Virtual Reality Therapy: A Means of Reducing Public Speaking Anxiety

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Abstract

In recent years, there has been considerable interest in the development of treatments to help people reduce their public speaking anxiety (PSA) in a variety of circumstances. A review of literature suggests that several treatments have been found to be effective in reducing communication apprehension. However, it has not been determined whether Virtual Reality Therapy (VRT) has proven to be as effective in reducing individual's public speaking apprehension (PSA) as other treatments, such as Visualization (Ayres & Hopf, 1985, 1991). Therefore, this study used a Virtual Reality Therapy (VRT) system to determine whether students with public speaking anxiety self-reported lower levels of PSA after being exposed to VRT than those students who were exposed to a visualization treatment (Ayres & Hopf, 1985, 1991). Data reveals that PSA students who were exposed to VRT reduced their public speaking apprehension more so than PSA students exposed to visualization (Ayres & Hopf, 1985, 1991). The findings of this study are discussed later in the paper.

Introduction

The need for a more effective approach in the development of treatments to help people reduce their communication apprehension in a variety of circumstances and in public speaking has never been greater. For some people, public speaking is so terrifying for people that many Americans fear giving a speech more than they do anything else (Wallenchinsky, Wallace, & Wallace, 1977). In fact, 41% of the people interviewed by Wallenchinsky et al. listed public speaking as the activity they feared the most, while only 19% of their respondents indicated dying as their greatest fear. Richmond and McCroskey (1985) report that 20% of the 30,000 people they surveyed suffer from extreme levels of communication apprehension (anxiety related to real or anticipated communication of any kind). Ayres and Hopf (1985) report that 14% of students enrolled in a basic public speaking course experienced the same level of stage fright reported by Richmond and McCroskey's respondents.

For more than a decade communication researchers have been interested in helping people cope with their communication apprehension (CA) in regards to public speaking. Anecdotal evidence of this advice can be found (e.g., Menchhofer, 1938). There have been serious research developments and interventions designed and tested to help people cope with (PSA). Not surprisingly, interventions have been developed to help people cope with their communication apprehension (e.g., Rational Emotive Therapy (RET), Ellis and Harper, 1975; Cognitive restructuring, Meichenbaum, Gilmore, & Fedoravicious, 1971; Fremouw & Zitter, 1978; Visualization, Ayres & Hopf, 1985, 1991; Skills Training, Fremouw & Zitter, 1978; Systematic Desensitization, Wolpe, 1958; and Multiple Treatments, Gross, 1989; Leary, 1995).

The following paragraphs will discuss a few of the most available and effective interventions in treating people with (PSA). Systematic Desensitization (SD), developed by Wolpe (1958), is based on the principle of reciprocal inhibition. This principle entails creating situations where a response antagonistic to feeling anxious is made to occur in place of an anxiety response. According to Wolpe, a person cannot feel anxious and relaxed at the same time, since anxiety and relaxation are incompatible responses.

Systematic Desensitization helps people learn to feel relaxed rather than anxious. Skills Training (e.g., Fremouw & Zitter, 1978; Fawcett & Miller, 1975) presumes that people experience public speaking anxiety because they lack delivery skills (Ayres & Hopf, 1993, p. 91). Skills Training involves an individual improving specific skills like the organization of a speech, posture, eye contact, vocal variety, gestures, etc. (Ayres & Hopf, 1993). Visualization (VIZ) developed by Ayres and Hopf (1985), is an intervention process that uses imagery to replace negative thoughts with positive thoughts. Visualization is based on the assumption that perception is linked with an image of the situation. If the image is negative, then a feeling of anxiety emerges (Ayres & Hopf, 1993, p. 31). Visualization is used to help students envision what they might be like as a public speaker, whether or not they were positive or negative in nature based on their level of apprehension (Ayres & Heuett, 1977). While the effectiveness of such treatments has been well documented, there continues to be a growing concern whether there might be more effective treatments used to help reduce individual's public speaking anxiety. It appears that the time has come to determine whether Virtual Reality Therapy (VRT) can be a predictor of treatment of reducing public speaking anxiety in comparison of other treatments.

Virtual Reality Therapy (VRT) is a technology that enables users to enter computer-generated worlds and interact with them through sight, sound, and touch. Virtual Reality environments differs from traditional displays in that computer graphics and various display and input technologies are integrated to give the user a sense of presence or immersion in the virtual environment (Held & Durlach, 1992; Bryson, 1992; Sheridan, 1992). Virtual environment offers "a new human-computer integration paradigm in which users are no longer simply external observers of data or images on a computer. They are active participants within a computer-generated, three dimensional virtual world" (North, North, & Coble, p. 47). Virtual Reality Therapy (VRT) has been used to combat obsessive-compulsive disorder (OCD), attention deficit disorder (ADD), post-traumatic stress disorder (PTSD), use of augmented reality to treat Parkinson's disease, and Internet-mediated visualization therapy in behavior therapy by using VRML (virtual reality modeling language), (North, North & Coble, 1996). In addition, Virtual Reality Therapy has been used to combat the fear of public speaking (North, et al., 1996); it seems of interest here in the rhelm of public speaking, that VRT could be a successful treatment in lowering PSA. Therefore, this study used a Virtual Reality Therapy system to determine whether students self-reported lower levels of PSA after being exposed to VRT than those students who were exposed to visualization (Ayres & Hopf, 1985, 1991).

In essence, this study was designed to determine whether a VRT procedure would prove to be as effective as a visualization treatment (Ayres & Hopf, 1985, 1991) in reducing public speaking apprehension. In addition to PSA, state CA, Willingness to Communicate (WTC), and Self-Perceived Communication Competence (SPCC), are likely to be affected by VRT. Willingness to Communicate has been defined "as an individual's predisposition to initiate communicating with others" (McCroskey, 1997, p. 77). Self-Perceived Communication Competence (SPCC) is defined as "an individual's self-perception of that competence or skill" (McCroskey, 1997, p. 104). State CA, McCroskey (1977) says, "is specific to a given oral communication situation, such as giving a particular speech…or interviewing for a new job at a given time and place" (p. 79). Thus, if we successfully reduce PSA levels, people should report feeling more competent and more willing to communicate with others. Because of the success that VRT has had in reducing people's PSA (North et al., 1996) it seemed likely that PSAs exposed to VRT would experience lower levels of trait and state CA, be more willing to communicate, and indicate having higher levels of self-perceived communication competence than PSAs who were exposed to a Visualization treatment and a control group.

Method

Participants

Students enrolled in multiple sections of a basic public speaking class served as participants in this study. Students had the option of refusing to participate in the study by raising their hand and letting the research assistant know they were not interested in going any further in the study. The students were primarily freshman, with some sophomores, juniors and seniors. Eighty of the 120 students eligible to participate in this study participated. The 40 students not participating incorrectly filled out the pre-test forms or were absent during the arranged time of the study when data was collected. The participants ranged in age from 18 to 26 with a mean age of 20.1. Thirty three of these respondents were men and 47 were women.

Data Gathering

During the first week of class students provided demographic information and filled out the PRCA.

Upon arrival at the study site, participants delivered an impromptu speech on what they expected to get out of college or what they expected to do after college. These topics were systematically varied so that 1/2 of the participants spoke on each topic. Participants were then asked to complete the state CA measure, (Speilberger, Gorsuch & Lushene, 1970), the Self-Perceived Communication Competence (SPCC) scale, (McCroskey & McCroskey, 1988), and the Willingness to Communicate scale, (McCroskey & Richmond, 199. Following the completion of these forms, participants were then exposed to one of three treatment conditions, Visualization, Virtual Reality Therapy, or a control group. Participants in the control group completed the pretest scales, delivered their speeches, and subsequently filled out the post-test scales but did not engage in the Visualization or VRT exercise. These treatments ranged from 10-20 minutes in length. Following treatment, participants were asked to deliver a second impromptu speech on the topic they were not assigned for the first speech and to fill out the trait CA, (Levine & McCroskey, 1990) state CA, (Speilberger, Gorsuch, & Lushene, 1970), SPCC (McCroskey & McCroskey, 1988), and WTC (McCroskey & Richmond, 1991) scales. At the conclusion of the study, participants were debriefed, awarded extra credit, and thanked verbally for their assistance.

Instruments

Trait communication apprehension.

Trait CA was measured using the Personal Report of Communication Apprehension (PRCA, Levine & McCroskey, 1990) because it has been repeatedly found to be reliable and valid (McCroskey, 1997). This measure was used to identify PSAs level of anxiety. Those who scored one standard deviation above the mean were considered high PSA and those who scored one standard deviation below the mean were considered low PSA. The test-retest reliability of the instrument in this study ranged from .87 to .82 in the pretest and posttest respectively.

State communication apprehension.

Speilberger, Gorsuch & Lushenes's (1970) five-item scale was employed in this study to measure state CA. State CA is thought to fluctuate according to the immediate demands inherent in a situation (McCroskey, 1984). This scale has been found to be of worth in related literature (e. g., Beatty, 1997). The reliability of this scale ranged from .88 to .86 in the pretest and post-test respectively.

Willingness to communicate.

The Willingness to Communicate (WTC) scale was used to collect data on an individual's general willingness to communicate (McCroskey & Richmond, 1991). The instrument consisted of twenty communication situations in which a participant may or may not choose to communicate. The reliability was .88 for the pre-test and .85 for the post-test data.

Self-perceived communication competence.

The Self-Perceived Communication Competence (SPCC) scale was used to collect data on a person's perception of his or her ability to communicate (McCroskey & McCroskey, 1988). The measure consisted of twelve situations in which a person might need to communicate. The SPCC asked a person to indicate how competently he or she believed she or he communicated in each of these situations. Reliability for this scale in this study was .84 for the pre-test data and .84 for the post-test data.

Treatments

Difficulties associated with public speaking apprehension have given rise to a number of interventions designed to help people cope with public speaking anxiety (Ayres, Hopf & Ayres, 1997; Friedrich, 1997; Kelly, 1997; Wilcox, 1997). This study was devoted to developing and testing a Virtual Reality Therapy instrument for treatment of public speaking anxiety compared to a visualization treatment and a control group.

Visualization (VIS).

The VIS treatment condition employed the video-taped visualization procedure developed by Ayres, et. al. (1993). The script asks a person to imagine a day on which she or he will deliver a speech. The person is taken through the day in a positive, upbeat fashion. At one point in the day, the person is illustrated delivering an admirable speech. The theoretical basis for the visualization process can be found in the works of Roberto Assagioli (1973, 1976), the developer of psychosynthesis. Piero Ferrucci (1982) has provided a step by step script for the visualization process.

Virtual reality therapy (VRT).

The VRT treatment condition employed an apparatus consisting of a Pentium based computer, head-mounted display and head-tracker (Virtual – I/O). The virtual auditorium is 48 feet wide, 50 feet long, and 55 feet high. Specialized features include a virtual wooden podium with a speaker's stand. An amplifier directly connected to the VRT software and hardware. This allowed the participants to hear his or her voices during the treatment session. Simulation of the echo of the real voice in the auditorium was created by a headphone attached to the head-mounted display. The treatment was scheduled one week prior to the students delivering an informative speech in their regularly scheduled public speaking course. The VRT conducted in this research was developed through a collaboration of Clark Atlanta University (CAU), the U.S. Army Research Laboratory and Boeing Computer Services, 1993.

Results

This study predicted that public speaking apprehensive people exposed to VRT would self-report lower levels of trait and state CA, self-report being more willing to communicate, and indicate having more self-perceived communication competence than those exposed to a Visualization treatment and a control group. These data were analyzed using a 3 x 4 table comparing pretest/post-test control group design. The independent variables consisted of the treatment conditions (VRT, VIZ, and a control group). The dependent variables are trait and state CA, Willingness to Communicate and Self-Perceived Communication Competence. (See Table 1 for means and standard deviations). This study employed *t*-tests to the dependant variable within the Visualization and Virtual Reality Therapy groups. The purpose of the *t*-test was two-fold. First, the *t*-tests were used to analyze the scores between the pretest and posttest data in both the visualization and Virtual Reality Therapy groups. Second, the *t*-test was appropriate in comparing the overall scores of the visualization group to the overall score of the Virtual Reality Therapy group to determine if visualization or Virtual Reality Therapy was more effective in reducing trait and state CA and increasing WTC and SPCC.

Individuals who participated in the visualization group reported a significant reduction at the .01 level in trait CA and state CA, t (39)= 4.46, $p < .01$; and t (39)= 4.60, $p < .01$ respectively. Participants in the visualization group also reported a significant increase in SPCC at the .01 level, t (39)= -3.74, $p < .01$. Participants in the visualization group also reported levels of WTC; however, these results were not significant t (39)= -1.60, $p > .05$.

Individuals participating in the Virtual Reality Therapy group reported a significant reduction in trait CA and state CA at the .01 level t (39)= 6.27, $p < .01$; and t (39)= 5.56, $p < .01$ respectively. Additionally, participants in the Virtual Reality Therapy group reported a significant increase in both WTC t (39)= -4.23, $p < .01$ and SPCC t (39)= -3.29, $p < .01$ respectively. Participants were also separated into a control group. Participants of the control group reported no significant change for trait CA, state CA, WTC, and SPCC ($p > .05$).

Table 1 Pre/Post-Test M, SD, and "N" Scores for the VRT, VIS, Control Conditions

	VRT Condition N=40		VIZ Condition N=40		Control Condition N=40	
	Mean	SD	Mean	SD	Mean	SD
Trait CA						
Pretest	16.7	4.75	14.3	4.69	20.5	2.7
Post-test	13.1	3.80	11.7	4.16	19.6	2.9
State CA						
Pretest	17.0	4.75	15.2	5.11	21.0	2.7
Post-test	13.7	4.50	12.4	4.40	20.4	3.0
WTC						
Pretest	125.1	35.61	35.1	31.1	198.1	31.9
Post-test	144.4	43.51	41.8	38.1	198.1	31.9
SPCC						
Pretest	829.3	24.09	00.0	21.9	900.2	26.0
Post-test	935.6	22.39	65.7	22.0	916.3	25.6

Both the visualization and Virtual Reality Therapy groups reported significance in reducing trait CA and state CA. Virtual Reality Therapy reported a significant increase in both WTC and SPCC, and visualization reported a significant increase in SPCC but not WTC. Furthermore, a *t*-test was applied to these data to compare whether visualization or Virtual Reality Therapy significantly influenced trait CA, state CA, WTC, and SPCC more. Results indicate that when comparing visualization to Virtual Reality Therapy, Virtual Reality Therapy had an overall stronger effect as a treatment for reducing trait CA and state CA and increasing WTC ($p < .01$). Results indicate that visualization was significantly more effective in increasing SPCC ($p < .01$).

Discussion

The purpose of this study was to determine whether students with public speaking anxiety self-reported lower levels of trait and state CA, reported being more Willing to Communicate in general, and reported higher levels of self-perceived communication competence after being exposed to Virtual Reality Therapy than those students who were exposed to a Visualization treatment (Ayres & Hopf, 1985, 1991). These data indicate that those exposed to the VRT treatment reported lower levels of trait and state CA, were more WTC, and indicated higher levels of SPCC. The VIS treatment also reported lower levels of trait and state CA, and an increase in SPCC, however WTC was not significant. The data revealed that the VRT treatment proved to be significantly more effective in reducing trait and state CA, and increase an individual's WTC in general more so than the VIS treatment. However, the VIS treatment indicated significance with regards to an individual's SPCC more so than VRT. Nonetheless, data revealed that VRT still significantly increased SPCC in students PSA. The control group indicated no significance at any level. Three of the four dependent variables in the hypothesis were supported.

Therefore, it appears that VRT reduces PSA, but other factors need to be considered. These findings are in accord with several previous studies (see North, North, and Coble 1996 for an overview of these studies) and reconfirms the usefulness of Virtual Reality Therapy in reducing PSA. This indicates that VRT affects the nature of trait and state CA, WTC, and SPCC that people have of themselves as public speakers. If proven accurate over time, it suggest, that VRT may prove to be an extremely useful addition to how we treat people with high levels of PSA. Eventually, VRT will need to be matched in head-to-head comparisons with other proven treatments, such as systematic desensitization (Wolpe, 1958), and skills training (Fremouw & Zitter, 1978; Fawcett & Miller, 1975) to determine the worth and validity of VRT as an overall treatment. Of course, all of this is largely conjecture at this time but certainly suggestive in nature. Obviously, this study contains a number of limitations that need to be addressed. One such limitation is that this study focused on public speaking and cannot be generalized to other context. It might be of interest to determine whether the same effects would emerge in other settings, for example, in small groups, interpersonal relationships, interviews, or meeting contexts? Research needs to be explored to verify such.

A second limitation is the size and homogeneity of the research subjects. Research needs to be conducted with larger, more diverse samples under different circumstances to augment the generalizability of these findings. Possibly with the psychological makeup between males and females being somewhat different there may be reason to focus on PSA males differently than PSA females, of a similar study. Also, these data may or may not impact people in other cultural contexts. For example, it may be possible for people of diverse cultures to experience VRT differently pending their cultural background and experience with technology and virtual reality worlds, particularly. Overall, these data suggest that, as hypothesized, Virtual Reality Therapy significantly reduces public speaking apprehension, enhances willingness to communicate and self-perceived communication competence.

More importantly, Virtual Reality Therapy appears to be more effective than Visualization (Ayres & Hopf, 1985, 1991) with regards to helping people with their PSA. This finding certainly poses the possibility that VRT can be used as a treatment technique to help public speaking teachers effectively reduce PSA and enhance individual's skills deficits with regards to public speaking. Lastly, this study offers evidence that Virtual Reality Therapy is an effective treatment that helps students reduce their PSA. Future research might examine the following: Does VRT affect males and females differently? Do people of diverse cultures experience VRT in different ways? Can VRT be used more effectively inside of the classroom verses an out of the classroom exercise? Can students use VRT by themselves and have a positive experience with preparing and delivering public speeches? Such questions need to be pedagogically approached and answered. Due to the implications this has for both theory and practice with regards to Virtual Reality Therapy, further research should be considered.

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