A Meta-Analysis of Gender, Smoking Cessation, and Hypnosis: A Brief Communication

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A META-ANALYSIS OF GENDER, SMOKING CESSATION, AND HYPNOSIS:
A Brief Communication

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Abstract: Results of a meta-analysis showed that males were more likely to report smoking abstinence than female participants following hypnosis-based treatments for smoking. Across 12 studies that used hypnosis in the treatment of smoking and reported outcome statistics by gender, the authors found that the odds of achieving smoking abstinence were 1.37 times greater for male than female participants. The results are consistent with the nonhypnosis literature suggesting that females have a more difficult time achieving smoking abstinence compared to males.

Within the nonhypnosis literature, several studies have concluded that women are less successful achieving smoking abstinence and are more likely to relapse than are men (e.g., Blake et al., 1989; Hatsukami, Skoog, Allen, & Bliss, 1995; Killen, Fortmann, Newman, & Varady, 1990; Perkins et al., 1996; Swan, Ward, Jack, & Javitz, 1993; Wetter et al., 1999). Unfortunately, the hypnosis literature has paid relatively little attention to gender in predicting smoking cessation. Of the 59 studies reviewed by Green and Lynn (2000), only 14 of them (24%) reported analyzing for gender differences, and several of these studies failed to report final outcome statistics by gender. The present study was motivated by the perception of a need to more closely examine whether gender differences comparable to those found in the general smoking-cessation literature would be revealed across hypnosis smoking-cessation studies.

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METADATA ANALYSIS OF GENDER AND SMOKING CESSATION

METHOD

We identified 12 studies that used hypnosis as a component of treatment for smoking cessation and specifically reported smoking abstinence rates by gender. For each report, we catalogued the following information: (a) sample size; (b) length of follow-up; (c) total abstinence rate (collapsing across gender); (d) whether abstinence rates differed by gender; (e) abstinence rates for females and males; (f) treatment characteristics (i.e., type, format, and intensity); and (g) the effect size associated with being male. Across the studies, abstinence was defined as total abstinence from smoking between the end of treatment and follow-up. Whenever possible, we recalculated abstinence rates to include dropouts as failures. Because of this, the data listed in Table 1 may be somewhat different from that reported in the original articles.

Calculation of Effect Sizes

Given the dichotomous nature of our variables of interest, we calculated an odds ratio for each report. Odds ratios are based on cell frequencies (denoted in the following formula with letters a through d) or proportions (P) from a $2 \times 2$ (e.g., male/female; success/failure) cross-tabulation table:

$$ES_{OR} = \frac{ad}{bc} = \frac{P_a P_d}{P_b P_c}$$

(If $a$, $b$, $c$, or $d = 0$, .5 was added to all cells; see Lipsey & Wilson, 2001)

The odds ratio has the peculiarity of being centered around 1, rather than zero, with values between 0 and 1 indicating a negative relationship. In order to simplify interpretation of the odds ratio, we calculated the natural log of the odds ratio (Lipsey & Wilson, 2001). The distribution of the logged odds ratio is approximately normal with a mean of 0 and a standard deviation of 1.83. The logged odds ratio, standard error, and inverse variance weight ($w$) were calculated as follows:

$$ES_{LOR} = \log_e (ES_{OR})$$

$$SE_{LOR} = \sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}$$

$$w_{LOR} = \frac{1}{SE_{LOR}^2}$$
Table 1
Abstinence Rates by Gender Across Smoking Cessation Studies Involving Hypnosis and the Effect Size of Being Male

<table>
<thead>
<tr>
<th>Study</th>
<th>Treatment Key</th>
<th>N</th>
<th>Follow up (mos)</th>
<th>Percent Abstinent (Total)</th>
<th>Number Abstinent / Total</th>
<th>Log Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahijevych &amp; Nedelski, 2000</td>
<td>H — hypnosis was the principle intervention strategy (e.g., hypnotic suggestions to resist smoking urges; visualizing self as a nonsmoker and/or mentally rehearsing behavioral substitution during hypnosis); HRS — hypnosis combined with rapid smoking; HCS — hypnosis combined with covert sensitization (e.g., noxious imagery of smoking and associated negative health effects); HIG — hypnosis combined with intensive group counseling. Treatment format: I = individual; G = group.</td>
<td>452</td>
<td>5–15</td>
<td>22</td>
<td>54/269 (20%)</td>
<td>47/183 (26%)</td>
</tr>
<tr>
<td>Barber, 2001</td>
<td>HRS</td>
<td>54</td>
<td>6–36</td>
<td>87</td>
<td>25/30 (83%)</td>
<td>22/24 (92%)</td>
</tr>
<tr>
<td>Elkins &amp; Rajab, 2004</td>
<td>H</td>
<td>21</td>
<td>12</td>
<td>33</td>
<td>5/9 (56%)</td>
<td>5/12 (42%)</td>
</tr>
<tr>
<td>Grosz, 1978††</td>
<td>H</td>
<td>479</td>
<td>3</td>
<td>44</td>
<td>123/277 (44%)</td>
<td>88/202 (44%)</td>
</tr>
<tr>
<td>Hart, 1992††</td>
<td>H</td>
<td>33</td>
<td>1</td>
<td>67</td>
<td>16/25 (64%)</td>
<td>6/8 (75%)</td>
</tr>
<tr>
<td>Horwitz et al., 1985††</td>
<td>H</td>
<td>219</td>
<td>12</td>
<td>26</td>
<td>31/149 (21%)</td>
<td>25/70 (36%)</td>
</tr>
<tr>
<td>Johnson &amp; Karkut, 1994</td>
<td>HRS</td>
<td>186</td>
<td>3</td>
<td>86</td>
<td>81/93 (87%)</td>
<td>80/93 (86%)</td>
</tr>
<tr>
<td>Kline, 1970††</td>
<td>HIG</td>
<td>60</td>
<td>12</td>
<td>88</td>
<td>10/10 (100%)</td>
<td>43/50 (86%)</td>
</tr>
<tr>
<td>Marriott &amp; Brice, 1990</td>
<td>H</td>
<td>34</td>
<td>3</td>
<td>29</td>
<td>8/23 (35%)</td>
<td>2/11 (18%)</td>
</tr>
<tr>
<td>Owens &amp; Samaras, 1981††</td>
<td>H</td>
<td>466</td>
<td>6–9</td>
<td>27</td>
<td>63/269 (23%)</td>
<td>65/197 (33%)</td>
</tr>
<tr>
<td>Sorensen et al., 1995††</td>
<td>H</td>
<td>2,642</td>
<td>12</td>
<td>16</td>
<td>239/1717 (14%)</td>
<td>179/925 (19%)</td>
</tr>
<tr>
<td>Straatmeyer, 1984</td>
<td>HCS</td>
<td>108</td>
<td>9</td>
<td>22</td>
<td>14/64 (22%)</td>
<td>10/44 (23%)</td>
</tr>
</tbody>
</table>

Notes. Outcome statistics for the Barber (2001) study were updated since the published report (Barber, personal communication, November 1, 2004). Gender statistics for the Ahijevych & Nedelski (2000), Elkins & Rajab (2004), and Hart (1992) studies were obtained from the authors (personal communications: Ahijevych, March 18, 2002; Elkins, May 7, 2004; and Hart, May 5, 2004).
For each of the reports, we calculated the effect size of a successful outcome associated with being male versus female. Logged odds ratios along with their 95% confidence intervals are listed in Table 1.

Meta-Analyses Formulas

Following the recommendations of Lipsey and Wilson (2001), a mean effect size (\( \bar{ES} \)) was calculated across reports by weighting each \( ES_i \) by the inverse variance (\( w_i \)). The mean effect size, standard error of the mean, and the 95% confidence intervals around the mean were calculated as follows:

\[
\bar{ES} = \frac{\sum(w_i ES_i)}{\sum w_i}
\]

\[
SE_{\bar{ES}} = \sqrt{\frac{1}{\sum w_i}}
\]

\[
\bar{ES}_L = \bar{ES} - 1.96 (SE_{\bar{ES}})
\]

\[
\bar{ES}_U = \bar{ES} + 1.96 (SE_{\bar{ES}})
\]

The significance of the mean effect size was determined by computing a \( z \) test:

\[
z = \frac{\bar{ES}}{SE_{\bar{ES}}}
\]

Finally, we performed a homogeneity test on the distribution of the effect sizes to determine whether all of the effect sizes estimated the same population effect:

\[
Q = \sum w_i ES_i^2 - \frac{\sum(w_i ES_i)^2}{\sum w_i}
\]

The \( Q \) statistic is distributed as a chi square with \( k-1 \) degrees of freedom, where \( k \) is the number of effect sizes (see Lipsey & Wilson, 2001).

RESULTS

Descriptive Statistics

For each individual study, chi-square tests were performed to examine the frequency of successfully stopping smoking among male and
female participants. Abstinence rates among male and female participants differed across 3 of the 12 reports (i.e., Horwitz, Hindi-Alexander, & Wagner, 1985; Owens & Samaras, 1981; Sorensen, Beder, Prible, & Pinney, 1995). In each case, a higher percentage of males achieved smoking abstinence following treatment relative to females (36 vs. 21%; 33 vs. 23%; 19 vs. 14%, respectively). None of the reports that we reviewed found females to be more successful than males in stopping smoking. Collapsing across all 12 reports, 26.1% of the entire sample (total \(N = 4,754\)) reported being completely abstinent from smoking at follow-up. Male participants (34.1%) were more likely to report being abstinent from smoking than female participants (22.8%), \(\chi^2(1; N = 4,754) = 43.58, p < .001\).

**Meta-Analyses**

We obtained a mean effect size of \(\overline{ES}_{LOR} = 0.31\), and 95% confidence intervals of \(\overline{ES}_L = 0.17\) and \(\overline{ES}_U = 0.46\). Results indicated that males were more likely to succeed in a hypnosis-based approach relative to females, \(z = 4.22, p < .01\). The variance within this sample of effect sizes was not demonstrably greater than would be expected from sampling error alone, \(Q = 10.33, ns\). The antilog of the \(\overline{ES}_{LOR}\) produced an odds ratio mean effect size \(\overline{ES}_{LOR} = 1.37\) (95% confidence intervals = 1.18, 1.58). This means that the odds of successfully quitting smoking were 1.37 times greater for males than for female participants.

Another meta-analysis was performed on the studies that relied on hypnosis and suggestion-based interventions as the principle intervention (identified in Table 1). Among these eight studies, we obtained an \(\overline{ES}_{LOR} = 0.33\) (95% confidence intervals = 0.18, 0.49), \(z = 4.36, p < .01\). As before, we failed to reject the hypothesis of homogeneity, \(Q = 7.62, ns\). The \(\overline{ES}_{LOR} = 1.40\) (95% confidence intervals = 1.20, 1.63) indicated that the odds of successful treatment were 1.40 times greater for males than females following smoking cessation interventions that had hypnosis as the principle treatment.

It is apparent from Table 1 that the Sorensen et al. (1995) study is an influential report based on its large sample size. The Sorensen et al. sample (\(N = 2,642\)) represented more than half (55.6%) of the total number of participants across all 12 studies. Given its large sample size and the fact that the Sorensen et al. study was one of three studies reporting a gender difference, we examined the possibility that our above findings might be attributable to the relatively large influence of this study. Excluding the Sorensen et al. study, we obtained an effect size of \(\overline{ES}_{LOR} = 0.24\) across the remaining 11 studies, and an \(\overline{ES}_{LOR} = 0.27\) across the seven studies that used hypnosis as the principle treatment.
intervention, both $p < .05$. Excluding the Sorensen et al. study had the effect of increasing the overall success rate among male and female participants. That is, without the Sorensen et al. data, the overall success rate for both male and female participants increased to 38.9%.

Correlational Analyses

Across all 12 studies, the overall success rate correlated with the intensity of treatment (i.e., the number of hours of treatment), $r = .80$, $p < .01$. Although not reaching statistical significance, the overall success rate, as expected, negatively correlated with length of follow-up, $r = -.26$, $p = .42$.3 The correlations did not differ as a function of gender (both $z$ transformation of $r$ tests were less than 0.16; $ps > .05$).

DISCUSSION

The results of our review suggest that there is a link between gender and outcome when employing hypnosis-based treatments for smoking cessation. When data across all 12 reports were combined (involving more than 4,700 treatment participants), an appreciable advantage for males emerged. The odds of successfully quitting smoking were 1.37 times greater for male participants than the odds for quitting among female participants. When only those studies with hypnosis as the principal treatment were analyzed, the advantage for males was reflected in an odds ratio of 1.40. On average (across all 12 studies), about 31% of males treated with a hypnosis-based treatment were abstinent at the end of the follow-up period compared to 23% of females.

Although the inclusion or exclusion of the Sorensen et al. (1995) study did not affect the principal finding that males are more likely to succeed in hypnosis-based treatments for smoking cessation, the study influenced the overall abstinence rate reported in this review. Across all 12 studies, the average success rate was approximately 26% among male and female participants. When we excluded data from the Sorensen et al. study, the average success rate increased to nearly 39%. Because the Sorensen et al. study resulted in the lowest success rate of all of the studies reviewed, a closer inspection of the Sorensen et al. methodology is warranted.

The Sorensen et al. (1995) treatment involved a 90-minute group seminar in which three hypnotic exercises were taught to help participants stop smoking. The sample consisted of individuals employed by the New England Telephone company (NET). Following a company

3Among studies reporting a range in the number of treatment hours, we used the highest value for calculation of the correlation coefficient. Among studies reporting a range in follow-up assessment, we used the shortest follow-up period for the correlational analyses.
instituted workplace ban on smoking, the hypnosis treatment program was offered during regular work hours, free of charge to all employees. Seventy-one percent of identified smokers participated. The single session intervention resulted in a 15.8% success rate at 12-month follow-up. Although in some respects the results from this low-intensity program are impressive, individuals who seek treatment to comply with a company policy banning smoking may well be differentially motivated than those who seek treatment on their own. Another consideration, as noted by Green and Lynn (2000), as well as by Holroyd (1991) and Barabasz, Baer, Sheehan, and Barabasz (1986), is that success rates of hypnosis-based treatments for smoking cessation often are a function of treatment intensity. Although intensified hypnosis-based treatments (e.g., multiple sessions, individualized treatment plans) tend to outperform low-intensity treatments, they do not guarantee better results (cf., Frank, Umlauf, Wonderlich, & Ashkanazi, 1986).

Although only one of the correlational analyses was statistically significant, results were in the direction of higher success rates among those studies employing more intensive treatments and whose follow-up periods were relatively shorter in duration. In our analyses, a single abstinence rate at a specified follow-up period of time was used for each study. In contrast, Spiegel, Frischholz, Fleiss, and Spiegel (1993) plotted relapse rates at multiple points in time for each of 11 studies that used a single session of hypnosis for smoking cessation. They found that recidivism rates of smoking tended to reach asymptotic levels approximately 6 months after treatment. Although the likelihood of recidivism declines with each successful month of not smoking (see Ockene et al., 2000), individuals who have successfully quit must continually be vigilant against the possibility of relapse.

In summary, our review offers the strongest evidence to date that the outcome of smoking cessation treatments involving hypnosis varies by gender. Of the 12 studies reviewed, three found higher success rates among males whereas none of the studies found an advantage for females. When the findings were collapsed across studies, it was apparent that the odds of quitting smoking following hypnosis-based treatments for smoking is higher for men than women.

Several limitations of this review are worthy of consideration. First, all of the studies reviewed were either clinical reports lacking control groups or, if more than one treatment approach was used, random assignment of patients to condition was not implemented. As such, demographic characteristics such as age, education level, motivation, smoking history, social support, and previous quit attempts were not taken into consideration when gender differences in outcome were considered. Combining data across studies that varied in length of follow-up may also be risky as our results suggest that success rates may be associated with length of follow-up.
It is important to point out that all of the studies relied on self-report to determine smoking abstinence. The failure to use biochemical measures to validate self-reports of smoking abstinence is a limitation common to most hypnosis-based studies of smoking cessation (see Green & Lynn, 2000). Future studies should either match female and male participants on important demographic variables or statistically control for such variables in order to isolate the effects of gender differences in hypnosis-based treatments for smoking cessation. Researchers should report gender differences across all of the measures of outcome, motivation, and variables thought to moderate or mediate treatment success. Ideally, studies should follow participants for up to 2 years, as per the Surgeon General’s recommendation (U.S. Department of Health and Human Services, 1990). These recommendations aside, it appears that the extant hypnosis literature is not inconsistent with the nonhypnosis literature indicating that women may have a more difficult time quitting smoking than men.

REFERENCES


*Studies with asterisks are those used in meta-analysis.


Metaanalyse von Geschlecht, Raucherentwöhnung und Hypnose: Ein Kurzbeitrag

Joseph P. Green, Steven Jay Lynn und Guy H. Montgomery

Zusammenfassung: Eine Metaanalyse ergab, dass nach hypnotischen Entwöhnungsbehandlungen Männer häufiger als Frauen Abstinenz vom Rauchen berichten. Über zwölf Studien, bei denen Hypnose in der Behandlung eingesetzt wurde und in denen Ergebnisstatistiken getrennt
nach Geschlecht berichtet wurden, fanden die Autoren, dass das Chancenverhältnis für die Erreichung des Abstinenzkriteriums für Männer gegenüber den Frauen 1.37 betrug. Dieses Ergebnis steht im Einklang mit den Befunden aus nichthypnotischen Behandlungen, in denen ebenfalls berichtet wird, dass es Frauen schwerer fällt als Männern, Abstinenz bezüglich des Rauchens zu erreichen.

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University of Konstanz, Konstanz, Germany

Une méta-analyse du genre, arrêt du tabac, et hypnose: communication brève

Joseph P. Green, Steven Jay Lynn, et Guy H. Montgomery
Résumé: les résultats d’une méta-analyse montrent que les hommes font plus part d’un arrêt du tabac que les femmes ayant participés à un traitement d’arrêt du tabac basé sur l’hypnose. Parmi 12 études utilisant l’hypnose dans le traitement anti-tabac et qui ont fait part des résultats statistiques par genre, les auteurs trouvent que les chances de succès de l’abstinence sont 1.37 plus grandes chez les participants hommes que chez les femmes. Ces résultats sont consistants avec la littérature non liée à l’hypnose qui rapportent que, comparées aux hommes, les femmes ont plus de difficulté de s’abstenir de fumer.

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Un meta-análisis de género, cesación de fumar, e hipnosis: Una comunicación breve

Joseph P. Green, Steven Jay Lynn, y Guy H. Montgomery
Resumen: Los resultados de un meta-análisis mostraron que los varones tienen mayor probabilidad de reportar abstinencia de fumar en tratamientos basados en hipnosis que las hembras. En 12 estudios que usaron hipnosis para tratar el tabaquismo con estadísticas de resultados por género, los autores encontraron que los varones reportaron abstinencia 1,37 veces más que las hembras. Los resultados son consistentes con la literatura no hipnótica y sugieren que es más difícil que las mujeres se abstengan de fumar que los hombres.

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