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► **To cite this version:**

Amélie Bret, Aurore Deledalle, Antonio Capafons, Frédérique Robin. Valencia scale of attitudes and beliefs towards hypnosis: adaptation of the French online version. *Quality and Quantity*, 2023, 58 (1), pp.207-224. <10.1007/s11135-023-01640-9>. <hal-04584934v2>

HAL Id: hal-04584934

<https://hal.science/hal-04584934v2>

Submitted on 16 Dec 2024

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**Valencia Scale of Attitudes and Beliefs Towards Hypnosis: Adaptation of the French
online version**

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Acknowledgments:

Thanks to Elise Le Berre, undergraduate student in psychology, for her participation in the distribution of online questionnaires, during an introductory research internship under the supervision of the authors.

The preprint version of the revised manuscript is available on Open Science Framework and data and materials supporting analysis presented in this paper would be freely available here: <https://osf.io/kau8p/>.

Valencia Scale of Attitudes and Beliefs Towards Hypnosis: Adaptation of the French online version

Abstract

The Valencia Scale, client version (VSABTH-C, Capafons et al., 2004; Capafons et al., 2015) is currently one of the most empirically-based scales assessing attitudes and beliefs toward hypnosis. This study aims to adapt the online VSABTH-C to a French sample and to determine its psychometric properties (Franquelo et al., 2020). Moreover, it is well-known that the efficiency of the clinical hypnotic process hinges on social and cognitive factors. Surprisingly, their influence on attitudes/beliefs toward hypnosis has not yet been examined. Therefore, we also investigated the role of personality dimensions, social desirability, and imagery abilities on attitudes/beliefs measured with the VSABTH-C. Our findings showed that the psychometric properties and the structural validation of the French version of the VSABTH-C form a valid measure essential for French-speaking clinicians as well as researchers. In addition, social desirability and personality dimensions did not bias hypnosis scale responses, confirming its robustness. High imagery abilities were positively correlated with positive beliefs/attitudes, suggesting that imagery may be a good predictor of hypnotic attitudes.

Keywords: attitudes; beliefs; hypnosis; imagery; personality; social desirability

Introduction

Hypnosis, or more exactly the hypnotic process, is often described as a particular level of awakesness/vigilance/attention in which the individual, through mental imagery, experiences coherent, vivid and multisensory memories (Robin, 2013). Recently, the Society of Psychological Hypnosis's revised definition considers hypnosis as "a state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion" (p. 382, Elkins et al., 2015). Nevertheless, defining the hypnosis-like state is controversial. The Association for the Advance of Experimental and Applied Hypnosis (AAHEA, 2017) has proposed to define hypnosis as:

"a social construction [...] commonly used to denote a range of social interactions in which the participants enact roles based on various forms of social influence. Therefore, hypnosis implies a process in which there is an explicit or implicit agreement among different people who believe that the situation is hypnotic and that an induction and de-induction (ritual or ceremony) will be used [...] In this interaction, the hypnotist/s attempt/s to influence the other people's perceptions, feelings, thinking and behavior by asking them to concentrate on ideas and images that may evoke the intended effects. The verbal communications that the hypnotist uses to achieve these effects are termed hypnotic suggestions. Suggestions differ from everyday instructions in that hypnotic suggestions imply that a "successful" response is experienced with a quality of non-volitionality, automaticity, or effortlessness." (AAHEA, 2017)

Today, the use of therapeutic hypnosis has been becoming increasingly frequent (e.g., management of acute or chronic pain, stress, anxiety, depression, mood disorders, etc.). Nevertheless, despite its clinical efficiency, its mechanisms of action are still not well understood. It has been claimed that attitudes and beliefs toward hypnosis are the main determinants of responding to hypnosis, although research on this topic is scant. A few studies have demonstrated that positive attitudes or beliefs about hypnosis are associated with higher levels of hypnotic suggestibility (Lynn & Kirsch, 2006; Lynn & Green, 2011; for a review see Robin, 2013). Attitudes towards hypnosis can amplify hypnotic suggestibility and affect the therapeutic relationship as well. The success of treatment outcomes is linked to positive attitudes (Mendoza et al., 2017). Negative and unrealistic beliefs can interfere with the patient's

adherence to treatment and cooperation with the practitioner (Lynn & Kirsch, 2006). Even worse, the iatrogenic reactions to hypnosis (i.e., false memories) are mainly associated to the therapist's and client's beliefs about hypnosis (Robin et al., 2018). Therefore, before using hypnosis as a therapeutic adjunct, it appears important to assess the patient's attitudes and beliefs toward hypnosis and to demystify fears and false expectations regarding hypnosis (Molina-Peral et al., 2020).

Capafons and his colleagues have developed a series of self-reported questionnaires measuring attitudes and beliefs towards hypnosis, with therapist or client versions (Capafons et al., 2004; Capafons et al., 2008; Carvalho et al., 2007; Capafons et al., 2015). The most recent version of the client questionnaire consists of 37 items using a 6-point scale, agree-disagree format (e.g., *I am fearful about hypnosis; under hypnosis, achievements can be reached without any effort on the part of the client*). The last version of this scale, the Valencia Scale of Attitudes and Belief Toward Hypnosis, Client version (VSABTH-C, Capafons et al., 2015) comprises eight factors. Each factor corresponds to the scale measures of attitudes and beliefs toward hypnosis: (1) *Fear* corresponds to the belief that hypnosis is dangerous; (2) *Memory* is the belief that hypnotic trance is a truth serum and that it allows precise memories to be recovered; (3) *Help* is the belief that hypnosis is an effective technique in addition to psychological and medical therapies; (4) *Control* is the belief that under hypnosis people remain aware of their actions and are able to resist suggestions if they wish; (5) *Collaboration* is the belief that participants must cooperate closely with the hypnotist in order for the therapeutic intervention to be effective; (6) *Interest* is the belief that participants desire to be hypnotized and desire to be easily hypnotized; (7) *Magical* is the belief that hypnotic suggestions solve an individual's problems effortlessly; (8) *Marginal* is the belief that hypnotized people are not gullible and ignorant and that hypnosis is not a scientific approach (definitions are taken from Green et al., 2012; Franquelo et al., 2020; Franquelo et al., 2021). Adequate attitudes associated with

hypnosis correspond to higher scores for the factors of *help, control, collaboration, and interest*. Inadequate attitudes toward hypnosis correspond to higher scores on items for the *fear, memory, magical, and marginal* factors (see Molina-Peral et al., 2020).

The VSABTH-C has gained interest among researchers as a predictor tool of hypnotic responses. A series of international samples and studies (except in French) has confirmed a consistent and stable eight-factor structure in the USA, Romania, Portugal, Mexico and Spain (Capafons et al. 2008; Capafons et al., 2015; Capafons et al., 2018; Franquelo et al., 2020; Green et al. 2012; Viñas-Velázquez et al., 2022). To our knowledge, none of the instruments known to estimate attitudes and/or beliefs toward hypnosis has been adapted in French, whereas they are crucial for scientific research on hypnosis. Indeed, given the increase in research studies about hypnosis and its widespread use in clinical settings, it is essential to have such a tool in French. Therefore, the absence of a valid instrument for assessing attitudes in French has led us to translate and analyze the psychometric properties of the VSABTH-C. It is the first instrument for assessing attitudes and beliefs towards hypnosis adapted to a French-speaking population. In addition, the present study is the first phase of a series of research studies aiming to determine the generalizability of the scale and the usefulness of this measure as a screening test for hypnosis-based treatments. Indeed, clinical trials have shown that attitudes are good predictors of the benefits elicited by treatments that include hypnosis as an adjunct (Mendoza et al., 2017). Barber (1985) has shown that techniques intended to reinforce the motivation of the patients, their expectations or their positive beliefs toward hypnosis increased the probability of responding to test suggestions and improved the therapeutic results.

Moreover, the present study also aimed to explore relationships with factors that may influence attitudes and beliefs regarding hypnosis, such as social desirability, personality dimensions and imagery abilities. Indeed, these variables have been widely explored in the

literature, but their relationship with VSABTH-C has never been evidenced, all the more so with a French sample.

A widespread idea is that hypnotizable people have high imagery abilities. In this respect, the socio-cognitive approach has argued that the participant's imagination, like beliefs and expectancies of hypnosis, is also a factor that plays a crucial role in explaining hypnotic phenomena (Barnier et al., 2008). In this vein, Spanos (1986) suggested that hypnotic behavior results from a phenomenon of social influence such as persuasion and compliance that will be reinforced with the participant's imagination. He argued that the lack of volition felt by the person when undergoing hypnotic suggestion is not the result of cognitive dissociation but of misattribution. The hypnotized person attributes their hypnotic behavior to external factors rather than to themselves. The context in which hypnosis takes place, with the formulation of suggestions and interpretations, encourages participants to recognize their answers as involuntary rather than deliberate acts. Imagination is considered to reinforce this sensation (Spanos, 1986). Spanos (1991) defined the hypnotic response as a product of the goal-oriented imagination. For example, to facilitate the levitation of the hand, the therapist suggests that the hand becomes lighter and lighter and that it can rise on its own. This hypnotic suggestion prompts the subject to mentally visualize and feel the events and implies that the hand should rise automatically. Indeed, post-hypnotic testimonies report that hypnotized people imagined a helium balloon raising their hand. Their absorption into the imagination was goal-oriented: to see the hand lift itself (Lynn & Sherman, 2000). However, imagination alone does not determine the success of hypnotic suggestion. Usually, letting oneself be taken over by one's own images and waiting for one's hand to rise on its own is doomed to fail. On the other hand, if the suggestion of levitation makes it important for patients to raise their hand, its execution is more likely. Overall, Spanos's theory (1986, 1991) argues that imagination plus motivation and interpretation are essential in explaining the responses to hypnotic suggestions. Spanos and

his colleagues found that hypnotizability scores provided by scales correlate significantly and positively with the degree of involvement in imaginative suggestions, with the positive attitudes towards hypnosis, and with the ability to comply with suggestions. Therefore, while it has not yet been demonstrated, we may expect correlation between participants' imaginative skills and their attitudes/beliefs toward hypnosis. Kirsch & Braffman (2001) view differences in hypnotizability as variations in the ability to engage in an imaginative experience called imaginative suggestibility. However, some authors have shown that imaging ability does not consistently correlate with hypnotic suggestibility, while imagination is crucial in the processing of hypnotic suggestions (Laurence, Beaulieu-Prévost & du Chéné, 2008 ; Terhune & Cadeña, 2010). EEG measures show imagery activity in people who are highly hypnotizable (Terhune & Cardeña, 2010). According to Rainville and Price (2003), during hypnosis, the imagery is multisensory (visual, auditory, somesthetic, etc.). In French populations, there are few studies concerning imagery and hypnosis. Nevertheless, Grebot & Paty (2005) found a significant relation between mental imagery and hypnotic suggestibility. The evocation of mental images is part of the content of hypnotic suggestions (Kihlstrom, 2013).

According to Spanos (1996), the variation between individuals regarding their suggestibility toward hypnosis results from individuals' beliefs and compliance, particularly their desire (conscious or unconscious) to appear as "good" hypnotic subjects. This attitude accounts for the classic phenomenon, widely known in psychology, of social desirability, which consists of wanting to present oneself in a favorable light to one's interlocutors. Therefore, responses to hypnotic suggestions might well be governed by psychosocial factors such as beliefs and social desirability. Thus, in order not to disappoint themselves in relation to a situation to which the patients have submitted voluntarily, and in relation to which they have developed expectations, they adopt the role that they think is expected of them. They then comply with the hypnotist's instructions, doing their best to respond. Wagstaff (1991) suggested

that compliance is crucial for the hypnotic response. Before complying with a hypnotic suggestion, participants will first attempt to determine what is appropriate to the hypnotic role or what the hypnotist expects of them. Then, they will apply these expectations or strategies so that their hypnotic experiences comply with their expectations. This behavior is underpinned by the patient's attitudes, expectations and beliefs about hypnosis.

However, to our knowledge, no study has attempted to relate attitudes, beliefs, imagination and social desirability, and to measure their respective weight on the effectiveness of hypnotic interventions.

It has also been suggested that certain personality dimensions may predict an individual's responses toward hypnotic suggestions. However, the first studies showed that hypnotic skill was not correlated with personality dimensions, as measured by the main personality inventories such as the Minnesota Personality Inventory and the California Psychological Inventory (Hilgard, 1965). Inversely, it was observed that the participants most susceptible to hypnosis were found on Cattell's personality tests to be the most open and authoritative (see Robin, 2013). They also manifest on the Guilford-Zimmerman personality test as sociable and gifted people of a high influence/ascendancy. The results of these two personality tests suggested that the "good" hypnotic subject is an individual who has easy social contact, who is open to others, who knows how to keep their own personality in the group, who knows how to express themselves, and who thus has a dominant role. However, these observations were not confirmed, and other studies did not report stable relationships between hypnotizability scales and personality measures (Kirsch & Council, 1992). Ultimately, absorption (a dimension of the personality) currently seems to be the best correlate of hypnotizability. Absorption is defined as an individual's predisposition to invest strongly in an imaginary or sensory experience and therefore to engage in a focused attention task (Council & Greene, 2004; Tellegen & Atkinson, 1974). Moreover, the relationship between hypnotizability

and absorption is believed to be increased by expectations toward hypnosis. Absorption is also linked with openness to experience, one of the five personality dimensions in the five-factor model, called the Big Five (Glisky & Kihlstrom, 1993). This model considers five personality dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. These dimensions are used to describe the different facets of a person's character.

Openness to experience as a personality dimension related to hypnotic suggestibility was tested by Malinoski and Lynn (1999). These authors found a strong relationship between pleasantness and extraversion factors and scores on the Harvard Hypnotic Susceptibility Scale. In contrast, they found no correlation between openness to experience and hypnotic suggestibility. Nordenstrom et al. (2002) replicated this research in which hypnotic suggestibility was measured with the Waterloo-Stanford scale. The correlations between personality dimensions and hypnotizability are weak, thus challenging the hypothesis of a relationship between hypnotizability scales and personality dimensions. Similarly, Zhang et al. (2017) have shown that hypnotic hypnotizability is associated with openness to experience, extraversion, and agreeableness. Nevertheless, these associations are weak and their patterns are different in participants with high or low hypnotizability.

Most experimental research has attempted to measure the effects of imagination, compliance, or personality on hypnotic suggestibility, but never on attitudes and beliefs toward hypnosis. Moreover, while some studies have shown correlations between personality dimensions within the Big Five model and social desirability (see Tournois et al., 2000), the relationship between these factors and their concomitant effect on attitudes and beliefs toward hypnosis has not yet been explored.

Taking into consideration all of the above, the present study aimed: (1) to analyze the eight-factor structure of VSABTH-C in its French online version following the research conducted by Franquelo et al. (2020; 2021), who were the first authors who evidenced that the

scale can be applied in online mode; (2) to analyze internal consistency, convergent validity and discriminant validity; (3) to analyze the variation across personality dimensions, social desirability and imagery abilities, since so far no study has presented these comparisons. Therefore, they should increase our knowledge of factors modulating attitudes and beliefs toward hypnosis and a fortiori the responses to hypnotic suggestions.

The effects of these factors (personality dimensions, vividness of multisensory imagery, social desirability) have usually been considered in the light of hypnotizability, i.e., the ease with which the individual behaves towards a hypnotic suggestion. However, the relationship between these factors and attitudes/beliefs toward hypnosis has not yet been studied. Many studies tend to show that social desirability is a personality trait, in particular because of strong correlations between social desirability scores and certain personality dimensions. However, it turns out that scores resulting from personality questionnaires may be biased because some of the participants' responses are imbued with strong social desirability. Therefore, we decided to examine these personality factors independently of each other.

Hence the study's second purpose was to contribute to better knowledge of the determinants of the hypnotic responses. Furthermore, the French adaptation of the VSABTH-C will be used as a predictor of hypnotic response and therapeutic outcome in our larger project conducted in the setting of a clinical surgery (Mendoza et al., 2017).

To sum up, the first aim was to adapt VSABTH-C in French and confirm its psychometric properties as obtained in other international studies. This included exploring psychometric properties, factorial structure and internal reliability on a sample of adults in order to provide a French-language scale of attitudes and beliefs toward hypnosis. A French version is essential for clinical and experimental studies on hypnosis. Moreover, this validation contributes to transcultural studies.

The second objective was to explore the link between attitudes towards hypnosis (measured with the VSABTH-C) and personality dimensions, social desirability, and imagery abilities.

We expected that attitudes toward hypnosis estimated with VSABTH-C might be related to personality dimensions. Similarly to previous studies (Zhang et al., 2017), we expected that adequate and positive attitudes toward hypnosis were significantly and positively correlated with at least one of these dimensions: openness to experience, extraversion and agreeableness.

Another expectation focused on the relationship between attitudes toward hypnosis and social desirability estimated via DS36, in order to ensure that attitudes toward hypnosis responses using VSABTH-C were not biased by social desirability and would confirm the psychometric properties of the French version of the Valencia scale. Moreover, this variable had not yet been examined in the case of the VSABTH-C validation process. The presence of social desirability would also be extended to the other psychometric tests used in this study.

Lastly, we assumed individuals' imagery abilities promoted positive inclination toward hypnosis. Therefore, we expected significant positive correlation between adequate and positive attitudes of hypnosis and the imagining scores on Grebot's imagery questionnaire, in accordance with certain previous studies that have underlined the benefit of the imagery abilities in the hypnotic process (Grebot & Paty, 2005; Kilhstrom, 2013; Rainville & Price, 2003; Robin, 2013).

Method

Participants

To determine the optimal sample size for this study, we examined the level of power obtained in previous research (Capafons et al., 2015; Franquelo et al., 2020), coupled with a consideration of the rules of thumb in this field. Some authors considered that there is a

minimum threshold for sample size (for example, $N = 100$ or $N = 200$, [Kline, 2015]) or else to take into account the complexity of the model by proposing a ratio of number of participants per parameter (Bentler & Chou, 1987). The VSABTH-C includes 37 items. Considering this heuristic, the sample should comprise between 185 and 370 participants. Power analysis carried out on CFA results obtained in previous studies (Capafons et al., 2015; Franquelo et al., 2020), were performed on 1,678 and 705 participants respectively. Power estimated with pwrSEM (Wang & Rhemtulla, 2020) for specific effects (factor weights) tends towards 1. This is because these loadings are very high and the number of indicators per variable is large (3 to 6). It is therefore not useful, given the robustness of this scale, to have such a large sample. A new simulation on these data reveals that with a size of 300 participants, the power remains close to the value 1. Thus, we expected a sample size of between 300 and 400 participants for this study.

Participants were contacted on social networks and on Nantes University forums. A total of 691 people deliberately completed the questionnaires (250 women; $M_{age} = 28.5$; $SD = 12.5$). However, we had to delete observations with more than 10% missing values, leading to a remaining 325 respondents. Then we deleted data for individuals who at the end of the questionnaires declared that they did not answer seriously, plus eight participants who were older than 70 years old as inclusion criteria. The data of 312 participants who had completed all questionnaires were selected and analyzed. A total of 312 French participants aged between 18 and 62 participated in this study ($M = 28.5$; $SD = 12.5$) of whom 19.9% were male and 80.1% female. All participants outside this range and nationality were excluded from the data analyses, because this study concerns an adult sample, and participants aged over 70 are generally insufficiently familiar with online questionnaires. In addition, visual imagery abilities tend to decline over a person's lifetime. Among the participants, 77% reported having received information about hypnosis and 27% had direct experience with hypnosis. Prior information about hypnosis was received from: 30.7% television, 14.1% books, 12.4% university courses,

6.2% conferences or scientific meetings, 1.2% secondary courses and 35% other. The participants' demographic data are available at the following link: <https://osf.io/kau8p/>.

Instruments

Four questionnaires were implemented on Qualtrics XM and presented to the participants (these questionnaires are available at <https://osf.io/kau8p/>):

1- The Valencia Scale of Attitudes and Beliefs Toward Hypnosis - Client Version

(VSABTH-C, Green et al., 2012; Capafons et al., 2015) was used in its online version of a 37-item self-report measurement in French. Each item is measured on a 6-point scale ranging from: 1 (completely disagree) to 6 (completely agree). Before the items, this scale includes a questionnaire about socio-demographic information (nationality, gender, age, marital status, level of education) and participants' previous experience with hypnosis (their knowledge about hypnosis, from which kind of media/source, whether they have been hypnotized, in which context, and so on.) The model obtained with the online version provides a satisfactory fit to all the participants' data in comparison with other previous studies and confirms validity, reliability and invariance across time and gender (Franquelo et al., 2020).

2- The Big Five Inventory (BFI) developed by John et al. (1991) is one of the most widely accepted tools for assessing dimensions of personality. The adapted and validated French version (BFI-Fr, Pleasant et al., 2010) comprises 45 items that assess the five dimensions of personality: E (Extraversion: 8 items); A (Agreeableness: 10 items); C (Conscientiousness: 9 items); N (Neuroticism: 8 items); O (Openness to experience: 10 items). Responses are rated on a five-point Likert scale, ranging from: 1 = Strongly Disagree to 5 = Strongly Agree. The psychometric properties of the validated BFI-Fr are excellent, with internal coherence coefficients varying from 0.77 to 0.83 and correlations with the large domains of the NEO PI-R varying from 0.69 to 0.79. The hetero-evaluative form of the BFI-Fr has recently been

validated, and its five scales present an internal consistency equivalent to that of the self-evaluation version and satisfactory test-retest reliability.

3- The Social Desirability (DS 36) scale is assessed on two dimensions: self-illusion and impression management (Tournois et al., 2000). Self-illusion (also called self-deception) refers to conscious or automatic positive self-esteem. Impression management (or hetero-deception) is a deliberate strategy for giving others a favorable self-image. This validated scale comprises 18 items for each dimension. Social desirability is defined as the tendency to distort self-descriptions in order to show oneself in a favorable light, i.e., a tendency to give an exaggerated self-profile. The DS36 (Tournois et al., 2000) comprises 36 assertions with 18 items assessing self-illusion (*I am always optimistic*) ($\alpha = 0.86$) and 18 items assessing impression management (*I am always polite*) ($\alpha = 0.82$). The low correlation between the two factors ($\alpha = .24$) testifies to their quasi-independence (see Tournois et al., 2000).

4- The imagery questionnaire. Based on the Survey of Mental Imagery questionnaire, Grebot (2003) adapted and validated the French version of this questionnaire for four imagery modalities: visual, auditory, somesthetic and kinesthetic. In this questionnaire, imagery abilities comprised two scores. The first of these rates the ease with which the participant imagines the scene described in each question. The participant has to circle 3 to declare that yes, they have built the image; 1 for no image; or 2 if they are not certain of having built an image. Then, the second score corresponds to the vividness of the imagery experiment varying from zero (for no image 0%) to four (for an image that is 100% as vivid as a real perception). Of course, participants can use intermediate estimates. From the adaptation by Grebot and Paty (2005), we have selected 35 questions: 14 rating visual imagery; 12 rating auditory imagery; and 9 rating the ability to imagine feeling physical sensations. This selection was made because some questions were redundant and we did not want responding to the entirety of the questionnaires to take too much time, with a maximum of 30 minutes. A global score was calculated for each

scale: (1) the ability to imagine; (2) the vividness of the image. For each scale, sub-scores were calculated for each imagery modality: visual, auditory and somatosensory. Question order was randomized for this Imagery questionnaire.

Procedure

The first step was to translate the English version of the VSABTH-C (adapted from Green et al., 2012) into French by a French native speaker, and then from French to English by an English native speaker. This procedure, the double translation procedure (English to French; French to English) by native speakers, is usually recommended for studies aiming to validate a tool in language other than that for which it was originally designed. We did not translate the original scale written in Spanish, because the other tests used in this study are validated French versions from the English version. Moreover, the English version of the VSABTH-C has reported the eight-factor structure (Green et al., 2012).

The administration of the four questionnaires was carried out through Qualtrics, from February to July 2021. Participants were contacted on social networks or on university forums. A message was sent to them specifying that it was a survey conducted by teacher-researchers from the University of Nantes on people's ideas of therapeutic hypnosis. They were warned that they had to answer four questionnaires independent of each other. The objective was to identify the factors that explain the benefits or not of hypnosis in medical practice. The estimated time to complete all questionnaires was approximately 20 minutes. The email contact details of the study were provided if they wished to contact the study managers or ask questions. In accordance with the ethics code for psychologists and research in psychology, they were explicitly asked to complete a free and informed consent form for participation in the study. It was specified that those contacted through networks or forums were free to agree to participate in this research. They were then provided with a link to access the online questionnaires on the

Qualtrics platform. The experimenters (three of the authors of the study) could only access the application and the handling of the information collected (including the results of the questionnaires and the scale). The ethical principles of the Declaration of Helsinki were also respected through the research process.

The participants then provided informed consent. Next, participants filled out the demographic questionnaire and answered a few questions about their knowledge and potential experience of hypnosis. Thereafter, they always completed the VSABTH-C first. Then, the three other questionnaires BFI-Fr, DS36, and the Multisensory imagery questionnaire, of which the order of presentation was counterbalanced. Questionnaires can be downloaded from <https://osf.io/kau8p/>.

Data analysis

Preliminary analyses were performed on the data firstly to assess their distribution. The univariate normality was considered acceptable as values of the skewness and kurtosis indices varied between -2 and +2 and -7 and +7, respectively (Byrne, 2013). We also examined the Mardia coefficient, which may indicate a violation of multivariate normality if it exceeds the value 5. In case of deviation from normality, we used a bootstrapping method as suggested by Nevitt and Hancock (2001). During the preliminary analysis, we also looked for the presence of multivariate outliers based on Mahalanobis distance. As suggested by Byrne (2013), if outliers were identified, they were removed.

To verify the relevance of the 8-factor structure of the scale VSABTH-C French version, we then performed a confirmatory factor analysis. The method adopted is maximum likelihood estimation. Based on the recommendations of several authors (Byrne, 2013; Kline, 2015; Marsh et al., 2004), model fit was assessed by the following indices: Chi-square (χ^2) whose p-value is expected to be $>.05$, Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) whose values

were greater than .90, Root Mean Square Error Approximation (RMSEA) and Standardized-Root Mean Square Residual (SRMR); for the latter two indices, we expected a value below .08 (considering that values between 0 and .05 indicate very good fit, values between .05 and .08 indicate reasonable fit, and values greater than .10 indicate poor fit [Byrne, 2013]). The quality of the factorial solution was also assessed by the absence of cross-loading. When the modification indices suggested the existence of cross-loading, we removed ambiguous items following the procedure used by Franquelo et al. (2020). We analyzed convergent and discriminant validity using the same method as Franquelo et al. (2020). For convergent validity, we assume that it is acceptable if the Average Variance Extracted (AVE) exceeds the threshold of .50; for discriminant validity, we examine if the AVE of each latent variable is greater than the square of the correlation between them. Finally, internal consistency was evaluated with Cronbach alpha (cut-off $<.70$).

Results

Preliminary analysis

Some preliminary descriptive analyses were performed on the VSABTH-C items. The item distributions did not show significant deviations from normality (skewness and kurtosis indices close to zero. Additional descriptive statistics for each item of the VSABTH-C scale are available in supplementary materials and on: <https://osf.io/kau8p/>. However, the value of Mardia's coefficient (multivariate kurtosis coefficient = 1581) indicated a significant deviation from multivariate normality, so we decided to perform a bootstrap analysis of 2,000 samples for the confirmatory factor analysis. The examination of the Mahalanobis distances did not reveal multivariate outliers.

Confirmatory Factor Analysis (CFA)

CFA was conducted on the 37 items of the scale. This first analysis offered unsatisfactory fit indices; examination of the modification indices revealed cross-loading patterns for five items. These are item 7 (FEAR - *I believe that under hypnosis the person is an automaton at the mercy of the hypnotist*), which was also related to the *Magical*, *Memory* and *Marginal* factors; item 16 (FEAR – *Hypnosis is a safe technique and poses few risks*), which was also related to the *Magical* and *Memory* factors; item 17 (CONTROL - *Hypnosis enhances one's capacity for self-control*), which was also related to the *Help* and *Magical* factors; item 22 (FEAR - *Under hypnosis, people can be forced to do things that they do not want to do*), which was linked to the *Control* and *Marginal* factors; item 30 (MEMORY - *What is remembered under hypnosis is the truth*), which was also linked to the *Fear* and *Marginal* factors. In accordance with our analysis plan, we decided to delete these five items. Examination of the factor loadings showed that item 34 (*Hypnosis takes place outside of scientific research*) was not related to the *Marginal* factor, nor to any other. It was also rejected. The final model with eight factors and 31 items showed a good fit with the data. However, reliability analyses sometimes revealed low values for Cronbach's coefficients ($.50 < \alpha < .60$), which can also be explained by a low number of items. Factor loadings are presented in Table 1 and fit indices in Table 2.

[Insert Table 1 and 2]

Convergent and Discriminant Analysis

Testing for convergent validity involves identifying whether the VSABTH-C items are truly preferentially associated with the dimension that defines them. The AVE values presented in Table 3 show that this validity is acceptable. For four of the dimensions (*Fear*, *Help*, *Control*, *Interest*), convergent validity exceeds the expected threshold with values for AVE above .50 (see Table 3). The convergent validity of the factors *Memory* (AVE = .25), *Collaboration* (AVE

= .40), *Magical* (AVE = .26) and *Marginal* (AVE = .27) are less satisfactory. It can be pointed out that in Franquelo's validation study of the scale (2020), the dimensions *Memory*, *Magical* and *Marginal* also showed the same psychometric weakness.

[Insert Table 3]

Discriminant validity refers to the extent to which factors are distinct and uncorrelated. One approach to providing evidence of discriminant validity is to check that AVE of each latent variable is greater than the square of the correlation between them (Hair et al., 2014). As a whole, the results are highly satisfying: the factors *Fear*, *Help*, *Control*, *Collaboration* and *Interest* appear to be discriminating. *Memory*, *Magical* and *Marginal* are less clearly discriminating. For example, $AVE_{\text{memory}} = .25$ is lower than $r^2_{\text{memory-magical}} = .45$, than $r^2_{\text{memory-marginal}} = .45$ and lower than $r^2_{\text{memory-fear}} = .28$.

The analysis of convergent and divergent validity thus shows us a degree of variability in the validity of the factors and leads to a cautious interpretation of the scores for the factors *Memory*, *Magical* and *Marginal*.

Correlation analysis

Correlation matrices between the set of scores calculated for each concept measured and its sub-dimensions are presented (see Table 4). Table 4 shows correlations between attitudes and beliefs toward hypnosis with the five personality dimensions (BFI-Fr). After, correlations between attitudes toward hypnosis and the two social desirability dimensions (DS36) are presented (Table 4). Finally, relationships between these attitudes and the imagery scores (Multisensory imagery questionnaire) are computed (see Table 4). Like Molina-Peral et al., (2020), based on the outcome of an exploratory factor analysis conducted on the eight dimensions of the VSABTH-C, we combined the dimensions of the hypnosis attitude scale into two composite variables to improve the clarity of the results: positive beliefs and attitudes

(*Interest, Help, Control* and *Collaboration*) versus negative beliefs (*Fear, Memory, Marginal,* and *Magical*). These composite scores were obtained by summing the scores for the items in each dimension, after reversing the scores for negatively formulated items.

[Insert Table 4]

We hypothesized positive correlations between attitudes and beliefs towards hypnosis and personality dimensions, in particularly with openness, extraversion and agreeableness. This hypothesis is partially validated. As a whole, there is no significant relationship between the personality dimensions and beliefs towards hypnosis, except for the dimension *Openness*, where medium-sized positive correlations were found (Table 4). More specifically, there are low correlations between *Openness* and the following dimensions: *Fear* ($r = -.13, p = .02$), *Help* ($r = .19, p < .001$), *Control* ($r = .14, p = .02$) and *Interest* ($r = .12, p = .05$). Nevertheless, the positive correlations tend to show a low relationship between *Openness* (a personality dimension) and positive attitudes and beliefs toward hypnosis ($r = .19, p < .001$: *Interest, Help, Control* and *Collaboration*).

Considering social desirability, the results presented in Table 4 support the expectation that participants' responses would be not biased or be only marginally so by social desirability. Indeed, correlations between VSABTH-C and DS36 scores are all very small, close to zero. Analysis of the VSABTH-C dimensions shows a single and small significant positive correlation between *Self-illusion* and *Magical* ($r = .11, p = .05$).

Finally, we expected to observe relationships between imagery scores and attitudes towards hypnosis. This last hypothesis is confirmed by the results presented in Table 4: positive small-sized correlations are observed between positive attitudes towards hypnosis and imagery abilities ($r = .22, p < .001$). Analysis of the VSABTH-C dimensions shows that these positive correlations are maintained for the dimensions *Help, Control,* and *Interest* (positive beliefs) and negative correlations for the dimensions *Fear* and *Memory* (negative beliefs), but not for the

last three, which are *Collaboration*, *Magical* and *Marginal*. Overall, it appears that individuals with positive attitudes and beliefs towards hypnosis are also more prone to visual, auditory and somatosensory imagery, and for whom somatosensory imagery is most vivid.

It should be noted, however, that some correlations have a relatively small effect size and may be false positives. Future work should attempt to replicate these effects in order to determine whether they are robust effects.

Discussion

In respect to the main aim of our research, the confirmatory factorial structure, internal consistency, and convergent and discriminant validity of VSABTH applied online and for the first time in its French version are in accordance with the exploratory and confirmatory analyses carried out in previous studies (see Franquelo et al., 2020; Viñas-Velázquez et al., 2022). In line with previous research, the factor structure did not fit the data well. Therefore, an alternative factorial structure model could be proposed based on the model by Franquelo et al (2020; Capafons et al. 2015), precluding six items from the scale because they showed significant and high correlation values with several factors of the scale. As in the study by Franquelo et al.(2020), we precluded six items from the final model, notably items 16, 22 and 17, that should be definitively discarded from the scale. Nevertheless, the CFA of the eight-factor/31-item scale showed good fit for the eight defined factors assessing attitudes and beliefs toward hypnosis. In addition, overall, the weakness or lack of correlation evidences that the social desirability personality dimension does not contaminate hypnosis scale responses, which testifies to its validity and robustness. Correlation analyses show that participants' responses to the VSABTH-C scale are not likely to be biased with possible social desirability, i.e., to show oneself as a person with attitudes and beliefs towards the hypnosis that are exclusively negative or positive. Scores on the VSABTH scale cannot be attributed to social desirability.

Although our sample size did not allow us to test gender-related variations, most previous studies demonstrated invariance, excepting Franquelo et al.'s study (2021) that showed a trend for women to have higher scores in two dimensions (*Fear* and *Control*).

The present findings show evidence that personality dimensions of the Big Five model (except for *Openness to experience*) are not associated to attitudes or beliefs toward hypnosis. The correlation between the *Openness* dimension and attitudes/beliefs towards hypnosis, although they are weak, are in line with a widely-held hypothesis in the literature that individuals open to the experience are more responsive to hypnotic suggestions.

Multi-sensorial images are at the core of hypnotic techniques. The issue was whether individual characteristics of mental imagery can influence individuals' attitudes and beliefs about hypnosis. Many studies have observed a significant and positive relationship between imaging abilities and hypnotic suggestibility (Glisky & Kihlstrom, 1993; Grebot & Paty, 2005). In the present study, one secondary objective was to determine whether high imagery abilities were associated to positive attitudes and beliefs towards hypnosis. This hypothesis was tested by considering three imaging modalities used in the hypnotic suggestions (auditory, visual and somatosensory). Two scores of imagery capacities were examined: control (the capacity to experience the scene described in the form of a mental image); vividness (the sharpness, clarity and precision of the image generated) (see Grebot, 2003). Overall, our results weakly support our predictions regarding the relationship between individuals' imagery abilities and their attitudes and beliefs about hypnosis. The results indicated that participants with positive beliefs toward hypnosis (*Help*, *Control*, and *Interest*) were also more prone to elaborate visual, auditory and somatosensory images. However, the correlations remained small to moderate in size. Therefore, an alternative explanation of these correlations might be, as Podsakoff and Organ (1986) pointed out, that self-reported measures could generate some biases, in particular, the bias of the variance related to the common method (Campbell & Fiske, 1959). Because both

measures come from the same source of self-reports, overlapping variance is partly due to an artefact of the same measurement method. Nevertheless, the ability to elaborate multi-sensorial images (i.e. *Control*) seems to be a better correlate with attitudes and beliefs towards hypnosis than the vividness of images. Therefore, these results tend to support our hypothesis about the relevance of the imagery abilities as playing a role on expectancies toward hypnosis and a fortiori the positive outcomes of the treatment or intervention that uses hypnosis as an adjuvant.

In clinical practice, motivations, attributions, expectations and beliefs are the driving forces in triggering responses to suggestions. Considering these variables is crucial. They contribute to elaborating a positive expectancy of treatment and hypnotic responses. The impact of these factors is recognized as essential by therapists. Response expectancy theory is based on the assumption that motivation is focused on expectations of particular behaviors in hypnosis. Hypnosis, like placebos, produces therapeutic effects by altering patient predictions (Kirsch & Lynn, 1998). Expectancy is believed to be a significant determinant of the hypnotic response. Successful hypnotic suggestions reinforce beliefs and motivation to respond in conformity with expectancies. According to Lynn and Kirsch (2006), reinforcing people's positive expectations of hypnosis can only maximize the benefits of treatment. Indeed, hypnosis is viewed by many people as a procedure whose power can help you lose weight, quit smoking, overcome fears, stop pain, regain childhood memories, etc. These beliefs spark positive expectations and most of them come to fruition. Expectations become individuals' self-fulfilling prophecies, reacting accordingly to what they predict. Patients' beliefs and expectations affect their responses to hypnotic suggestions. Therefore, if people sense that they are receptive to hypnosis, they will be. They will then perceive their responses as involuntary because the dominant cultural belief is that hypnotic responses are not self-initiated. Loss of control is due to expectations (Lynn & Kirsch, 2006).

The limit of this study is that data analyses were reduced to a sample of 312 participants. Indeed, the number of questionnaires proposed, taking time and attention, discouraged more than half of the participants who partially completed them.

As many researchers and practitioners have underlined, before using hypnosis as a therapeutic complement, it is important to know patients' attitudes and beliefs towards hypnosis and to resolve their fears and goals associated with unrealistic or false expectations. Attitudes toward hypnosis influence treatment outcomes, with positive and realistic attitudes linked to positive outcomes. Moreover, positive attitudes reinforce hypnotic suggestibility and therapeutic collaboration. Negative and unrealistic beliefs can interfere with cooperation with the hypnotist and adherence to treatment (Capafons et al., 2004; Capafons et al., 2015).

Therefore, it is crucial to offer the community of French clinicians and researchers a reliable instrument allowing them to take into account the attitudes and beliefs of individuals with regard to hypnosis. The present study responds entirely to this purpose.

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Table 1

Factor Loadings of the Final Model of each Factor and reliability indices of VSABTH-C

Item	FE	MEM	HE	CON	COL	INT	MAG	MAR
Item 4	.81							
Item 18	.80							
Item 19	.72							
Item 20	.70							
Item 32		.55						
Item 31		.53						
Item 3		.46						
Item 33		.45						
Item 23			.80					
Item 37			.77					
Item 10			.77					
Item 12			.74					
Item 1			.62					
Item 25				.88				
Item 15				.87				
Item 14				.84				
Item 24				.81				
Item 21				.59				
Item 13					.86			
Item 2					.60			
Item 8					.34			
Item 26						.97		

Item 27						.94		
Item 28						.77		
Item 29							.63	
Item 9							.53	
Item 6							.49	
Item 5							.35	
Item 11								.69
Item 35								.48
Item 36								.32
Alpha	.84	.55	.86	.90	.58	.92	.59	.52

Note. FE = *Fear*; MEM = *Memory*; HE = *Help*; CON = *Control*; COL = *Collaboration*; INT = *Interest*; MAG = *Magical*; MAR = *Marginal*

Table 2

Fit Indices for Current CFA Model and Previously Published Models for VSABTH-C

Model	Chi2	df	Chi2/df	<i>p</i>	SRMR	CFI	TLI	RMSEA	90% CI
<i>Previous models</i>									
Green et al. (2012)	1500	566	2.65	< .001	.10	.96	–	.06	–
Capafons et al. (2015)	2972	566	5.25	< .001	.08	.95	–	.05	–
Franquelo et al. (2020)	1113	406	2.74	< .001	.07	.91	.90	.06	.05-.06
<i>Current model</i>	894	406	2.20	< .001	.08	.89	.87	.06	.05-.06

Table 3
 Convergent validity, discriminant validity and average variance extracted for the latent
 dimension of the VSABTH

	FE	MEM	HE	CON	COL	INT	MAG	MAR	AVE
FE	1								.57
MEM	0.28	1							.25
HE	0.00	0.00	1						.55
CON	0.45	0.15	0.18	1					.65
COL	0.04	0.02	0.11	0.13	1				.40
INT	0.22	0.00	0.27	0.10	0.03	1			.80
MAG	0.01	0.45	0.28	0.02	0.00	0.29	1		.26
MAR	0.24	0.45	0.13	0.49	0.12	0.09	0.03	1	.27

Note. FE = *Fear*; MEM = *Memory*; HE = *Help*; CON = *Control*; COL = *Collaboration*; INT = *Interest*; MAG = *Magical*; MAR = *Marginal*, AVE = average variance extracted.

Table 4

Correlations between beliefs towards hypnosis (VSABTH-C) and Personality (BFI-Fr); Social Desirability (DS36); Imagery questionnaire

Personality	Positive beliefs	Negative beliefs	M	SD
Extraversion	.01	-.03	24.6	6.9
Agreeableness	.04	-.07	34.1	8.55
Consciousness	.02	-.07	31.7	8.16
Neuroticism	.03	.01	25.9	5.36
Openness	.19***	-.12*	36.8	7.11
Social Desirability				
Self-illusion (<i>self-deception</i>)	.01	-.06	65	18.1
impression management (<i>hetero-deception</i>)	.01	-.05	72.8	16.1
Imagery				
Imagery ability	.22***	-.18**	89.1	11.8
<i>Visual ability</i>	.16*	-.16**	39.1	4.58
<i>Auditory ability</i>	.16*	-.18**	30.3	6.01
<i>Somatosensory ability</i>	.18**	-.08	19.5	5.03
Imagery vividness	.15	-.15	122	30.1
<i>Visual vividness</i>	.12	-.13	55.8	13.3
<i>Auditory vividness</i>	.14	-.19*	41.7	13
<i>Somatosensory vividness</i>	.18*	-.09	27.1	9.38

Note. * $p < .05$, ** $p < .01$, *** $p < .001$