Applied relaxation: an experimental analogue study of therapist vs. computer administration

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Abstract

This experimental analog component study compared two ways of administrating relaxation, either via a computer or by a therapist. The second phase of applied relaxation was used, which is called “release-only relaxation”. Sixty participants from a student population were randomized to one of three groups: computer-administered relaxation, therapist-administered relaxation, or a control group in which participants surfed on the Internet. Outcome was measures using psychophysiological responses and self-report. Objective psychophysiological data and results on the subjective visual analogue scale suggest that there was no difference between the two forms of administration. Both experimental groups became significantly more relaxed than the control group that surfed on the Internet. Practical applications and future directions are discussed.

Keywords: Applied relaxation; Computer administration; Internet; Psychophysiology

1. Introduction

Computer-mediated psychological interventions have been developed for a few conditions (Marks, Shaw, & Parkin, 1998), and the advent of the Internet made it possible to
disseminate computer based treatment to a large number of people (Smith & Senior, 2001). Recently, Internet-based self-help treatment has been tested for a range of conditions, and there is now a need for experimental component studies on how well psychological interventions can be transferred into computer-mediated self-help. One suitable technique for such a test could be applied relaxation (AR) which is a coping skill that enables the patient to relax rapidly, in order to counteract, and eventually alleviate their anxiety reactions altogether (Öst, 1987). AR has been used in a number of studies on self-help via the Internet targeting panic disorder (Carlbring, Ekselius, & Andersson, 2003), insomnia (Ström, Pettersson, & Andersson, 2004), tinnitus (Andersson, Strömgren, Ström, & Lyttkens, 2002), headache (Andersson, Lundström, & Ström, 2003; Ström, Pettersson, & Andersson, 2000), chronic pain (Buhrman, Fältenhag, Ström, & Andersson, 2003), and stress (Zetterqvist, Maanmies, Ström, & Andersson, 2003). However, given the way that these studies have been conducted (e.g., from the participants home/own computer) it has not been possible to investigate physiological effects of relaxation training.

The full program of AR consists of several phases. The first phase includes teaching the patient to relax with the help of progressive relaxation (Jacobson, 1938). Typically, a therapist, who first demonstrates how the different muscle groups should be tensed and then relaxed, teaches progressive relaxation. The patient does the different tension-release cycles at the same time; the therapist checks that they are being done properly, and any questions or unclear points are dealt with. Then the patient closes his/her eyes and the therapist instructs him/her to tense and relax the different muscles in the right order and at the correct tempo. Interestingly, it has not been convincingly proven that the tension instruction (i.e., muscle contraction) is necessary to achieve relaxation (Lucic, Steffen, Harrigan, & Stuebing, 1991).

The second phase of AR is release-only relaxation in which the time it takes the patient to become relaxed is reduced from 15–20 to 5–7 min. The release-only relaxation means that the therapist deletes the instructions concerning the tensing of the muscle groups (Öst, 1987). Instead the therapist instructs the patient to relax these muscle groups directly, starting at the top of the head and working through right down to the toes. Cue-controlled relaxation, differential relaxation, rapid relaxation, and finally the application training follow the second phase.

A review by Öst (1987) of 18 controlled outcome studies revealed that AR has been used for different phobias, panic disorder, headache, pain, epilepsy, and tinnitus. The results showed that AR was significantly better than no-treatment, or attention-placebo conditions, and as effective as other behavioral methods with which it was compared. At follow-up after 5–19 months the effects were maintained, or further improvements were obtained. AR has also been adopted for uses in treatment of generalized anxiety disorder (GAD). In two recent studies AR has proven to be equally as effective in treating GAD as Cognitive therapy, which demands much more of the therapist (Arntz, 2003; Öst & Breitholtz, 2000).

Common to all the self-help studies conducted via the Internet is the absence of face-to-face therapist contact. Hence, the therapist cannot demonstrate the different muscle groups that should be tensed and then relaxed, or check that the different tension-release cycles are properly done. A question that came up during these trails was whether Internet-administered AR was equally effective as therapist-administered AR. In an attempt to answer this question the present experimental component study was initiated. In order to
repeatedly test its effectiveness the brief release-only relaxation was targeted and we were in particular interested in subjective as well as psychophysical effects of relaxation (Cacioppo & Tassinary, 1990; Peveler & Johnston, 1986). To our knowledge, this is the first study to compare computer administration vs. live instructions of relaxation using a comprehensive selection of outcome measures.

2. Method

2.1. Recruitment and selection

Participants were recruited by putting up a poster on notice boards at the university library and at the student union in Uppsala. Sixty healthy volunteers were included: 30 males and 30 females aged 18–55 ($M = 24$ years). Fifteen percent had never tried relaxation techniques, 70% had infrequently tried them, and 15% had occasionally used them. Participants who had used relaxation techniques more than once typically did so in connection with keep-fit exercises. Each subject gave his/her informed consent and the institutional review board approved the protocol.

3. Material

3.1. Psychophysiological measures and equipment

Galvanic skin response was measured with BIO-PAC Systems MP100 hardware and AcqKnowledge, version 3.5.5, software (MP100 system Guide, 2000). The BIOPAC-equipment was attached to a Dell Latitude CPt S500ST, Celeron 500 MHz, and 128 Mb RAM. Skin conductance was measured with the GSR 100B Electrodermal Activity Amplifier Module. Data were recorded in $\mu$mho using two electrodes (BIOPAC Systems Reusable Ag–AgCl Electrodes EL208). Tape (ADD 298) was attached to each of the electrodes, and electrodes were covered with a gel paste (GEL 100), with a molarity of 0.05 NaCl.

3.2. Relaxation instructions

A computerized relaxation slide show, based on release-only relaxation, was created. It consisted of 35 separate screens with relaxation instructions presented via a 17-in. screen in centered, white Arial font (40 points in size). The background was blue (color code: red = 51; green = 51; blue = 204). Each screen was faded in and out. The total time for each administration was 8 min and 45 s. During the final minute the participant was instructed to keep his/her eyes closed.

3.3. Self-report measures

A visual analogue scale (VAS) was used six times to determine each subject’s self-reported state of relaxation. The scale ranged from “very tense” to “very relaxed” and was 5 in. long (126 mm).
4. Procedure

Participants were randomized to one of three groups: relaxation administered by a therapist, relaxation administered by a computer, or a control in which the participants instead of relaxing surfed on the Internet. All testing was done with one participant at the time, and in the same room.

Initially participants reported their state of relaxation on the VAS. Following this the control group was instructed to surf the Internet. Participants were free to visit any websites they wanted. After 8 min and 45 s they were interrupted. They were then instructed to rate their state of relaxation on the VAS. Then a cognitive stressor (serial seven; Smith, 1967) was delivered. Each participant was instructed to silently count backward in steps of seven until the research assistant said stop. After 20 s the participant was asked to say the number he/she had calculated. This was followed by a third VAS rating. Then the participant was instructed to surf the Internet a second time (8 min 45 s); followed by a fourth VAS rating. That was followed by a second cognitive stressor (“I want you to silently count backward in steps of seven again. I will give you a three-digit number, and this time I want you to really make an effort. It is important that you count as fast and as accurately as possible!”); and a subsequent fifth VAS rating. Finally, the participant was instructed to surf the Internet a third time, whereupon the final VAS rating was done.

For the two relaxation groups the procedure was identical except that instead of surfing the Internet the participants were given three sets of relaxation instructions either administered by a computer, or by a therapist. The relaxation instructions were identical.

4.1. Statistical analysis

Psychophysiological data were collected throughout the entire experiment, but grouped together into 30 separate values for the analysis. The first value is the average galvanic skin response during the 1-min baseline. The nine following values are data collected during the first relaxation or Internet-surfing episode (period A:1–9). The 8 min and 45 s have been broken down into nine values, each 58 s long. The 11th value is the average GSR during the first stressor. This is followed by nine values from the second relaxation or Internet-surfing episode (period B:1–9). The 21st value is the average during the second stressor. Finally, the last nine values are from the third relaxation or Internet-surfing episode (period C:1–9).

5. Results

5.1. Objective measurement of relaxation with galvanic skin response

Fig. 1 shows the galvanic skin response for the entire course of the experiment. There were no differences between the groups or between the genders at the baseline measurement. Mean and standard deviation are presented in Table 1.

5.2. Main effects

A three-way repeated measures ANOVA revealed no main effect for group or gender. However, there was a significant main effect for time on all three episodes (F(8,432) = 2.98, p = .003; F(8,432) = 27.13, p < .0001; F(8,432) = 44.86, p < .0001).
5.3. Interactions

The three-way repeated measures ANOVA revealed no three-way interactions, or group \times gender interactions. However, interactions for time \times group and time \times gender were found.

5.4. Time \times group interaction

Significant time \times group interactions were found for all three relaxation episodes \((F_{(16,432)} = 1.72, \ p = .0407; \ F_{(16,432)} = 3.59, \ p < .0001; \ F_{(16,432)} = 3.47, \ p < .0001)\).

A subsequent analysis with ANOVA shows that the GSR for the computer administered relaxation group drops significantly in all three relaxation episodes \((F_{(8,152)} = 3.36, \ p = .0014, \ F_{(8,152)} = 21.451, \ p < .0001; \ F_{(8,152)} = 33.35, \ p < .0001)\). Specifically, a post hoc test (Tukey/Kramer) shows that there are significant differences between A:1 to A:4–8, B:1 to B:2–9, B:2 to B:4–9, B:3 to B:6, C:1 to C:2–9, C:2 to C:4–9 and C:3 to C:9 for the computer administered relaxation (all p’s < .05).

A subsequent analysis with ANOVA shows that the GSR for the therapist administered relaxation group remains unchanged during the first relaxation episode. However, during the second and third relaxation episode the GSR significantly drops \((F_{(8,152)} = 9.15, \ p < .0001; \ F_{(8,152)} = 14.06, \ p < .0001)\). Specifically, a post hoc test (Tukey/Kramer) shows that there are significant differences between B:1 to B:3–9, B:2 to B:5–6, B:2 to B:9, C:1 to C:2–9, C:2 to C:5–9, and C:3 to C:9 (all p’s < .05).

A subsequent analysis with ANOVA shows that the GSR for the control group surfing the Internet remains unchanged during the second relaxation episode. However, during the first episode there is a trend towards higher GSR values \((F_{(8,152)} = 1.73, \ p = .0947)\). In contrast, during the third episode the GSR values decrease \((F_{(8,152)} = 5.66, \ p < .0001)\). Specifically, a post hoc test (Tukey/Kramer) shows that there are significant differences between C:1 to C:3–9 (all p’s < .05).
5.5. *Time × gender interaction*

Significant time × gender interactions were found for the first two of the three relaxation episodes ($F_{(8,432)} = 4.73$, $p < .0001$; $F_{(8,432)} = 4.10$, $p < .0001$).

A subsequent analysis with ANOVA shows that the GSR increases for men ($F_{(8,232)} = 3.54$, $p = .0007$; $F_{(8,232)} = 7.33$, $p < .0001$), but decreases for women ($F_{(8,232)} = 3.97$, $p = .0002$; $F_{(8,232)} = 18.30$, $p < .0001$). Specifically, a post-hoc test (Tukey/Kramer) shows that there are significant differences between A:3 to A:9, B:1 to B:2–9, B:2 to B:4–9, and B:3 to B:6 for women (all $p$'s < .05).

5.6. Subjective measurement of relaxation with visual analogue scale

The participants rated their state of relaxation on a Visual Analogue Scale (see Fig. 2). A three-way repeated measures ANOVA revealed no three-way interaction, group ×
gender interaction, or time \times gender interaction. However, a significant time \times group interaction was found ($F_{(6,162)} = 7.17, p < .0001$).

A subsequent analysis with ANOVA shows that both the computer and therapist administered relaxation groups were significantly more relaxed after the relaxation episodes as compared to the baseline ($F_{(3,57)} = 26.15, p < .0001; F_{(3,57)} = 18.64, p < .001$). A post hoc test (Tukey/Kramer) shows that the subjective rating of relaxation was significant for each of the relaxation episodes and for both the relaxation groups (all $p$'s < .05). There was no difference between the three relaxation episodes.

There was a significant main effect for the group variable [$F_{(2,54)} = 15.70, p < .0001$]. A post hoc test (Tukey/Kramer) shows that both the computer and therapist administered relaxation groups were significantly more relaxed than the control group that surfed the Internet ($p < .05$). There was no difference in self-rated relaxation between the two different administration types.

5.7. Participants response

After the experiment the participants in the two relaxation groups were asked how relaxed they thought they would have become if the relaxation instructions had been administered in the other format (live or via a computer). In the computer-administered relaxation group 40% thought they would have become more relaxed if the instructions had been given by a therapist. Twenty-five percent thought it would not have mattered, and 35% thought they would have been less relaxed. In the therapist-administered relaxation group only 5% thought they would have become equally relaxed if the instructions had been administered by a computer. The rest, 95%, thought they would have been less relaxed.

6. Discussion

This study generally provides evidence for the possibility of administering release-only relaxation by a computer. Specifically, the group that received relaxation instructions via a
slide show on a computer showed significant reductions in GSR during all three relaxation episodes. Whereas the group that received the relaxation instructions from a therapist only relaxed during two of the three episodes. In contrast, the control group that surfed on the Internet tended to become tenser according to the GSR readings during the first episode; there was no change during the second, and they were significantly more relaxed during the third and final episode. However, both the computer- and therapist-administered relaxation groups became more relaxed compared to the control.

The subjective measure of relaxation using the visual analogue scale showed that both the computer- and therapist-administered relaxation groups were significantly more relaxed than the control group that surfed on the Internet. Interestingly, even though the two methods of administering AR were approximately equally effective, 95% of the people receiving therapist-administered relaxation thought they would have been less relaxed had a computer administered the relaxation.

Although promising, this study has a number of problems. It is impossible to generalize the results from this limited treatment component experiment to a population of anxiety patients. Furthermore, as only one of the components of AR was tested it is uncertain how effective it would be to administer the whole AR-package via the Internet. While it is true that the results have low ecological validity, recent self-help studies have shown relative good outcomes using Internet-delivered AR in naturalistic settings (Andersson et al., 2003; Andersson et al., 2002; Carlbring et al., 2003; Ström et al., 2000; Ström et al., 2004; Zetterqvist et al., 2003). Interestingly, while Carlbring et al. (2003) found no clear differences between AR and cognitive behavior therapy in the treatment of panic disorder, other researchers have found more modest effects of AR (e.g., Arntz & Van den Hout, 1996). However, a series of investigations by Öst and colleagues have found minor differences between AR and cognitive behavior therapy (e.g., Öst & Westling, 1995), suggesting that AR can be an effective treatment for panic disorder.

Should the computer administrated AR prove to be effective in naturalistic settings it could be of great benefit for people suffering from GAD. Even though GAD is associated with great distress and a socio-economic burden (Nutt, Ballenger, Sheehan, & Wittchen, 2002) only few sufferers seek treatment. Barriers to accessing expert assistance include shortage of skilled therapists, long waiting lists, and cost (Richards, Klein, & Carlbring, 2003). These barriers particularly disadvantage geographically isolated people such as those in regional and rural areas where travelling time is an added burden. Self-help via the Internet could be a way of increasing the accessibility and affordability of evidence-based psychological treatments. In the future a randomized treatment study, with either live or computer-administered AR, and a waiting-list control could provide further answers regarding the benefit of a Internet delivered self-help program for GAD in naturalistic settings.

In conclusion, the present data suggest that computer administrated release-only relaxation is at least equally effective as when administered by a therapist.

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References


