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Social anxiety and physiological arousal during computer mediated vs. face to face communication ☆

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ABSTRACT

Although survey results suggest that socially anxious individuals may use computer mediated communication (CMC) differently from others and feel differently about CMC relative to face to face (FTF) communication, little is known about their actual experience during CMC. Using an experimental interaction task, we assessed ($N = 73$) high and low social anxiety participants during CMC and FTF. In addition to self-reported social anxiety, arousal, and perception of success and control, we assessed heart rate and skin conductance, which are physiological indices of arousal. Both CMC and FTF interaction tasks were associated with significant increases in physiological arousal compared to baseline. Although subjective anxiety and arousal were higher in FTF compared to CMC, physiological arousal showed no significant differences across conditions. An interaction effect was found for perceived success such that those high in social anxiety perceived greater success in CMC than in FTF while those low in social anxiety showed no differences across conditions. Further experimental study of subjective and objective indices of anxiety will help elucidate the unique experience of CMC for those with high social anxiety.

1. Introduction

Computer mediated communication (CMC) has rapidly developed into a central conduit of human interaction. Individuals interact online through a range of modalities including email, chat, and an array of social networks (Lewandowski, Rosenberg, Jordan-Parks, & Siegel, 2011). Psychology is beginning to grasp the dramatic impact of CMC on our social–interpersonal realities (Stokols, Misra, Runnerstrom, & Hipp, 2009). Although CMC includes a range of modalities such as audio and video-conferencing, special consideration is warranted for text based communication due to its unique features.

A number of distinct characteristics of text-based CMC have been the subject of scientific attention. One prominent feature is anonymity, whereby internet users can share even intimate conversations without necessarily sharing identifying information (Mckenna & Bargh, 2000). A second characteristic is the lack of non-verbal cues that are found in face-to-face conversation (McKenna & Bargh, 2000) or vocal cues that are available in telephone communication. Anonymity and absence of nonverbal cues, may lead to changes in the quality and content of the interaction, including increased self-disclosure and intimacy (Nguyen, Bin, & Campbell, 2012; Tidwell & Walther, 2002) and these also provide more control over self-presentation (Caplan, 2005).

Although relevant for all CMC users, distinct aspects of CMC may have special importance for individuals with high social anxiety who experience difficulties with traditional modes of interaction, such as face to face and telephone contact (Reid & Reid, 2007). We undertook an experimental study with the goal of increasing understanding of the experience of CMC for those with high social anxiety.

1.1. Social anxiety

Among the most common psychological disorders (Kessler et al., 2005) social anxiety disorder is defined by a marked and persistent fear of social or performance situations in which embarrassment may occur, resulting in significant distress and difficulties in functioning (American Psychiatric Association, 2013). Social anxiety disorders causes considerable disability, including higher rates of suicide attempts, lower income, work impairment, and extensive economic cost to society (Lipsitz & Schneier, 2000; Magee, Eaton, Wittchen, McGonagle, & Kessler, 1996; Stein & Kean, 2000).

The cognitive model of social anxiety (Clark & Wells, 1995; Rapee & Heimberg, 1997) suggests that socially anxious individuals have core negative beliefs about themselves such as "I am stupid."

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These beliefs influence appraisal of social situations as dangerous. Social experiences are filtered through negative biases, such as interpreting neutral social cues as signs of negative evaluation, which help perpetuate anxiety. Finally, socially anxious individuals focus attention inward, highlighting perceived negative aspects of their own appearance, performance, etc. and thus lack the capacity to appropriately process corrective information from the social experience others' reactions (e.g., Clark, 2001). The strong concerns with self-presentation and frantic efforts to control it (Schlenker & Leary, 1982) make realistic processing of face-to-face interaction very challenging.

Since features of computer mediated communication allow for more ease of control of personal information and less openness to scrutiny, especially in terms of physical appearance and vocal sounds, the experience and effects of CMC interactions for those with high social anxiety may differ from their experience in FTF.

In addition to subjective feelings of anxiety, social anxiety disorder is associated with a range of physiological symptoms, such as sweating, blushing, trembling, or palpitations (American Psychiatric Association, 2013), which may occur in social situations and, because some of these are detectable by others, often become an additional source of anxiety in face to face interactions. Although the specificity of this physiological response remains in question (Gerlach, Wilhelm & Roth, 2003; Hofmann, Ehlers, Newman, & Roth, 1995), a number of studies have identified patterns for social anxiety, including increased heart rate (HR) and systolic blood pressure (Matthews, Manuck & Saab, 1986), reduced heart rate variability (Chalmers, Quintana, Maree, Abbott & Kemp, 2014), and excessive blushing (Gerlach, Wilhelm, Gruber & Roth, 2001). A discrepancy has been noted between self-reported physiological arousal, for which consistent increases are found and objective physiological measures for which a more complex association with social anxiety is found (Mauss, Wilhelm, & Gross, 2004; Wilhelm, Kochar, Roth & Gross, 2001).

1.2. CMC and social anxiety

Some studies have examined aspects of CMC use among individuals with high social anxiety using survey methods. A number of surveys have found, for example, that those with high social anxiety tend to spend more time interacting on-line (Mazalin & Moore, 2004; Pierce, 2009). In addition McKenna and Bargh (1999) found that those who are high in social anxiety are more inclined to form online relationships compared to those with normal levels. These patterns may be related to specific effects of CMC features of anonymity and absence of nonverbal cues for the socially anxious. High and Caplan (2009) suggest, based on results of their survey, that lack of immediate social context and unavailability of nonverbal cues in CMC help socially anxious individuals become less preoccupied with impression management. As a result, they may be perceived as less anxious than they would be in FTF situations. While these surveys suggest that social anxiety is associated with different patterns of use of CMC and perhaps different benefits from its use, little is known about the actual experience of CMC for the socially anxious and how this experience might differ in important ways from FTF. It is not known, for example, to what degree interactions in CMC also provoke subjective anxiety and physiological arousal symptoms which typify experiences of the socially anxious in FTF situations.

1.3. The current study

We conducted a comprehensive experimental study of anxiety and associated features in CMC vs. FTF, comparing individuals with high and low social anxiety. In addition to subjective reports of social anxiety and associated features, we measured two physiological indices of anxiety, heart rate and skin conductance during parallel interaction tasks in CMC and FTF. Several studies have examined physiological reactivity in social anxiety in FTF situations (Yoon & Quartana, 2012), but studies have yet to compare patterns of arousal in FTF to CMC. Understanding those patterns of anxiety response and physiological arousal among the socially anxious in the on-line environment may help us understand the appeal and also the function of CMC for those with high levels of social anxiety. This may have implications for understanding broader effects of CMC for a range of users. For the socially anxious specifically, this may reveal how CMC use can be optimized and how CMC can be best integrated into intervention strategies.

We hypothesized that, (1) both CMC and FTF tasks would be associated with increases in physiological arousal (heart rate and skin conductance) from baseline measures, (2) differences between conditions would be found across groups such that subjective anxiety, subjective and objective physiological arousal would be lower in CMC compared to FTF, and (3) an interaction would be found such that differences between CMC and FTF in subjective anxiety, subjective and objective physiological arousal would be more prominent in those high in social anxiety compared to those low in social anxiety.

2. Method

2.1. Design

The present study used a 2×2 mixed model design with repeated measures on one variable. The first factor, a between subjects variable, is the participant's general level of social anxiety as assessed prior to the experiment (high anxiety group/low anxiety group). The second factor, a within subjects variable, is the condition (CMC/FTF). The order of presentation of the two conditions (CMC and FTF) was counterbalanced so that half of participants conversed via CMC and then via FTF and the other half vice versa. The major dependent variables were (a) self-reported anxiety, (b) subjective physiological arousal, and objective ratings of (c) heart rate (HR), and (d) skin conductance level (SC) assessed continuously. Additionally, we tested other factors associated with social anxiety: (e) perception of success in the interaction, and (f) perceived control in the interaction.

2.2. Participants

Participants were 73 undergraduate students from Ben-Gurion University in Israel, 34 of which had high level of social anxiety and 39 which had low levels of social anxiety. Ranking was based on screening thresholds described below. The high anxiety group's (23 women, 11 men) mean age was 23.24 years old (SD = 1.39). The low anxiety group's (29 women, 10 men) mean age was 22.59 (SD = 2.68). All participants were sampled from a larger pool (N = 250) recruited for a survey study that contained a brief social anxiety screening questionnaire, the Mini-Social Phobia Inventory (Mini-SPIN, Connor, Kobak, Churchill, Katzelnick, & Davidson, 2001; see below). High and low social anxiety groupings were further validated using two well validated social anxiety scales, the Liebowitz Social Anxiety Scale (Liebowitz, 1987, see below) and the Fear of Negative Evaluation Scale (Watson & Friend, 1969, see below). Participants received course credit or a small monetary payment to compensate for their time.

2.3. Measures

2.3.1. Measures of social anxiety

Mini-Social Phobia Inventory (Mini-SPIN; Connor et al., 2001): The Mini-SPIN is a self-administered screening tool derived from