

The Effect of Posthypnotic Suggestion and Task Difficulty on Adherence to Health-Related
Requests

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Abstract

The effects of posthypnotic suggestion on health-related behavior, using a behavioral measure of adherence were investigated. Three hundred twenty three students covering the full range of hypnotic suggestibility were prescribed an easy (mood rating) or a difficult (physical activity) task. Participants were randomly assigned to receive either a) hypnosis with posthypnotic suggestions to facilitate performance of the assigned task or b) a social request to perform the assigned task. There were significant effects for type of task and hypnosis, revealing that participants adhered significantly more to the easy task and that hypnosis decreased task adherence. Hypnotic suggestibility did not predict adherence, and its interaction with posthypnotic suggestion was not significant. These results suggest that posthypnotic suggestion may decrease adherence rates regardless of participants' suggestibility level.

Key Words: hypnosis, posthypnotic suggestion, adherence, treatment compliance, health behavior

The Effect of Posthypnotic Suggestion and Task Difficulty on Adherence to Health-Related Requests

People who seek health care do not always follow prescribed medical treatments, a phenomenon that has important personal and social consequences. Non-adherence increases co-morbidities among disorders and results in increased visits to general practitioners and additional missed days of work (Straub, 2007). Social consequences include increases in the economic burden on the health care system (World Health Organization, 2003) and the development of treatment-resistant organisms (Bennett, 2002; Dunbar-Jacob, Burke & Puczynski, 1995). The problem of non-adherence refers not only to medicine-taking but to life style changes, such as losing weight or quitting smoking, as well as recommendations regarding preventive measures like starting an exercise program or avoiding fatty foods (Straub, 2007).

Hypnosis is a non-invasive, non-pharmacological, and relatively inexpensive procedure that has been suggested as a modality of choice for minimizing discomfort and improving adherence with medical regimens (Temes, 1998). Nevertheless, the use of hypnosis to enhance adherence to medical advice is a virtually unexplored area. We are aware of only six studies on this subject. Anbar (2002) reported a case-report of the use of self-hypnosis to alter the perception of taste, thereby improving tolerance to medication in a 9-year-old boy. LaGrone (1993) reported a case of a 10-year-old boy, in which a 10-session hypnotic intervention reduced psychogenic vomiting and nausea associated with pill ingestion and remained effective over a one year follow up. Forman (1985) presented three cases in which hypnosis was effective in improving adherence to medication among psychiatric patients. Kelly, McKinty and Carr (1988) used a hypnotic procedure to increase adherence to routine dental flossing in 96 patients at a Dental University Center. After 8 months, 67% of the participants continued to floss daily, compared with 15% of the non-

hypnotized control group. Finally, Ratner, Gross, Casas and Castells (1990) reported a case study in which hypnotherapy was used to increase adherence to treatment in six insulin-dependent adolescents with a previous history of poor adherence. A 6-months follow up using biochemical measures of adherence, confirmed the effectiveness of the hypnotic intervention. Albeit differences in design, these studies suggests that hypnosis can be an effective tool to promote adherence to medical regimens and health-related behavior change. Nevertheless, none of the studies reviewed assessed the hypnotic suggestibility of participants. In the only study that tested the relation between adherence and hypnotic suggestibility, DiClementi, Berrenberg, and Giese (2007) found that high suggestible college students were more adherent than low suggestible participants to a task modeled on a four week HIV medication treatment schedule. DiClementi et al. (2007) also found that hypnotic suggestibility alone showed greater effects on adherence compared with self-efficacy and health-provider contact. Nevertheless, hypnosis was not used to increase adherence in this study.

Posthypnotic suggestions are suggestions provided to the individual during hypnosis for behaviors that are to be carried out after the hypnosis is terminated (Barnier & McConkey, 1998). According to the results of early experiments on posthypnotic suggestion (e.g. Orne, Sheehan & Evans, 1968; Nace & Orne, 1970), posthypnotic behavior is not limited to the experimental setting. In one study, Orne, Sheehan and Evans (1968) tested the response to a posthypnotic suggestion in an extraexperimental context (waiting-room) in 17 previously hypnotized participants and 14 simulators (i.e., participants instructed to behave just as they thought an excellent hypnotic subject would behave). Hypnotic participants were more likely to respond to posthypnotic suggestions than simulators. In addition, consistent posthypnotic response outside of the experimental setting was related to the level of hypnosis participants achieved at the time the posthypnotic suggestion was administered. In a subsequent study, Nace and Orne (1970) confirmed the

association between suggestibility and responses to a posthypnotic suggestion outside the hypnotic setting.

Data on the effects of posthypnotic suggestion on compliance with requested behavior are mixed. Barnier and McConkey (1998, experiment 1) asked highly hypnotic suggestible students to comply with a social request (sending daily postcards to the experimenter) and found that participants that received the posthypnotic suggestion performed worse than those given a simple social request. In experiment 2, however, the post hypnotic suggestion was given to hypnotized (highly suggestible) participants and simulators, whereas the social request was given to non-hypnotic participants (controls). Hypnotized participants complied more than simulators, but comparably to controls.

Damaser, Whitehouse, Orne, Orne and Dinges (2010) tested highly and medium suggestible participants for compliance with a social request (sending daily postcards to the experimenter) provided in the form of posthypnotic suggestion, waking social request, or both. Results revealed a high level of compliance to the social request alone in medium suggestible participants. Highly suggestible participants who received either the posthypnotic suggestion combined with the waking request or the waking request alone behaved similarly to the medium suggestible. Highly suggestible participants who received posthypnotic suggestion, coupled with instructions to experience posthypnotic amnesia, showed considerable variation in responding. Tobis and Kihlstrom (2010) tested highly suggestible participants in a laboratory cognitive task and found that participants were no more responsive to posthypnotic cues than to non-hypnotic cues. All these results show that there is great variability in the reaction to posthypnotic suggestion that cannot be explained entirely in terms of level of suggestibility.

In a previous study in which we tested the effect of hypnosis with posthypnotic suggestion in relation to adherence to a placebo pill-taking task in a highly suggestible non-clinical sample (Carvalho, Mazzoni, Kirsch, Meo & Santandrea, 2008, Experiment 1), we

found that posthypnotic suggestion enhanced adherence. In a second study (Carvalho et al., 2008, Experiment 2), we replaced the pill-taking task with a physical activity task and tested participants over the full range of suggestibility. We found that suggestion improved self-reported adherence for highly suggestible participants, but not for those of moderate or low suggestibility. Indeed, posthypnotic suggestion hindered adherence among low suggestible participants.

One limitation of our previous study was our reliance on a self-report measure of adherence (Carvalho et al., 2008, Experiment 2). The purpose of the present study was to investigate posthypnotic suggestion as an aid to adherence to a prescribed health-related behavior using behavioral measures of adherence. We investigated a large sample that spanned the entire range of suggestibility and prescribed two different types of tasks, an easy task (a mood report) and a more difficult task (the same physical exercise task as in the Carvalho et al., 2008's study). We also varied the type of task instruction given. Half of the participants were asked to perform the task in an unspecified time and/or place of their choice (general instruction) and half were asked to choose a particular time of the day and a specific location in which to perform the task (specific instruction). Participants in the hypnosis condition were given the suggestion that the thought of performing the task would come to mind without effort. The purpose of varying task instruction was based on the claim that specifying in advance the time and place in which a behavior will be performed (i.e. forming an implementation intention; Gollwitzer, 1993, 1999) creates a link between the critical environmental cue (the time and place pre-established) and the intended behavior. Under these conditions, the behavior is hypothesized to be elicited swiftly and effortlessly, without necessitating a conscious intent (Gollwitzer, 1993; Gollwitzer & Bramdstäter, 1997; Gollwitzer & Bargh, 2005) in a process that parallels suggested hypnotic involuntariness (Kirsch & Lynn, 1997).

Method

Participants.

To facilitate interpretation of potential non-significant findings, we aimed for a sample size of 320 participants, yielding a power of .95 for finding a small effect size ($d = .20$; Cohen, 1992). Participants were 323 college students (246 females) in Lisbon, Portugal, who had been screened for hypnotic suggestibility, as measured on the Portuguese translation of the Waterloo-Stanford Group Scale of Hypnotic Susceptibility, Form C (WSGC; Bowers, 1993, 1998; Carvalho et al., 2008). Their ages ranged from 17 to 42 years old ($M = 22.3$, $SD = 3.13$, 91% age 26 and under). Participants were assigned to experimental conditions randomly, stratified for suggestibility level. Prior to suggestibility assessment, all participants were told that after the suggestibility assessment they may or not may be contacted for further participation and gave their informed consent. Selection for continuation was based on suggestibility level; however this criterion was not disclosed to participants. Specifically, of the 707 students screened with the WSGC-C, all of those showing very high or very low levels of suggestibility were asked to participate to ensure adequate representation of these levels of suggestibility. Invitations to students with moderately low and moderately high levels of suggestibility were limited so as to guarantee approximately equal numbers of individuals at various levels of hypnotic suggestibility.

For the purpose of this study, we used the following categories of suggestibility: High: WSGC scores between 8-12; Medium High: 6-7; Medium Low: scored 4-5, and Low: 0-3. Using this four-level classification for stratification, participants were randomly distributed across the full range of suggestibility. The study was completed by 81 high, 80 medium high, 79 medium low and 83 low suggestible participants.

Measures

Measures of adherence. We used two measures of adherence, a behavioral measure (the number of text messages sent, regardless of their content) and a self-report measure (whether the content of the text messages message indicated task completion).

WSGC. The WSGC is a group adaptation of the Stanford Hypnotic Susceptibility Scale: Form C (SHSS:C, Weitzenhoffer & Hilgard, 1962) in which a standard eye closure induction is followed by 12 hypnotic suggestions that are presented via audiotape. Participants then rate their responses by indicating whether or not they had responded behaviorally to the twelve suggestions. Each suggestion is rated pass or fail, yielding total behavioral scores ranging from 0 to 12. We used a Portuguese translation of the WSGC (Carvalho, Kirsch, Mazzoni & Leal, 2008). Normative data indicated that this translation is reliable (Cronbach's $\alpha = .62$). Correlations of item difficulty between the Portuguese and English versions of scale ranged from .92 to .94 (Carvalho, Kirsch, Mazzoni & Leal, 2008).

Past Behavior. At base line we inquired about frequency and intensity of regular physical exercise, assessed by the questions: "How many days per week do you usually exercise enough to be tired and sweating?" [0 / 7 days]" and "When you exercise enough to be tired and sweating, how much time do you usually spend per session? [0= don't exercise, 1= less than 15 minutes, 2= between 15 and 30 m, 3= between 30 m and 1 hr, 4 = between 1 and 2 hrs, 5= between 2 and 3 hrs and 6 = more than 3 hrs]. The scores of the two questions were combined multiplicatively to provide a measure of physical exercise to indicate the number of hours per week in which the participant engaged in strenuous exercise (from 0 to 42).

Perception of Automaticity. At the end of the 21 days period, participants were phoned and asked to be present at a final session in which they were asked to rate on a 7 point scale the answer to the following question: "I found myself doing the task without even thinking about it [never / always]". The higher the score, the greater the perception of automaticity.

Procedure.

The experiment used a 2 x 2 x 2 x 4 factorial design (task difficulty x instruction type x posthypnotic suggestion x level of suggestibility) resulting in a total of 8 experimental conditions repeated across the four levels of suggestibility. Participants at each suggestibility level were randomly assigned to a difficult (run in place for 5-min. each day for a three-week period, take their pulse rate before and after the exercise, and send a text message report to the experimenter) or an easy task (assess their mood daily on a 1 to 5 Likert scale/1 -“Não me sinto bem” / translated: “I do not feel well” and 5 - “Sinto-me muito bem”/ translated: ” I feel very well”) for a period of three weeks and to send the mood rating by text message to the experimenter). Participants received general (time and place not specified) or specific (time and place specified) instructions, and received or did not receive hypnosis with a posthypnotic suggestion to perform the task. Participants were also asked to send a text message if they did not complete the exercise and pulse rate task. This provided two measures of task adherence: a behavioral measure (the number of text messages sent) and a self-report measure (the number of days on which the task was reported to have been done).

Participants assigned to the general instruction condition were simply asked to perform the exercise or assess their mood and send the text messages daily to the experimenter. Those in the specific instruction group were further asked to specify in advance the exact place and time they would perform the task (exercise or mood evaluation) each day.

Half of the participants were hypnotized and given a posthypnotic suggestion indicating that the thought of performing the task would come to mind without effort at the appropriate moment. The other half was neither hypnotized nor given the suggestion.

Wording of the suggestion varied depending on whether the participant was in the general

instruction or the specific instruction condition. In the general instruction condition, the wording of the posthypnotic suggestion was as follows:

Performing this task is very important for you and it will be very easy for you to remember to do it. The thought of doing these tasks will come to your mind at the right time of the day, and you will want to do them. The thought of doing these tasks will come to mind in an automatic way, without any effort on your part. The instructions to [easy or difficult task] and the willingness to do it will come to your mind easily and without any effort, and you will have no problem whatsoever in following these instructions.

In the specific instruction condition, the posthypnotic suggestion included guided imagery of task completion at the time and place that had been specified by the participant and was worded as follows:

Performing this task is very important for you and it will be very easy for you to remember to do it. The thought of doing these tasks will come to your mind at the time of the day and place you decided to do them. Imagine that this is the time of day that you have decided to do the [specified] task... you are in the place you decided to be when you [easy or difficult task is specified]. Imagine being there now...imagine the place and see what is around you. Imagine what time it is. Imagine [easy or difficult task is specified]...imagine writing down the number...imagine typing the message and clicking the “send” button ... the thought of doing these tasks will come to mind in an automatic way, without any effort on your part. The instructions to [easy or difficult task is specified] and the willingness to do it will come to your mind easily and without any effort, and you will have no problem whatsoever in following these instructions.

Participants were paid for their participation in the study with vouchers that could be redeemed in the college cafeteria or bookshop for a total amount of 8€ (5€ were paid initially to cover the text messages costs and the remaining was paid after completing participation). Motivation to participate was also induced by explaining to participants the problem of non-adherence in health care and noting that this study would help health professionals to make therapeutic prescriptions more effective.

Results

There were no significant between group differences in gender, age, or regular exercise practice. Mean scores indicate a low regular exercise practice in the sample of 163 participants assigned to the exercise task ($M=5.05$, $SD=6.37$, $Mode=0$). Fifty participants did not return to complete the retrospective question on automaticity. Fourteen participants did not send any text message or report any task completion and therefore their score on both adherence measures is 0. We included all 323 participants in the data analyses.

Group Differences in Adherence.

The mean number and standard deviation of text messages sent (behavioral measure of adherence) in each experimental condition is presented in Table 1.

Please insert table 1 about here

Behavioral adherence to the instruction to send text messages was highly correlated with self-reported task completion, with the correlation calculated by collapsing across all conditions ($r = .99$, $p < .001$), and a regression analysis including the interaction term did not reveal any difference in the level of this association as a function of task difficulty. Both behavioral adherence and self-reported adherence were analyzed as dependent variables. As both analyses yielded the identical patterns of results, we report analyses of the behavioral data only.

We analyzed the behavioral data in two ways, first using a 2 x 2 x 2 x 4 (task difficulty x type of instruction x posthypnotic suggestion x suggestibility level) analysis of variance (ANOVA) and second using an analogous regression analysis with actual suggestibility scores rather than four suggestibility groups. As both analyses yielded the same pattern of significant results, we report here on the ANOVA results. The analyses failed to reveal any effect of the type of suggestion on behavior, $F(1,291) = .120, p = .73$. There were, however, significant effects of task difficulty, $F(1,291) = 28.58, p < .001, \eta^2 = .09$ and posthypnotic suggestion $F(1,291) = 10.14, p = .002, \eta^2 = .03$. Participants showed greater adherence to the easy task ($M = 15.51, SD = 5.80$) than to the difficult task ($M = 11.69, SD = 7.25$). Adherence was also higher for participants in which posthypnotic suggestions were *not* utilized ($M = 14.70, SD = 6.45$) than in the group that received posthypnotic suggestions ($M = 12.49, SD = 7.03$).

Suggestibility level failed to reveal any significant effects, and there were no significant interactions between factors. Figure 1 displays the pattern of adherence. Most participants (86%) sent messages on the first day, but this decreased to 52% by the end of the 21-day period. This affirms the importance of examining sustained behavior when assessing strategies for enhancing adherence.

Please insert figure 1 about here

Content of Text Messages

The proportion of participants sending text messages reporting that they had not completed the task was significantly ($p < .001$) greater in the difficult task condition (22%) than in the easy task condition (3%). In contrast, task difficulty did not affect the extent to which participants claimed to have performed the task on a previous day, without having sent an text messages that day (easy task = 4%; difficult task = 6%).

Perception of Automaticity

Two hundred seventy three participants were reached by phone and responded to the question on automaticity. A 2x2x2x4 (task difficulty x type of instruction x posthypnotic suggestion x suggestibility level) ANOVA revealed a significant effect for the type of task $F(1,241) = 9.215, p = .003, \eta^2 = .04$ and for the level of suggestibility $F(1, 241) = 3.213, p = .024, \eta^2 = .04$. Participants in the easy task condition reported perceiving the task more automatically ($M = 3.06, SD = 1.64$), compared with participants in the difficult task condition ($M = 2.47, SD = 1.57$). LSD posthoc tests revealed a significant difference only between the extreme groups (high suggestible participants reported greater automaticity than low suggestible participants ($p = .003$) (low suggestible: $M = 2.33, SD = 1.55$; high suggestible: $M = 3.16, SD = 1.72$). No effects were found for hypnosis or type of instruction, and no significant interactions were found. Means and standard deviations for the retrospective question across conditions are presented in table 2.

Please insert table 2 about here

Discussion

The aim of the present study was to assess the effect of posthypnotic suggestions on adherence to two laboratory health-related tasks that differed in difficulty. Specifically, we wanted to test whether posthypnotic suggestion would increase adherence to the tasks and if this effect was moderated by the suggestibility level, producing an enhancement in adherence in high suggestible and a decrease in adherence in low suggestible participants, as found in a previous study (Carvalho et al., 2008). Our results revealed that posthypnotic suggestions significantly *decreased* adherence rates in all participants, independently of their level of hypnotic suggestibility, the type of task instruction they received (and hence the inclusion or exclusion of guided imagery in the posthypnotic suggestion), and the task to which they were assigned (easy or difficult). This is partially consistent with our

previous findings (Carvalho et al., 2008) in which posthypnotic suggestion was found to decrease adherence in low suggestible participants. These results are also partially consistent with Tobis and Kihlstrom (2010) and Damaser et al (2010) studies that, although in different tasks (laboratory and outside the hypnotic context, respectively) found no differences in behavioral response to the posthypnotic suggestion and nonhypnotic instruction in highly suggestible participants.

Our failure to find any effect for the type of instruction (general instruction and specific instruction, consistent with Gollwitzer's (1993, 1999) goal and implementation intention, respectively) on behavior is interesting, given that we used a sufficiently large sample to provide a high likelihood of detecting small effects. At first glance, these results seem inconsistent with the body of research that supports the effectiveness of implementation intention interventions (e.g. Armitage, 2004; Milne Orbell, & Sheeran, 2002; Orbell, Hodkins, & Sheeran, 1997; Orbell & Sheeran, 2000; Sheeran & Orbell, 1999; 2000; Steadman & Quine, 2004; Prestwich, Conner, Lawton, Bailey, Litman, & Molyneaux, 2005). However these studies differ from the present study in a number of ways. First, we used a behavioral measure that cannot be feigned, in addition to a self-report measure. Second, we asked participants to perform a repeated ongoing behavior to be performed daily for 21 days. Asking participants to perform a task at least once in a given period of time is different from asking to establish a routine behavior for an extended period of three weeks, as we did. Consistent with our findings, a number of previous studies have failed to find significant effects of implementation intentions on adherence to various ongoing health-related requests, such as increasing fruit and vegetables consumption in a three months period (Jackson et al. 2005), increasing dental flossing for three weeks (Lavin & Groarke, 2005); taking antibiotics for 14 days (Jackson et al. 2006); exercising two more times per week for two weeks (Prestwich, Lawton, & Conner, 2003); increasing physical activity level by at least two hours per week or 15 to 20 minutes per day, post-tested at two

weeks, three months and six months (DeVet, Oenema, Sheeran & Brug, 2009); increasing the number of 30-min exercise sessions undertaken over 3 weeks (Hill, Abraham, & Wright, 2007); and running daily for 5 minutes and reporting by email for three weeks (Carvalho et al. study 2, 2008). Indeed, one study found that forming implementation intentions actually significantly decreased the performance of the intended behavior in comparison with controls (exercise for 7 days, Budden & Sagarin, 2007). Therefore, our results confirm that specifying implementation intentions is not an effective strategy to enhance adherence to repeated and ongoing tasks, which confirms the previous claim that forming implementation intentions (specific instructions in the present study) is more effective in studies with short-term follow-ups than for long-term goals (Koestner et al., 2006).

Consistent with behavioral findings, participants reported experiencing a low perception of automaticity indicating that receiving a posthypnotic suggestion did not lead to a sense of “compulsion” to trigger the target behavior. What did elicit this perception of automaticity was the easiness of the task. However, highly suggestible participants significantly differed from low suggestible participants in reporting a greater sense of compulsion to perform the task, regardless of type of task. This finding is consistent with Barnier and McConkey’s (1998) study, in which highly suggestible participants reported a greater sense of compulsion to perform the task compared with participants who received a simple social request, despite the fact that participants in the social request condition were more compliant than participants in the posthypnotic condition.

In our study we found high rates of adherence in all conditions. Even in the condition that performed worse (difficult task), adherence rates were never below 45% (day 13) and in the hypnosis condition were never below 44% (day 21), whereas in the no hypnosis condition they were never below 60% (day 11). These rates indicate that a request is as (if not more) effective as posthypnotic suggestion, which confirms the findings reported by

Barnier and McConkey (1998). The present results also add to Tobis and Kihlstrom's (2010) conclusion that posthypnotic responses are not automatic in the technical sense of the term, because they are not inevitably evoked by the presentation of the pre-arranged cue. Accordingly, the experience of involuntariness seems to be less a reflection of true automaticity and more a personal illusory sense of automaticity (Tobis & Kihlstrom, 2010). In other words, automaticity is more likely to be a post-hoc attribution about the cause of the behavior, as claimed by adherents of the socio-cognitive model of hypnosis (Spanos, 1982; Kirsch & Lynn, 1997).

The socio-cognitive approach also states that hypnotic behavior is culturally shaped; that is, the nature of the response and the degree of responsiveness to suggestion is largely a function of participants' expectancies (Kirsch, 1985). Because our study was conducted in a country (Portugal) in which there is no tradition of research on hypnosis, and lay practitioners are responsible for most of its clinical application, it is possible that cultural factors may have modulated the response to hypnosis and posthypnotic suggestions. Our findings may be attributable to various misconceptions about hypnosis in our sample, such as believing in the "irresistible" power of hypnosis, which compels people to act contrary to their will (Carvalho, Capafons, Kirsch, Espejo, Mazzoni & Leal, 2007). Accordingly, when confronted with hypnosis for the first time, many of the Portuguese participants might have displayed resistance in order to test whether hypnosis really works in the expected 'irresistible' way. Future studies might focus on other types of post-hypnotic suggestion aimed at enhancing adherence and also include measures of social desirability to examine the potential influence of that response set on adherence reports and behaviors.

In summary, our data indicate that posthypnotic suggestion decreases adherence to medical requests, regardless of participants' levels of hypnotic suggestibility. However, this effect might be moderated by the participants' cultural background, specifically their beliefs and expectations about hypnosis.

References

- Anbar, R.D. (2002). You don't like the taste of your medication? So change the taste. *Clinical Pediatrics*, *41*, 197-198.
- Armitage, C. (2004). Evidence that implementation intentions reduce dietary fat intake: a randomized trial. *Health Psychology* *23*, 319-323.
- Barnier, A., & McConkey, K.M. (1998). Posthypnotic responding away from the hypnotic setting. *Psychological Science*, *9*, 256-262.
- Bennet, P. (2002). *Introdução clínica à psicologia da saúde (Introduction to clinical health psychology, Taylor & Francis, 2000)*. Lisboa: Climepsi.
- Bowers, K.S. (1993). The Waterloo-Stanford Group C (WSGC) scale of hypnotic susceptibility: normative and comparative data. *International Journal of Clinical and Experimental Hypnosis* *41*, 35-46.
- Bowers, K.S. (1998). Waterloo-Stanford Group Scale of Hypnotic Susceptibility, Form C: Manual and response booklet. *International Journal of Clinical and Experimental Hypnosis* *46*, 250-268.
- Budden, J.S., & Sagarin, B.J. (2007). Implementation intentions, occupational stress, and the exercise intention-behavior relationship. *Journal of Occupational Health Psychology* *12*, 391-401.
- Carvalho, C., Capafons, A., Kirsch, I., Espejo, B., Mazzoni, G. & Leal, I. (2007). Factorial Analysis and Psychometric Properties of the Revised Valencia Scale of Attitudes and Beliefs toward Hypnosis – Client Version. *Contemporary Hypnosis*, *24*, 76-85.
- Carvalho, C., Kirsch, I. Mazzoni, G., & Leal, I. (2008). Portuguese norms for the Waterloo-Stanford Group C (WSGC) Scale of Hypnotic Susceptibility. *International Journal of Clinical and Experimental Hypnosis*, *56*, 295-305.
- Carvalho, C., Mazzoni, G., Kirsch, I., Meo, M., & Santandrea, M. (2008). The effect of posthypnotic suggestion, hypnotic suggestibility, and goal intentions on adherence to

- medical instructions. *International Journal of Clinical and Experimental Hypnosis*, 56, 143-155.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159.
- Damaser, E., Whitehouse, W.G., Orne, M., Orne, E.C., & Dinges, D.F. (2010). Behavioral persistence in carrying out a posthypnotic suggestion beyond the hypnotic context: a consideration of the role of perceived demand characteristics. *International Journal of Clinical and Experimental Hypnosis*, 58, 1-20.
- DiClementi, J.D., Berrenberg, J.L., & Giese, L. (2007). Association between hypnotizability, perceived self-efficacy and provider contact in a healthy college student sample: an analogue adherence study. *Journal of Applied Social Psychology*, 37, 370-379.
- Dunbar-Jacob, J.; Burke, L.E., & Puczynski, S. (1995). Clinical Assessment and management of adherence to medical regimens. In P.M. Nicassio & T.W. Smith (Eds.). *Managing Chronic Illness. A Biopsychosocial Perspective* (pp.313-349). Washington D.C.: American Psychological Association.
- Forman, B.D. (1985). Use of hypnosis for improving medication compliance in psychiatric patients. *Southern Medical Journal*, 78, 242-4.
- Gollwitzer, P. M. (1999). Implementation intentions: strong effects of simple plans. *American Psychologist*, 54, 493-503.
- Gollwitzer, P.M. (1993). Goal achievement: the role of intentions. In W. Stroebe & M. Hewstone (Eds.), *European Review of Social Psychology*, vol. 4, (pp.141-185). New York: John Wiley & Sons.
- Gollwitzer, P.M., & Bargh, J.A. (2005). Automaticity in goal pursuit. In A. Elliot and C. Dweck (Eds.), *Handbook of competence and motivation* (pp. 624-646). New York: Guilford.

- Hill, C., Abraham, C., & Wright, D. (2007). Can theory-based messages in combination with cognitive prompts promote exercise in classroom settings? *Social Science & Medicine* 65, 1049-1058.
- Jackson, C., Lawton, R., Knapp, P., Raynor, D. K., Conner, M., Lowe, C., & Closs, S. J. (2005). Beyond intentions: do specific plans increase health behaviours in patients in primary care? A study of fruit and vegetable consumption. *Social Sciences & Medicine*, 60, 2383-2391.
- Jackson, C., Lawton, R., Raynor, D. K., Knapp, P., Conner, M., Lowe, C., Closs, S. J. (2006). Promoting adherence to antibiotics: a test of implementation intentions. *Patient Education and Counseling*, 61, 212-218.
- Kelly, M.A., McKinty, H.R., & Carr, R. (1988). Utilization of hypnosis to promote compliance with routine dental flossing. *American Journal of Clinical Hypnosis*, 31, 51-60.
- Kirsch, I. (1985). Response expectancy as a determinant of experience and behavior. *American Psychologist*, 40, 1189-1202.
- Kirsch, I., & Lynn, S.J. (1997). Hypnotic involuntariness and the automaticity of everyday life. *American Journal of Clinical Hypnosis*, 40, 329-348.
- Koestner, R., Horberg, P. G., Powers, T., Di Dio, P., Bryan, C., Jochum, R., & Salter, N.(2006). Bolstering implementation plans for the long haul: the benefits of simultaneously boosting self-concordance or self-efficacy. *Personality and Social Psychology Bulletin*, 32, 1547-1558.
- LaGrone, R.G. (1993). Hypnbehavioral therapy to reduce gag and emesis with a 10-year-old swallower. *American Journal of Clinical Hypnosis*, 36, 132-136.
- Lavin & Groarke, 2005

- Lavin, D., & Groarke, A. (2005). Dental floss behaviour: a test of the predictive utility of the Theory of Planned Behaviour and the effects of making implementation intentions. *Psychology, Health & Medicine* 10, 243-252.
- Milne, S., Orbell, S., & Sheeran, P. (2002). Combining motivational interventions to promote exercise participation: protection motivation theory and implementation intentions. *British Journal of Health Psychology*, 7, 163-184.
- Nace, E.P. & Orne, M.T. (1970). Fate of an uncompleted posthypnotic suggestion. *Journal of Abnormal Psychology*, 75, 278-285.
- Orbell, S., & Sheeran, P. (2000). Motivational and volitional processes in action initiation: a field study of the role of implementation intentions. *Journal of Applied Social Psychology*, 30, 780-787.
- Orbell, S., Hodkins, S., & Sheeran, P. (1997). Implementation intentions and the theory of planned behavior. *Personality and Social Psychology Bulletin* 23, 945-954.
- Orne, M. T., Sheehan, P. W., & Evans, F. J. (1968). Occurrence of posthypnotic behavior outside the experimental setting. *Journal of Personality and Social Psychology*, 9, 189-196.
- Prestwich, A., Conner, M., Lawton, R., Bailey, W., Litman, J., & Molyneaux, V. (2005) Individual and collaborative implementation intentions and the promotion of breast self-examination. *Psychology & Health*, 20, 743-760.
- Prestwich, A., Lawton, R., & Conner, M. (2003). The use of implementation intentions and the decision balance sheet in promoting exercise behavior. *Psychology and Health* 18, 707-721.
- Ratner, H., Gross, L., Casas, J., & Castells, S. (1990). A hypnotherapeutic approach to the improvement of compliance in adolescent diabetics. *American Journal of Clinical Hypnosis*, 32, 154-159.

- Sheeran, P., & Orbell, S. (1999). Implementation Intentions and repeated behavior: augmenting the predictive validity of theory of planned behavior. *European Journal of Social Psychology, 29*, 349-369.
- Sheeran, P., & Orbell, S. (2000). Using implementation intentions to increase attendance for cervical cancer screening. *Health Psychology, 19*, 283-289.
- Spanos, N.P. (1982). Hypnotic behavior: a cognitive social psychological perspective. *Research Communications in Psychology, Psychiatry and Behavior, 7*, 199-213.
- Steadman & Quine, 2004;
- Straub, R.O. (2007). *Health Psychology. A biopsychosocial approach*. 2nd Ed. New York: Worth Publishers.
- Temes, R. (1998). *Medical hypnosis: an introduction and clinical guide*. New York: Churchill Livingstone.
- Tobis, I.P. & Kihlstrom, J.F. (2010). Allocation of attentional resources in posthypnotic suggestion. *International Journal of Clinical and Experimental Hypnosis, 58*, 367-382.
- Weitzenhoffer, A.M., & Hilgard, E. (1962). Stanford Hypnotic Susceptibility Scale: Form C. Palo Alto, CA: Consulting Psychologists Press.
- World Health Organization (2003). *Adherence to long term therapies - evidence for action*. Geneva: World Health Organization.

Table 1
Mean and Standard Deviation of text messages sent in each condition

Type of Task	Posthypnotic Suggestion	Type of suggestion	Text messages's sent		Cohen's <i>d</i> *
			Mean	SD	
<i>Low suggestible (0-3)</i>					
Easy	No	General	18.70	2.87	.85
		Specific	15.73	4.00	
	Yes	General	17.10	4.20	.47
		Specific	14.27	7.32	
Difficult	No	General	12.40	7.55	.11
		Specific	11.50	8.36	
	Yes	General	10.91	7.70	.24
		Specific	9.10	7.39	
<i>Medium Low suggestible (4-5)</i>					
Easy	No	General	15.70	4.19	1.15
		Specific	19.44	1.88	
	Yes	General	13.90	3.87	.15
		Specific	16.50	6.26	
Difficult	No	General	14.40	5.52	.19
		Specific	13.00	8.74	
	Yes	General	10.50	7.66	.29
		Specific	8.30	7.42	
<i>Medium High suggestible (6-7)</i>					
Easy	No	General	13.40	7.71	.55
		Specific	17.20	5.99	
	Yes	General	9.5	7.55	.58
		Specific	13.90	7.55	
Difficult	No	General	9.20	7.63	.78
		Specific	15.10	7.45	
	Yes	General	12.91	7.92	.41
		Specific	9.90	6.84	
<i>High suggestible (8-12)</i>					
Easy	No	General	15.71	5.02	.78
		Specific	18.80	2.49	
	Yes	General	15.73	4.15	.42
		Specific	13.27	7.28	
Difficult	No	General	13.00	6.04	0
		Specific	13.00	6.41	
	Yes	General	12.70	7.76	.39
		Specific	9.90	6.62	

* Calculated as the difference between the means of each group divided by the pooled standard deviation.

Table 2
Perception of automaticity across conditions

<i>Condition</i>		Mean	SD	<i>F</i>	<i>p</i>	Cohen's <i>d</i> *
Type of task	Easy	3.06	1.64	9.215	.003	.37
	Difficult	2.47	1.57			
Hypnosis	Hypnosis with Posthypnotic suggestion	2.70	1.69	.801	.372	-.10
	No Hypnosis	2.87	1.57			
Type of suggestion	General	2.80	1.68	.086	.770	.02
	Specific	2.76	1.58			
Suggestibility level	Low	2.33	1.55	3.213	.024	
	Medium Low	2.73	1.55			
	Medium High	2.78	1.60			
	High	3.16	1.72			

Note. N= 273. Answer to the question “*I found my self doing the task without thinking about it*”. Values correspond to a 7 point Lickert scale to in which 1= *never* and 7 = *always*.

* Calculated as the difference between the means of each group divided by the pooled standard deviation.

Proportion of text messages sent

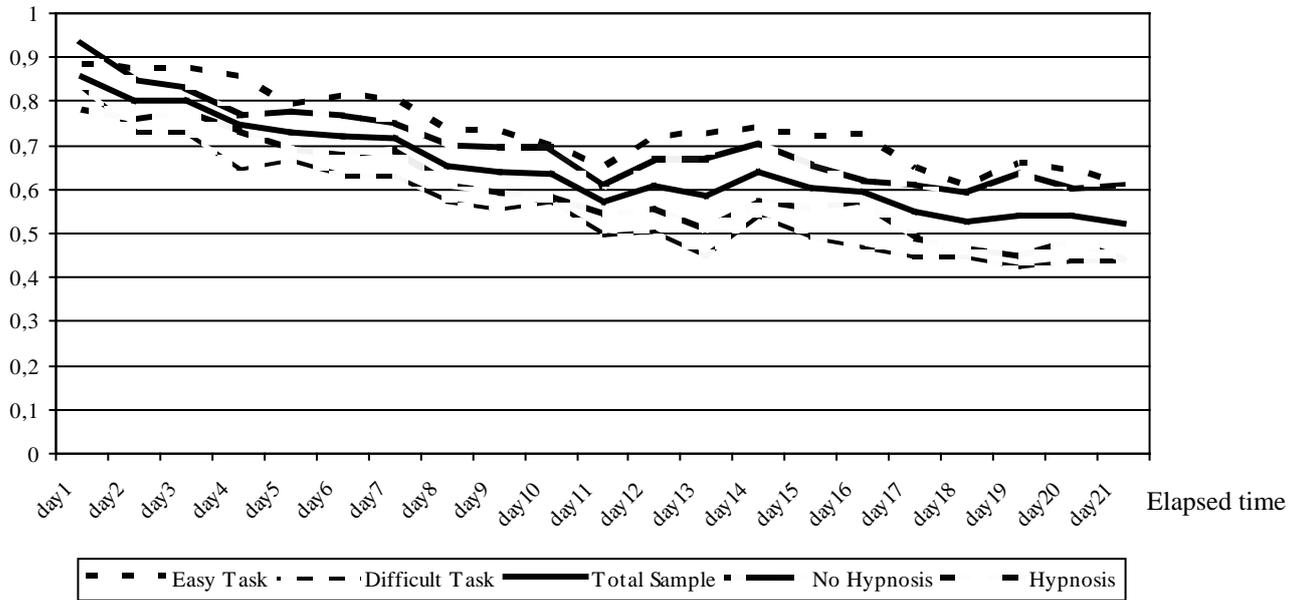


Figure 1. Mean proportion of text messages sent in the total sample and as a function of task difficulty and hypnotic suggestion over the 21 day period