

Research Report

DOUBLE-BLIND TESTS OF SUBLIMINAL SELF-HELP AUDIOTAPES

Anthony G. Greenwald,¹ Eric R. Spangenberg,² Anthony R. Pratkanis,³ and Jay Eskenazi⁴

¹University of Washington, ²Washington State University, ³University of California, Santa Cruz, and ⁴University of California, Santa Barbara

Abstract—Three replications of a double-blind experiment tested subliminal audiotape products that were claimed to improve memory or to increase self-esteem. Conditions of use adhered to manufacturers' recommendations, and subjects ($N = 237$) were limited to persons who desired the effects offered by the tapes. Actual content and labeled content of tapes were independently varied, so that some subjects who believed they were using memory tapes were actually using self-esteem tapes, and vice versa. After a month of use, neither the memory nor the self-esteem tapes produced their claimed effects. Nevertheless, a general improvement for all subjects in both memory and self-esteem (a nonspecific placebo effect) was observed, and more than a third of the subjects had the illusion of improvement specific to the domain named on the tape's label.

Subliminal self-help (SSH) audiotapes are widely advertised as being able to produce many desirable effects, including weight loss, smoking cessation, anxiety reduction, and improvement of sexual function. In ordinary use, purchasers of SSH tapes know and desire the target effect, which is clearly marked on the tape label and in accompanying literature. However, in listening (perhaps daily) to the tape, the user may hear nothing relevant to the target effect. The audible content of the tape typically consists of relaxing material, often music or recorded nature sounds.

There are numerous reports of claimed therapeutic effects of subliminal audiotapes, but no such report has ap-

peared in a competitively refereed psychology journal. Further, many of these reports have been produced by researchers associated with manufacturers of the tapes (Becker & Charbonnet, 1980; Borgeat & Chaloult, 1985; Doche-Budzynski & Budzynski, 1989; Taylor, 1988; VandenBoogert, 1984; see review by Eich, in press).

The present research was conducted to provide a rigorous assessment of therapeutic effectiveness of selected SSH audiotapes. Four aspects of procedure were essential to the experimental protocol. First, a double-blind method was used in order to separate effects of subliminal content from possible placebo effects. Second, conditions closely resembled the conditions of ordinary use of SSH tapes, in order not to omit contextual aspects of the ordinary procedure that might be necessary to claimed effects. Third, the research used subjects who were motivated to achieve the goals claimed by the tapes, because such motivation is plausibly a precondition for occurrence of claimed effects and is a condition that applies generally in the marketplace. And, fourth, the research used both pretest and posttest measures of status relative to the target goals, in order to obtain the increased sensitivity afforded by analyses of covariance with pretests used as covariates.

Among the target goals for which SSH tapes were available from several manufacturers, improving memory and increasing self-esteem were selected both because it was easy to locate subjects who desired these goals, and because several well-established measures that could be used in a pretest-posttest design were available. Some manufacturers generously provided multiple copies of their tapes for the research; with manufacturers' permission, we also duplicated mail-ordered tapes for use in the research. Audible identifications of contents (at the beginnings of some of the tapes) were carefully and selectively

erased by an audio laboratory prior to giving any tapes to subjects.¹

METHOD

The research was conducted in three similar replications.² Subjects were recruited from the student and adult populations of university communities; posters and newspaper advertisements sought the participation of volunteers who were interested in participating in a study of memory and self-esteem subliminal audiotapes. Of 288 volunteers (186 female, 102 male) who completed pretests, 237 (82%; 149 female, 88 male) returned to complete posttests at the end of one month of SSH tape use. Tapes provided by three manufacturers were used in the course of the research; their audible content consisted of classical

1. In obtaining tapes for the research, we proposed that no manufacturers' names would be included in reports of this research. This removed the possibility of conflict of interest on the part of researchers, and also eliminated any possibility that the results might be interpreted as either an endorsement or criticism of specific brands.

2. One replication was conducted in Santa Cruz, California, and two were conducted in Seattle, Washington. The Santa Cruz and the second Seattle replication were identical in design; the first Seattle replication differed by adding weight loss as an additional studied goal. No effects of any kind were found for weight loss. In the combined analysis reported here, subjects who received weight-loss tape products or labels are grouped with those who received memory tapes or labels, as appropriate, in analyses of the self-esteem results, and with those who received self-esteem tapes or labels, as appropriate, in analyses of the memory results. Analyses showed no significant interaction effects involving replication as a design factor, as a consequence of which we omit report of the replication factor in presenting results (see Pratkanis, Eskenazi, & Greenwald, 1990, and Spangenberg, 1990, for detailed reports of the individual studies).

Address correspondence to A.G. Greenwald, Dept. of Psychology, NI-25, University of Washington, Seattle, WA 98195. Telephone: (206) 543-7227, email: agg@u.washington.edu.

Double-Blind Tests of Subliminal Tapes

music, popular music, or recorded nature (surf or woodlands) sounds. (A preliminary analysis tested for differences among the tapes provided by the three manufacturers; no differences were found, and the results below are reported for a design that did not include manufacturer as a variable.)

The research used a within-subjects double-blind procedure that is possible when two (or more) treatments that have different target effects are perceptually indistinguishable. After completing both memory and self-esteem pretests, each subject was given a tape to which a memory or self-esteem label had been randomly assigned. As a consequence of this procedure, for example, subjects who received a self-esteem-labeled memory tape served simultaneously as treatment subjects for the memory tape and as placebo subjects for the self-esteem tape. (In the informed consent procedure, subjects had indicated interest in receiving either tape and had agreed to be randomly assigned to a tape, but were not explicitly informed that they might receive a mislabeled tape.)

Although the specific measures that were used varied across replications, each replication included three measures of self-esteem (e.g., Coopersmith, 1967; Rosenberg, 1965) and three or four measures of memory (e.g., Wechsler, 1945). After the pretest administration of these measures, tapes were randomly assigned to subjects, who were asked to listen to the tape every day for one month, which is a period indicated by most SSH tape vendors as sufficient to produce advertised effects. Subjects returned within 5 weeks to the laboratory for the posttest session, which included self-esteem and memory tests parallel to the pretest. (Memory test materials were varied between pretests and posttests, with order counterbalanced across subjects, in order to avoid specific practice effects.) The posttest session also included single items to assess self-perceived improvement in memory ability and in self-esteem (e.g., "Do you feel that the tape has improved your memory?" [answered "yes" or "no"].)

RESULTS

As expected, each memory and self-esteem test was strongly correlated with

other tests of the same construct, whereas memory and self-esteem were uncorrelated (overall $r = -.06$ for combined memory and self-esteem scores at pretest). Each replication's data were prepared for analysis by converting each pretest self-esteem and memory scale to standard-score form (zero mean, unit variance, standardizing across subjects who completed posttests). The multiple pretest measures for self-esteem were then averaged into a single pretest self-esteem measure, and similarly for memory. Next, the parallel posttest scales were standardized and combined. The posttest scales were standardized using the mean and standard deviation for the corresponding pretest scale, in order to preserve both the scale unit and the direction of posttest change relative to pretest. The major tests of significance were then conducted as analyses of covariance in the 2 (subliminal content: self-esteem vs. memory) \times 2 (tape label: self-esteem vs. memory) design of each experiment, using the combined posttest measure as criterion and the combined pretest measure as covariate.³ Analyses were conducted separately for the self-esteem and memory measures. A 2-tailed $\alpha = .05$ criterion was used for significance tests.

The main results are shown in Figure 1. If the claimed subliminal content effects had materialized, there should have been higher posttest memory scores for subjects receiving subliminal memory content than for those receiving self-esteem content, and higher posttest self-esteem scores for those who received subliminal self-esteem content than for

those who received memory content. The results tended to be opposite to these expectations. For memory (see Fig. 1B), the findings were nonsignificant [$F(1, 224) < 1$], but for self-esteem (see Fig. 1A), the data were unexpectedly significant in the direction opposite to the claimed effect [$F(1, 224) = 9.12$]. It is clear that the claimed effects did not materialize.

Figure 1 shows that posttest means tended to be greater in the domain corresponding to the label on the assigned tape than in the domain not named on the label. This effect, however, was weak and not statistically significant [for self-esteem, $F(1, 224) < 1$; for memory, $F(1, 224) = 2.19$, ns].

Figure 1 also shows that all posttest means were substantially above zero, indicating that both self-esteem and memory scores generally increased above their pretest levels (which were standardized at a mean of zero). These increases were strong effects, as can be seen by comparing them to the standard errors of means shown in Figure 1. [For self-esteem, $F(1, 224) = 116.73$, $p < .001$; for memory, $F(1, 224) = 52.91$, $p < .001$.] This result may be a nonspecific placebo effect—an improvement of subjects' memory and self-esteem by virtue of being in the experiment, independent of condition assignment. It is also possibly a practice effect, especially in the case of the memory measures, for which the use of similar items at pretest and posttest might have led to some general improvement.

Figure 2 gives the findings for measures of self-perceived improvement. There were no effects of subliminal content on these measures (F s < 1 for both memory and self-esteem). At the same time, the data showed clearly that subjects tended to believe that they had improved in the domain corresponding to the label on their assigned tape. Overall, approximately 50% of subjects believed that they had improved in the domain corresponding to the label they received, compared to only about 15% believing they had improved in the domain corresponding to the label not received. For the effect of tape label on self-perceived improvement in memory, $F(1, 211) = 28.20$, $p < .001$; for self-esteem, $F(1, 125) = 24.40$, $p < .001$ (degrees of freedom are lower for self-esteem because

3. As a check on the appropriateness of our use of analysis covariance, the data were first examined to assess homogeneity of within-group regression slopes of posttest measures on their associated pretests (see Cohen & Cohen, 1983, p. 319). These slopes were homogeneous for all of the posttest measures (F ratios < 2), indicating that covariance analyses were valid. Next, we looked for pretest differences between treatments. One such difference was found, consisting of lower pretest self-esteem among subjects who received tapes with self-esteem labels than among those who received tapes with memory labels. This difference could reduce the accuracy of the test of tape label on self-esteem, but does not affect the focal test for effects of actual subliminal content.

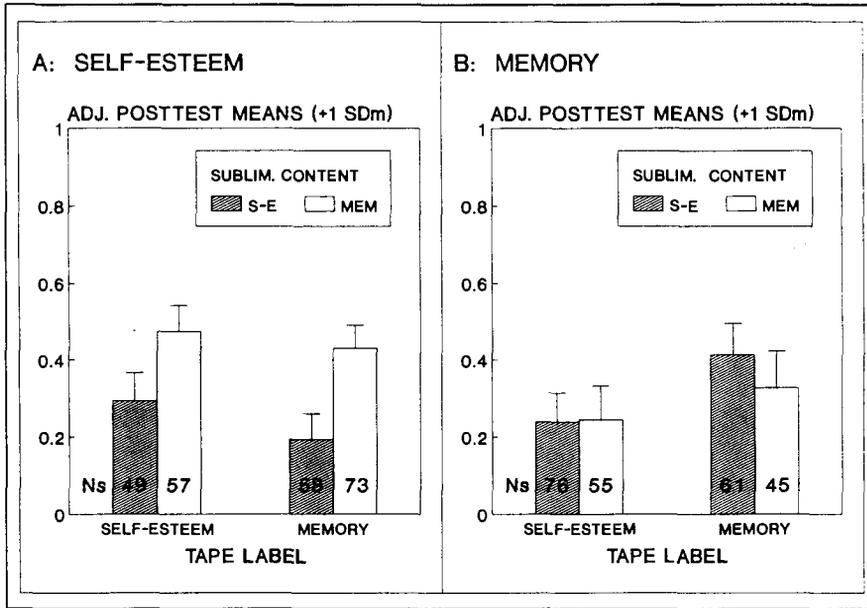


Fig. 1. Adjusted posttest means as a function of audiotape subliminal content and tape label. The dependent variable is the average of standardized scores on multiple self-esteem or memory scales; zero is at the mean of pretest scores.

the measure for self-esteem was not included in one replication).

DISCUSSION

The double-blind design permitted separation of subliminal content effects

from placebo (or label) effects. The results established that there was no trace of a subliminal content effect corresponding to manufacturers' claims. There was a suggestion of a placebo effect associated with subjects' belief about which tape they had received, but this was not statistically significant de-

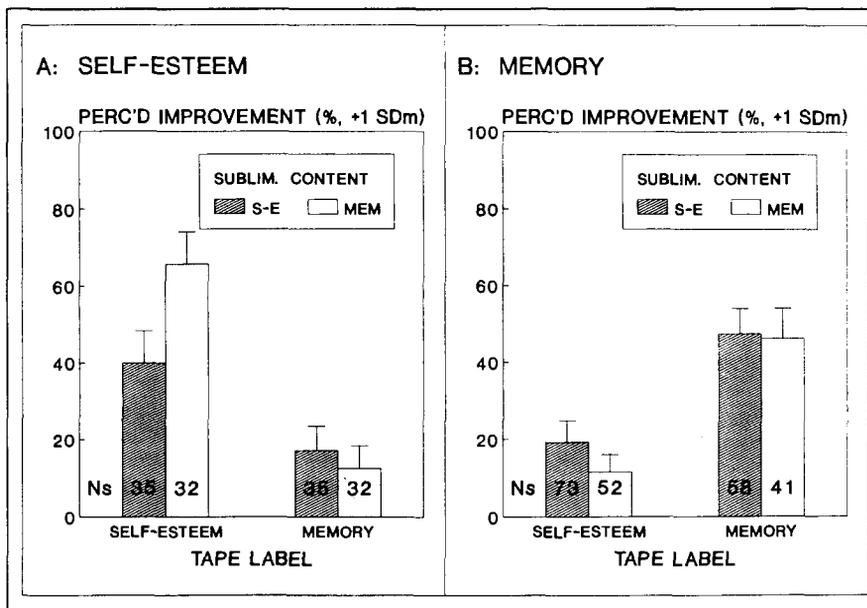


Fig. 2. Percent of subjects perceiving improvement in self-esteem and memory as a function of audiotape subliminal content and tape label.

spite the design's substantial power to detect a relatively small effect.⁴

The strong effect of tape label on measures of self-perceived improvement, coupled with its lack of significant effect on the multiscale measures of the target effects, indicates that the effect of tape label on perceived improvement is not mediated by any effect of tape label on actual changes in self-esteem and memory (see Baron & Kenny, 1986). The effect of tape label on perceived improvement can therefore be described as an *illusory* placebo effect. Other such illusions—i.e., that a treatment produced its expected effect—have recently been demonstrated in several other domains (Conway & Ross, 1984; Ross, 1989).

The significant reverse-direction effect of the SSH tapes that were designed to increase self-esteem is not explainable from any theoretical perspective of which we are aware. On the one hand, these unexpected findings allow an even stronger conclusion than simple nonconfirmation of the claimed product effect; they allow statistical rejection of any hypothesis of an effect in the claimed direction. On the other hand, it might be argued that any effect of subliminal content, even one opposite from expectation, indicates some unconsciously mediated effect. This is a variant on the argument offered by researchers on extrasensory perception (ESP or psi) that reverse effects are expected from skeptical subjects ("goats"), and thus confirm the validity of psi (see Alcock, 1987; Rao & Palmer, 1987). However, this explanation should not be applied to the present research, because our subjects were not skeptics. Rather, our subjects volunteered in the hope of experiencing improvement, and at the end of the experiment many believed that the tapes had been effective.

4. The sample size of 237 provided power (probability of detecting an effect at the 2-tailed $\alpha = .05$ level) of .90 for a main-effect difference between treatment means of .166 on the combined posttest self-esteem measure of Figure 1; for memory, there was power of .90 to detect a treatment difference of .206. For comparison, Cohen's (1977) standard "small" effect corresponds to mean differences of .164 in self-esteem and .182 in posttest memory; our design had power, respectively, of .897 and .871 to detect these small effects.

Double-Blind Tests of Subliminal Tapes

Our research demonstrated no effects corresponding to the subliminal content effects claimed by manufacturers, but did demonstrate two substantial placebo effects. One was a nonspecific placebo effect—an across-the-board increase in memory and self-esteem that was independent of condition assignment. This result has many potential explanations that cannot be selected among on the basis of our design. Perhaps the least interesting of these is that the result might be due to practice provided by the pretest. That explanation can easily be tested by using a Solomon (1949) four-group design, in which half of the subjects receive a tape treatment and half do not, and within each of those groups half of the subjects receive posttests without having been previously pretested. The second placebo effect was confined to measures of self-perceived improvement, and was specific to the dimension for which subjects believed their tape had been designed. Although this effect of tape label on self-perceived improvement was illusory (in the sense of not being determined by gains on the multiscale measures of the target dimensions), nevertheless it may be worthy of further exploration. That is, such an illusory placebo effect may have the potential to become an actual effect by mechanisms of expectancy or self-fulfilling prophecy (Darley & Fazio, 1980; Orne, 1969; Rosenthal, 1969; Ross & Olson, 1981).

CONCLUSION

The experiments described in this report are the most extensive double-blind tests yet conducted of claimed therapeutic effects of audiotapes having subliminal verbal content. The findings showed

clearly that subliminal audiotapes designed to improve memory and to increase self-esteem did not produce effects associated with subliminal content. Pending further double-blind research, it seems most prudent to regard the general class of claims for therapeutic efficacy of subliminal audio content as lacking in empirical foundation.

Acknowledgments—This research was supported in part by a research grant from the National Institute of Mental Health (MH41328). The authors thank Jonathon D. Brown and Timothy E. Moore for comments on a preliminary draft. The research was conducted while Eric R. Spangenberg was at the University of Washington, and Jay Eskenazi at the University of California, Santa Cruz.

REFERENCES

- Alcock, J.E. (1987). Parapsychology: Science of the anomalous or search for the soul? *Behavioral and Brain Sciences*, *10*, 553-643.
- Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182.
- Becker, H.C., & Charbonnet, K.D. (1980, March). Applications of subliminal video and audio stimuli in therapeutic, educational, industrial, and commercial settings. Presented at meetings of Northeast Bioengineering Conference, Cambridge, MA.
- Borgeat, F., & Chaloult, L. (1985). A relaxation experiment using radio broadcasts. *Canada's Mental Health*, *33*, 11-13.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (rev. ed.). New York: Academic Press.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Conway, M., & Ross, M. (1984). Getting what you want by revising what you had. *Journal of Personality and Social Psychology*, *47*, 738-748.
- Coopersmith, S. (1967). *The antecedents of self-esteem*. San Francisco: Freeman.
- Darley, J.M., & Fazio, R.H. (1980). Expectancy confirmation processes arising in the social interaction sequence. *American Psychologist*, *35*, 867-881.
- Doche-Budzynski, L., & Budzynski, T.H. (1989). Subliminal self-esteem enhancement in adult Type A males. *Education*, *110*, 50-56.
- Eich, E. (in press). Subliminal self-help. In R.A. Bjork & D. Druckman (Eds.), *In the mind's eye: Understanding the basis of human performance*. Washington, DC: National Academy Press.
- Orne, M.T. (1969). Demand characteristics and the concept of quasi-controls. In R. Rosenthal & R.L. Rosnow (Eds.), *Artifact in behavioral research* (pp. 143-179). New York: Academic Press.
- Pratkanis, A.R., Eskenazi, J., & Greenwald, A.G. (1990). What you expect is what you believe (but not necessarily what you get): On the ineffectiveness of subliminal self-help audiotapes. Unpublished manuscript, University of California, Santa Cruz.
- Rao, K.R., & Palmer, J. (1987). The anomaly called psi: Recent research and criticism. *Behavioral and Brain Sciences*, *10*, 539-643.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Rosenthal, R. (1969). Interpersonal expectations: Effect of the experimenter's hypothesis. In R. Rosenthal & R.L. Rosnow (Eds.), *Artifact in behavioral research* (pp. 181-277). New York: Academic Press.
- Ross, M. (1989). Relation of implicit theories to the construction of personal histories. *Psychological Review*, *96*, 341-357.
- Ross, M., & Olson, J.M. (1981). An expectancy-attribution model of the effects of placebos. *Psychological Review*, *88*, 408-437.
- Solomon, R.L. (1949). An extension of control group design. *Psychological Bulletin*, *46*, 137-150.
- Spangenberg, E.R. (1990). An empirical test of subliminal self-help audiotapes: Are expectancies the active ingredient? Unpublished doctoral dissertation, University of Washington.
- Taylor, E. (1988). *Subliminal learning: An eclectic approach*. Salt Lake City: Just Another Reality Publishing.
- VandenBoogert, C. (1984). A study of Potentials Unlimited subliminal persuasion/self-hypnosis tapes. Grand Rapids, MI: Potentials Unlimited, Inc.
- Wechsler, D. (1945). A standardized memory scale for clinical use. *Journal of Psychology*, *19*, 87-95.

(RECEIVED 7/24/90; REVISION ACCEPTED 10/12/90)