The total score was computed by averaging the scores obtained by the subjects in the scale: higher scores denoted, then, higher levels of computer-expertise.

- Computer Self-efficacy Scale, as re-arranged by Chifari, Ottaviano, D’Amico and Cardaci (2000) from the original Eachus and Cassidy Scale (1997) – it is a 30-item scale that explores the individuals’ perception of self-efficacy toward computers. Subjects were required to indicate their level of agreement/disagreement to each statement along a 6-point Likert scale (from 0=not agree to 6=agree). The total score was computed by averaging the scores obtained by the subjects in each of the items of the scale: higher scores revealed, then, higher levels of computer-self-efficacy.

- Internet Attitude Scale, developed by Sam, Othman and Nordin (2005) – it is a 28-item scale that measures the positive and negative attitudes toward the Internet. Subjects were required to indicate their level of agreement/disagreement to each statement along a 6-point Likert scale (from 0=not agree to 6=agree). The total score was computed by averaging the scores obtained by the subjects in each of the items of the scale: higher scores signified, then, positive attitudes toward the Internet.

- Computer Anxiety Rating Scale, developed by Weil and Rosen (1995) – it is a 19-item scale that investigates the perceptions of stressors associated with computer usage. Subjects were required to indicate their level of agreement/disagreement to each statement along a 6-point Likert scale (from 0=not agree to 6=agree). The total score was computed by averaging the scores obtained by the subjects in each of the items of the scale: higher scores expressed, then, higher levels of computer-anxiety.

Participants spent in average from 15 to 20 minutes at filling all questionnaires. Data were collected in fall 2008.

**Statistical analysis**

All data were analyzed using SPSS 8.0 (SPSS Inc., Chicago IL). Descriptive statistics were computed to describe demographic characteristics of participants. To examine the contribution of computer-expertise, computer self-efficacy and Internet attitude to the explanation of variance in computer-anxiety a multiple regression analysis, using the enter method, was performed on participants’ averaged scores.

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<th>Mean</th>
<th>SD</th>
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<tr>
<td>Computer Expertise Questionnaire</td>
<td>2.5</td>
<td>0.7</td>
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<tr>
<td>Computer Self-efficacy Scale</td>
<td>4.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Internet Attitude Scale</td>
<td>3.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Computer Anxiety Rating Scale</td>
<td>2.4</td>
<td>0.6</td>
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As reported previously (Table 1 above), participants scored lower on Computer-Expertise and Computer-Anxiety and scored higher on Computer Self-Efficacy and Internet Attitude. Hence, Italian teachers exhibit moderate levels of computer-expertise, but perceive themselves as highly efficient in computer usage. Moreover, they reveal positive attitudes toward the Internet and low levels of computer-anxiety.

In order to investigate the contribution of computer-expertise, computer self-efficacy and Internet attitudes to the explanation of variance in computer-anxiety, Gauss-Markov assumptions were preliminary verified and correlations among all questionnaires were calculated. Table 2 reported correlations among all questionnaires (Pearson’s r).
Table 2 - Pearson’s Correlations between Computer-Expertise, Computer-Self-Efficacy, Internet Attitudes and Computer-Anxiety Questionnaires (N=77)

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<tr>
<td>Computer- Expertise (1)</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Computer Self-efficacy (2)</td>
<td>.453</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet Attitude (3)</td>
<td>.408</td>
<td>.360</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Computer Anxiety (4)</td>
<td>-.525</td>
<td>-.641</td>
<td>-.554</td>
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Note: * Correlation is significant at the 0.01 level (2-tailed).

As can be seen from the Table 2 (above) results showed positive correlations between Computer-expertise/Computer self-efficacy (r=.45; p<.01) and Computer-expertise/Internet Attitude (r=.40; p<.01). Similarly, a positive correlation of .36 (p<.01) has emerged between Computer self-efficacy/Internet Attitude. On the contrary, negative correlations have emerged between Computer anxiety/Computer-expertise (r=-.52; p<.01), Computer anxiety/Computer self-efficacy (r=-.64; p<.01) and Computer anxiety/Internet Attitude (r=-.55; p<.01).

Successively, a multiple regression analysis using the enter method was performed on the participants’ average scores. In turn, the R^2 value for the whole model was determined during the analysis. Results at the multiple regression analysis (see Table 3) showed that the three predictors (i.e., computer-expertise, computer self-efficacy and Internet Attitude) explain approximately 69% (R^2=0.69) of computer-anxiety. The model was significant at level 1% - F (3, 73) = 54.48; p<.0001. Specifically, low scores on Computer-Self-efficacy scale (β=-.046; p<.01) significantly predicted computer-anxiety. Moreover, scores on Computer-Expertise Scale and Internet Attitude Scale didn’t predict significantly computer-anxiety scores (see Table 3).

Discussion and Conclusion

The present paper suggests important outcomes for studying psychological antecedents of computer-anxiety.

Consistently with the literature (e.g., Bonzielos, 2001; Chua et al., 1999; Compeau & Higgins, 1995; Wilfong, 2006), computer-expertise is significantly positively associated with computer self-efficacy. Furthermore, computer-anxiety is significantly negatively related to computer-expertise, computer self-efficacy and Internet attitude. Also this last result is coherent with literature outcomes (e.g., Sam, Othman, e Nordin, 2005). Interestingly, our correlation data showed also significant positive correlations between Computer-expertise/Internet Attitude and Computer self-efficacy/Internet Attitude. As follows, individuals’ predispositions towards the Internet are associated both to their effective skills to interact with a computer or to manage its unexpected difficulties and to their own capabilities to feel able of using it. As demonstrated by regression analyses performed on participants’ averaged scores on the considered questionnaires, computer-anxiety depends more on psychological competences of efficacy toward technologies then on effective technological skills in computer usage. Similarly, attitudes toward the Internet seem not to influence the individuals’ computer-anxiety levels. Specifically, computer-self-efficacy is the ability to manage technologies satisfactorily, as well as to feel confident towards technology. This is responsible for the reduction of computer-anxiety individuals’ levels. From a theoretical point of view, our outcomes are coherent with the well-known model of self-efficacy proposed by Bandura (1977; 1986). Indeed, as suggested by Bandura (1977; 1986), higher levels of self-efficacy lower anxiety that individuals perceive independently of a specific domain. Our study suggests a very different point of view for possi-

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<tr>
<td>Computer-Expertise</td>
<td>.147</td>
<td>.02</td>
<td>.005</td>
</tr>
<tr>
<td>Computer Self-efficacy</td>
<td>-.370</td>
<td>.04</td>
<td>-.81</td>
</tr>
<tr>
<td>Internet Attitude</td>
<td>-.231</td>
<td>.07</td>
<td>-.02</td>
</tr>
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Note: R^2=.69; F (3, 77) = 54.48; p<.0001. *p<.01

Table 3 - Summary of General Regression Analysis for Variables Predicting Computer-Anxiety (N=77)
ble psychological treatments aimed at reducing individuals’ levels of computer-anxiety. In this sense, we believe that de-sensitizing psychological treatments could be oriented not to enlarge individuals’ cold technological notions or their expertise toward computer, as proposed by the current literature (e.g., Sam, Othman, & Nordin, 2005), but to step up individuals’ self-confidence beliefs to manage such peculiar technologies such as computers and the Internet. Moreover, training programs about technologies that involve mainly teachers should be based on the improvement of individuals’ trusts toward technologies more then on the improvement of mere technological skills. Only in this way, we guess that could be prevented the emergence of individuals’ computer-anxiety.

References


man Behavior, 10 (4), 529-539.