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The structure of computer anxiety: a six-factor model

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Abstract

A six-factor model of computer anxiety was tested in two samples of university students. The dimensions involved were: computer literacy, self-efficacy, physical arousal caused by computers, affective feelings about them, beliefs about the beneficial effects of computers, and beliefs about their dehumanizing aspects. Confirmatory factor analyses showed that, compared to a number of alternative models proposed in the literature, the data fitted this six-factor model relatively well. In addition, it was demonstrated that computer literacy has a strong directional influence on both physical arousal and affects. Beliefs about computers, in turn, were shown to be dependent on affects and physical arousal. Self-efficacy mainly contributed to increased computer literacy. These findings suggest that training programs that enhance self-efficacy and computer literacy may in principle reduce computer anxiety. © 2001 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Computer anxiety as a psychological phenomenon has been well-researched over the past three decades. Gradually, a better insight has been acquired into its nature. The construct is still defined in various ways, but terms recurring in most of these definitions are aversion, fear or apprehension towards interacting with computers or thinking about computers, intimidation by, resistance to, hostility, or aggression towards computers (Jay, 1981; Meier, 1986; Glass & Knight, 1988). Sometimes,

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computer anxiety is manifested by physiological reactions such as sweaty palms, dizziness, and shortness of breath, and often these behaviors are accompanied by self-critical internal dialogue (Hemby, 1998; Weil, Rosen & Wugalter, 1990; Lalomia & Sidowski, 1993).

Rosen and Weil (1995, 1996) found computer anxiety to be endemic among groups such as public school teachers, students, and psychologists. They estimated that as many as 40% of the population in the United States experience computer anxiety to a degree. In a large sample of first year university students from 23 countries, Rosen and Weil (1995) found the occurrence of computer anxiety to vary widely, e.g. Israeli students had a low of 12% and Indonesian students a high of 100% computer-related anxiety. Bozionelos (1996) showed that more than 20% of a sample of British managers and professionals had scores above the midpoint on a computer anxiety scale. With the increasing penetration of personal computers in business, education, and the home, the problem of computer anxiety has become more pertinent. It is an unsolved issue whether blooming Internet use and the emergence of technologies such as digital telephony will decrease the occurrence of computer anxiety or will enhance it.

Computer anxiety has been studied in a number of different ways. Of relevance to the present article is a subset of studies that has employed factor analysis to explore dimensions underlying this phenomenon. These studies have demonstrated that computer anxiety may not be a one-dimensional construct. The computer-anxiety model of Loyd and Gressard (1984) for instance, identifies three separate factors: self-confidence in dealing with computers, fear of, and liking of computers. Other researchers have concentrated on various aspects of interacting with computers, e.g. whether anxiety was generalized or just related to specific aspects of computer use such as manipulating the keyboard or dealing with errors and crashes (Marcoulides & Wang, 1990; Brosnan & Lee, 1998). Other studies focused on the circumstances under which computer anxiety emerges, i.e. does anxiety only appear when actually dealing with a computer, or does it already emerge while thinking about using it or seeing others use it? (Weil & Rosen, 1995; Rosen & Weil, 1995; Dyck, Gee & Smither, 1998). Table 1 reviews the major findings of these factor-analytic studies. For each study the relevant factors are reported and where needed further explained. In addition, an attempt is made to establish common themes.

The table suggests that computer anxiety is comprised of at least the following elements: (1) low confidence in one's own ability to use computers; (2) negative affective responses to them; (3) becoming aroused while using a computer or thinking about it; and (4) negative beliefs about the role of the computer in our lives. It is presently unclear, however, how these factors interact. For instance, is low confidence a precursor of negative affect, or is it the other way around? Do beliefs about the role of computers cause people to become aroused in the presence of these machines, or are beliefs by-products of these aversive responses? In addition, the studies reviewed are not very clear about the role of actual experience with computers in the emergence of anxiety. One can, however, hardly imagine people suffering from computer anxiety without ever having tried to use one. Various studies have found the relationship between computer experience and computer anxiety to be

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