



The relationship between transliminality, hypnotic and imaginative suggestibility, and other personality traits

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ABSTRACT

To our knowledge, no study has directly examined the link between hypnotic response and the personality trait of transliminality (which is underpinned, for example, by magical ideation, mystical experience, fantasy proneness, absorption, hyperaesthesia). In order to further understand the correlates of suggestibility, the aim of the current project was to investigate whether transliminality is associated with hypnotic and imaginative suggestibility (considering: objective response, subjective response and involuntariness). Another aim was to assess the contribution of transliminality as a predictor of suggestibility when a range of previously studied personality trait measures were considered.

Participants completed: the Revised Transliminality Scale, Tellegen Absorption Scale, Creative Experiences Questionnaire, and the Dissociative Experiences Scale II. To avoid context effects, where knowledge or measurement of one trait or ability might influence measurement of another, a separate standalone study was conducted where hypnotic and imaginative (without hypnosis) suggestibility screenings were carried out in-person in small groups using the modified Carleton University Responsiveness to Suggestion Scale. The merging of these two datasets enabled the analyses.

Transliminality was weakly correlated with the imaginative suggestibility subjective response measure ($r = 0.19$). Likewise, weak correlations were found between transliminality and the hypnotic suggestibility response measures (objective, $r = 0.21$, subjective, $r = 0.23$, involuntariness, $r = 0.24$). The multiple regressions (forward selection) reflected the pattern of correlations, with no model for any of the variables, retaining more than a single significant predictor.

In summary, this study combination, avoiding context effects, shows transliminality to be a weak predictor of response to suggestion.

1. Introduction

1.1. Transliminality

The concept of transliminality has been proposed to pertain to the permeability of a threshold that separates conscious and unconscious awareness across various cognitive and perceptual functions. Transliminality is defined as “a hypothesised tendency for psychological

material to cross (*trans*) thresholds (*limines*) into or out of consciousness” (Thalbourne & Houran, 2000, p853). It has been suggested that people at the high-end of the scale of this cognitive/personality construct, and who therefore have excessive and disruptive flow of material into consciousness, may be prone to psychosis (Thalbourne et al., 1997). However, it has also been suggested that people who are well-functioning, emotionally stable and high in transliminality may have experiences that promote artistic/intellectual activity (Thalbourne et al., 2001) and

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creative personalities (Thalbourne, 2000).

Despite earlier works using the term “trans-liminal” (Myers, 1903) or “transliminal” (Rugg, 1963; Usher & Burt, 1909), the term “transliminality” as a noun was conceived independently by Thalbourne (1991), rather than in reference to a process, as previously applied (Lange et al., 2000). The recent conceptualisation came from the work of Thalbourne and Delin (1994), who, while investigating correlates of beliefs in the paranormal, found that a number of variables of interest correlated with each other. Namely, these variables were paranormal belief, creative personality, mystical experience, magical ideation, history of manic-like experience, history of hypomania and history of depressive experience. Principal components analysis carried out on the data (omitting hypomania due to similarities with other measures) revealed loading of these variables upon a single factor. Additional studies, which reassessed the contribution of the initial variables, included new variables, removed others, and incorporated additional factor analyses (e.g., Thalbourne, 1998; Thalbourne et al., 1997), led to the development of the Transliminality Scale (Form B; 29-item) (Thalbourne, 1998). The psychometric properties of the scale were later improved with Rasch scaling and by excluding the questionnaire items that were prone to age or gender biases (the scored items were reduced from 29 to 17), and the newer scale was termed the Revised Transliminality Scale (RTS) (Houran, Thalbourne, & Lange, 2003; Lange et al., 2000). The revised scale comprises items that assess mystical experience, absorption, magical ideation, manic experience, hyperaesthesia, fantasy proneness and dream interpretation. For a more in-depth description of the evolution of the term transliminality and the analyses on which its relevant measurement scales are based, see Lange et al. (2019).

Transliminality has been shown to correlate with absorption, fantasy proneness and dissociative experiences. High positive correlations have been found between absorption, as measured with the Tellegen Absorption Scale [TAS] (Tellegen & Atkinson, 1974) and the Transliminality Scale ($r = 0.74$, when items with overlap are removed from the TAS) (Thalbourne, 1998), and in a more recent study, between the TAS and the RTS ($r = 0.72$; Evans et al., 2019). While absorption is an antecedent of transliminality, transliminality encompasses more phenomena beyond conscious immersion (Evans et al., 2019). Fantasy proneness is another constituent of transliminality, and a positive correlation has been demonstrated between the Transliminality Scale and the Inventory of Childhood Memories and Imaginings: Children's Form [ICMIC], $r = 0.77$, when items with overlap were removed from the ICMIC, and items relating to parapsychology omitted during administration (Thalbourne, 1998). In the test development stage, absorption and fantasy proneness loaded upon a single factor and were considered core components of transliminality. However, when dissociation, as measured with the Dissociative Experiences Scale [DES] (Bernstein & Putnam, 1986), was included, this led to splitting of the single factor (Thalbourne, 1998). Dissociation was therefore not considered a core component of transliminality, and unlike absorption and fantasy proneness, did not contribute items to the Transliminality scale. Dissociation was shown in the same study to be positively correlated with the newly created Transliminality Scale ($r = 0.47$, Thalbourne, 1998), albeit the correlation was not as high in strength as those observed for absorption or fantasy proneness. Evans et al. (2019) later found a positive correlation of $r = 0.595$ between the DES-II (Carlson & Putnam, 1993) and RTS.

1.2. Hypnotic suggestibility

Thalbourne and Delin (1994) predicted that people high in transliminality might also be more receptive to hypnotic induction. Thalbourne (2009) later elaborated on this prediction, stating that as correlation is high between belief in the paranormal and transliminality, and that as people who believe in the paranormal score higher on hypnotic ability (e.g., Wickramasekera, 1991), then transliminality and

hypnotic ability should also be related. In his 2009 article, Thalbourne urged hypnosis researchers to investigate directly the relationship between transliminality and hypnotic ability. Currently, only a positive relationship between transliminality and ‘hypnosis-related’ experiences in respondents' daily lives, as measured with questionnaires (Spearman $r = 0.67$) has been demonstrated by Cooper and Thalbourne (2005). However as noted by Terhune (2005), measuring hypnotisability with a self-report questionnaire in this way is inadequate, and to our knowledge there has been no direct assessment of the correlation between transliminality (as measured with the Transliminality Scale or the RTS) and hypnotic suggestibility as measured with a standardised scale (that includes behavioural and experiential evaluation).

Transliminality shares personality characteristics that have been linked to hypnotic suggestibility. Firstly, both transliminality and hypnotic suggestibility have been linked to the trait of absorption. Strength of correlation between absorption and hypnotisability has been found to vary, but generally to be small to moderate (Barnier & McConkey, 1999); for reviews see Roche and McConkey (1990) and Council, Kirsch and Grant (1996). Council et al. (1996), in a meta-analysis, report an estimated population correlation of 0.21, $p < .001$, when hypnotic suggestibility is assessed behaviourally (regardless of the order of test procedures), and 0.23 or 0.25, both p -values $< .001$, when subjective assessments of hypnotic suggestibility are used (with the higher magnitude population correlation observed when hypnotic context is established prior to the absorption testing). The influence of potential ‘context effects’, which relevant to this type of research, is where the knowledge or completion of one measure may affect the completion of another, can be avoided by, for example, obtaining the measures from different studies and later combining them, so as to minimise the chance that participants may notice connections between the measures. Context effects have been proposed to underpin the potential inflation of correlations in personality studies (e.g., Council et al., 1986). In their meta-analysis, Council et al. (1996) found that the correlations between absorption and hypnotic suggestibility were smaller when measured out of context, and the estimated population correlations were 0.12 ($p < .001$) and 0.09 ($p < .01$) for behavioural and subjective measures of suggestibility, respectively. It has also been reported that experiential/situational variables can influence completion of a well-known absorption measure – the Tellegen Absorption Scale (Tellegen & Atkinson, 1974) and participant expectancies can influence the relationship between absorption and hypnotic suggestibility (Roche & McConkey, 1990).

Fantasy proneness has also been proposed as a characteristic of highly hypnotisable individuals and as a constituent of transliminality (Kelley, 2010; Wilson & Barber, 1982). Again, a small to moderate correlation has been identified between the personality characteristics. For example, correlations have been observed between the Inventory of Childhood Memories and Imaginings (ICMI; Wilson & Barber, 1983) and the Harvard Group Scale of Hypnotic Susceptibility, Form A (HGSHS:A; Shor & Orne, 1962): $r = 0.29$, $p < .01$ and $r = 0.28$, $p < .01$ (Green & Lynn, 2008); and $r = 0.33$, $p < .01$, (Green & Lynn, 2010); and ICMI and The Carleton University Responsiveness to Suggestion Scale (CURSS; Spanos, Radtke, Hodgins, Bertrand, et al., 1983): CURSS-Objective $r = 0.29$, $p < .01$; CURSS-Subjective $r = 0.32$, $p < .01$; CURSS-Involuntariness $r = 0.36$, $p < .001$; CURSS-Objective/Involuntariness $r = 0.31$, $p < .01$, (Silva & Kirsch, 1992). Furthermore, Braffman and Kirsch (2001) investigated the relationship between the ICMI and CURSS by differentiating between non-hypnotic suggestibility ($r = 0.27$, $p < .01$) and hypnotic suggestibility ($r = 0.34$, $p < .001$). The study found a weak correlation between the ICMI and hypnotisability (conceived as the change in suggestibility due to hypnosis, while controlling for non-hypnotic suggestibility), $r = 0.17$ ($p < .05$).

Similar to the relationship between dissociative experience and transliminality, dissociative experiences have also been hypothesised and presented with a complex relationship to hypnotisability. Although dissociation theories of hypnosis predict that a tendency to experience

dissociation in everyday life should correlate with hypnotic suggestibility, generally only a zero to small relationship has been evidenced in the literature (Dienes et al., 2009). While some studies report a significant small correlation (e.g., between the Dissociative Experiences Scale (DES) and HGSHS:A, $r = 0.14$, $p < .05$; Sapp & Hitchcock, 2002); others have reported non-significant relationships of similar magnitude, for example, between the DES and CURSS:O, $r = 0.15$; CURSS:S, $r = 0.17$; CURSS:I, $r = 0.16$; CURSS:OI, $r = 0.12$ (Silva & Kirsch, 1992); and DES-C (Wright & Loftus, 1999) and Waterloo Stanford Group Scale of Hypnotic Susceptibility, Form C (WSGC; Bowers, 1998), $r = 0.08$ (Dienes et al., 2009). A potential explanation for inconsistencies may be due to heterogeneity across high suggestible people, and the existence of a dissociative subtype (see e.g., Terhune et al., 2011). Acunzo et al. (2020) have also demonstrated that high suggestible people who score high in dissociation are more likely to have anomalous experiences.

1.3. Boundary structure

Transliminality has been discussed hand-in-hand with boundary structure, with both referring to the extent to which different parts/functions of the brain/mind are separated (Sherwood & Milner, 2005). Despite this apparent overlap, boundary structure is conceptually broader than transliminality (Sherwood & Milner, 2005), with thick or thin boundaries being referred to in relation to categories as diverse as: perception, thoughts and feelings, states of awareness or consciousness, sleep-dream-wakefulness, play, memory, the body, interpersonal, identity, group, environmental preferences, opinion, and decision making (see Table 1 in Hartmann, 1991). In support of the relationship between the two concepts, Houran, Thalbourne, and Hartmann (2003) found that transliminality (RTS) and mental boundary scores (provided using the Boundary Questionnaire (BQ) developed by Hartmann (1991)) were moderately-to-highly correlated ($r = 0.66$), with further evidence of a significant association between the concepts provided by Sherwood and Milner (2005), and by Thalbourne and Maltby (2008), who by applying factor analysis, noted the emergence of a single factor.

Boundary scores have also been shown to be associated with hypnotisability, as significant positive correlations have been reported between the BQ score and both hypnotic suggestibility ($r = 0.19$) and hypnotic depth ($r = 0.29$) (Barrett 1989, as cited in Rader et al., 1996). Rader et al. (1996) also found BQ scores to be significantly positively associated with hypnotic suggestibility ($r = 0.20$), and Kunzendorf and Maurer (1989) reported a correlation of similar magnitude ($r = 0.16$; although this was not significant).

Furthering research on this topic, Cardeña and Terhune (2014) found positive correlations between thin personality boundaries (as measured with the BQ) and experiential measures of hypnotic suggestibility ($r = 0.25$) and absorption ($r = 0.56$). However, the correlation with the behavioural measure of hypnotic suggestibility, although quite similar in magnitude to the previous studies, was not statistically significant ($r = 0.13$). Cardeña and Terhune administered the BQ and the suggestibility screening in different sessions and under different premises, in order to avoid context effects.

1.4. Aims and objectives of current study

Given that no existing studies to our knowledge have directly tested the relationship between transliminality and suggestibility, the aim of the present study was to fill this research gap:

- i) Personality questionnaires (transliminality, absorption, fantasy proneness, dissociation) were administered within a separate study to the suggestibility screenings to minimise/avoid context effects.
- ii) Given that thinner boundaries should facilitate response to suggestion, and that transliminality and hypnotic suggestibility have both been reported to share an association with traits such as the

potential for absorption, dissociative experiences and fantasy proneness, it was expected that transliminality would correlate positively with the suggestibility measures.

- iii) Hypnotic and imaginative suggestibility were both assessed (that is suggestibility with and without hypnosis), so that the relationships between these variables and transliminality could be tested independently, and furthermore this enabled a difference score (hypnotisability score) to be calculated to evaluate whether transliminality was linked to increased response relating to the hypnotic induction. This approach fits with a conceptualisation outlined by Kirsch (1997), in which suggestibility can be considered separately to hypnotizability (the difference in suggestibility scores due to hypnosis).
- iv) Experiential data in response to suggestions were collected in addition to behavioural data. This approach provides a more comprehensive dataset, to enable assessment, for example, of involuntariness that is thought to underpin the classical suggestion-effect (Weitzenhoffer, 1974). Experiential data might be less prone to confounding effects such as those due to compliance, and we hypothesised that transliminality would be more closely related to the experiential scores.
- v) In an attempt to replicate previous findings, we investigated whether there were positive associations between transliminality and absorption, fantasy proneness, and dissociative experiences.
- vi) Finally, multiple regression was used to assess the best predictors of behavioural and experiential response to hypnotic and imaginative response to suggestion.

2. Material and methods

2.1. Design

To examine the relationship between transliminality, other personality traits (absorption, fantasy proneness, dissociative experiences) and suggestibility (hypnotic and imaginative: behavioural, subjective and involuntariness experience), we used a correlational design (Pearson). We also applied false discovery rate multiple comparison correction to adjust the p-values in the correlation analysis (with alpha set at 0.05). In addition to Table 2 which provides the FDR-adjusted p-values (and which can be found within this paper), a table containing the uncorrected p-values can be found in the Supplementary material. Multiple regression (forward selection method) was then used to investigate the predictive power of the variables of absorption, dissociation, fantasy proneness and transliminality for each of the suggestibility measures. With this design, the influence of transliminality as a predictor of suggestibility could be assessed, specifically whether it was selected in the regression models, when variables that have previously been studied more frequently in the literature are also possibilities. The analyses were carried out using IBM SPSS version 28.0.0.0 (IBM Corp, 2021), JASP version 0.18.1 (JASP Team, 2023) and Python v3.9, using the statsmodels 0.14.1 module (Skipper & Perktold, 2010). This project (hypotheses, sample size calculation, data analysis plan, etc.) was not preregistered. Depending on the combinations of data (see below), our sample sizes were greater or similar to other studies that have examined the relationship between personality traits such as absorption, dissociation and fantasy proneness and either transliminality or suggestibility, and as shown in our replications of these relationships, our analyses result in correlations of very similar magnitude. The data from the project can be downloaded from: <https://osf.io/q7nak/>.

To avoid context effects, that might modify expectancies and alter performance (see e.g., Council, 1993), the two components of this project were listed as stand-alone studies led by different Chief Investigators (WJM for the suggestibility screening and SWK for the online questionnaires).

2.2. Participants

Six-hundred and forty-four people participated in the studies in total. Of these, 456 participants completed the online questionnaire set in full that covered transliminality, absorption, fantasy proneness, and dissociation (mean age 21.00; SD: 5.48; range 17–52). The majority of participants were female ($n = 357$; 78.3 %) and one person did not disclose their gender.

To avoid context effects, suggestibility screening was carried out separately, and without reference to the online questionnaire study. Of the participants screened, imaginative suggestibility was assessed in 328 people (ages available for $n = 297$, mean age: 21.84, SD: 5.54, range: 17–58; gender available for $n = 324$, female 76.5 %, $n = 251$), 243 of whom were also screened for hypnotic suggestibility (ages available for $n = 213$; mean age: 21.92, SD: 5.94, range: 17–58; gender available for $n = 239$, female 74.1 %, $n = 180$). Those people who were screened for both imaginative and hypnotic suggestibility screening participated in a study offering course credit, whereas those people who were screened for imaginative suggestibility only, took part in a teaching workshop on suggestibility. Of those who had completed both the online personality questionnaires and a suggestibility screening, 140 had data available for imaginative suggestibility (mean age: 21.89, SD: 6.34, range: 17–48; female 76.4 %, $n = 107$) and 127 had data available for hypnotic suggestibility (mean age: 21.65, SD: 5.89, range: 17–48; female 74 %, $n = 94$).

The vast majority of participants were psychology students (at University of Strathclyde). Recruitment was opportunistic, with no explicit stopping rule, and for most participants, course credits were obtainable. All procedures conformed to institutional regulations and UK law, and ethical approval was granted by <retracted for peer review>. Informed consent was obtained from all participants.

2.3. Materials

Four separate self-report scales were used to measure transliminality, absorption, fantasy proneness and dissociation, and a standardised screening test was used to assess suggestibility.

2.3.1. Revised Transliminality Scale (RTS; Lange et al., 2000)

To assess transliminality, participants are presented with a series of statements to which they respond (false = 0, true = 1) whether the statement applies to them. In the RTS, the score across 17 items are summed. The minimum raw score for the RTS, should be 0 and the maximum score 17 (the range after Rasch conversion should be 13.7–37.3), where higher scores indicate greater levels of transliminality. The Rasch reliability is reported as 0.82, with a KR-20 reliability coefficient of 0.85 (Lange et al., 2000), and test-retest reliability is 0.82 as assessed over a mean of fifty days (Houran, Thalbourne, & Lange, 2003). In the design of our study and the administration of the questionnaires, we were unaware that one of the items in the RTS: “At times I somehow feel the presence of someone who is not physically there” had been included in error in the original paper that describes the RTS scoring by Lange et al. (2000), and instead a different item from the TS form B should have been included in the scoring (see erratum by Houran, Thalbourne, & Lange, 2003). For that reason, we excluded the erroneous item from the scoring, leaving our scoring range from 0 to 16 (with the range after Rasch conversion from 13.7 to 35.0). Cronbach's Alpha calculated with our data (16-item) was $\alpha = 0.80$.

2.3.2. Tellegen Absorption Scale (TAS; Tellegen & Atkinson, 1974)

The TAS is a 34-item measure for absorption that asks participants to state whether a set of statements are true or false to their typical behaviour (false = 0, true = 1). The minimum score for this scale is 0 and the maximum 34, with higher scores indicating higher levels of absorption. Internal consistency has been reported as $r = 0.88$, and test-retest reliability, $r = 0.91$ (Tellegen, 1982 as cited in Menzies et al.,

2008). Cronbach's Alpha calculated with our data was $\alpha = 0.87$.

2.3.3. Dissociative Experiences Scale (DES-II; Bernstein & Putnam, 1986; Carlson & Putnam, 1993)

Dissociative experiences were measured across 28 items, using an eleven-point Likert scale.

Participants responded to statements on a scale of 0–100 %, in increments of 10 %, of how much the statement applied to them, with 0 % equalling ‘never’ and 100 % equalling ‘always.’ The mean score across items is taken, for a minimum score of 0 and a maximum of 100, with higher scores indicating a greater extent of dissociative experiences. Cronbach's alpha for the DES-II has been reported as 0.93, and the test-retest reliability as $r = 0.89$ (Arzoumanian et al., 2022). Cronbach's Alpha calculated with our data was $\alpha = 0.93$.

2.3.4. Creative Experiences Questionnaire (CEQ; Merckelbach et al., 2001)

Fantasy proneness was measured on the CEQ that includes 25 true/false items (false = 0, true = 1). Participants were asked to mark whether statements were true or not to their typical behaviour. Items were summed, with higher scores on this scale indicating increased fantasy proneness. The minimum score achievable was 0 and the maximum was 25. Test-retest reliability has been reported as reasonably good ($r = 0.95$) and internal consistency, in separate samples, adequate (Cronbach's alpha = 0.72 and 0.76) (Merckelbach et al., 2001). Cronbach's Alpha calculated with our data was $\alpha = 0.76$.

2.3.5. Modified Carleton University Responsiveness to Suggestions Scale (CURSS; Comey & Kirsch, 1999); original by Spanos and colleagues (see e.g., Spanos, Radtke, Hodgins, Bertrand, et al., 1983; Spanos, Radtke, Hodgins, Stam, & Bertrand, 1983)

The CURSS is a standardised scale that is used to measure participant response to suggestions. The screening scale, which is administered using an audio recording, enables groups of participants to be tested simultaneously, with or without a hypnotic induction. It has reasonable coverage of different types of suggestions, measuring responses to 7 suggestions (two ideomotor items, two motor-challenge items and three cognitive/perceptual items); cognitive/perceptual items in particular can help to identify those people who may be regarded as high in suggestibility. Another strength of the scale is that it can be used to obtain three different scores for differing aspects of hypnotic suggestibility, namely objective response, subjective response and involuntariness. A CURSS:O score sums the number of suggestions that the individual passed out of the seven items, (0 = no, 1 = yes), this is the objective score and is typically used to assess suggestibility. The minimum scoring on this sub-scale was 0, and the maximum was 7. An example statement included, ‘Would you estimate that an onlooker would have observed that your arm had risen at least six inches?’ A CURSS:S score is the subjective score, which measures the strength with which participants subjectively experienced the suggestions on the same seven items using a 4-point Likert scale, ranging from ‘not at all’ (0) and ‘to a great deal’ (3). The minimum scoring on this sub-scale was 0 and the maximum was 21. An example statement included, ‘You were told that your arm was feeling lighter...in this situation my arm felt light.’ A CURSS:I score reflects the extent to which participants experienced their responses as involuntary on the same 7 items - this is the involuntary score. On seven 4-point Likert scale participants rated the extent to which each response was experienced as involuntary, which ranged from ‘not at all’ (0) to ‘to a great degree’ (3). An example statement included ‘You were told that your arm was feeling lighter...In this situation, I felt as if the movement was involuntary.’ The minimum scoring on this sub-scale was 0 and the maximum was 21. Audio recordings were used to deliver the CURSS suggestions and the induction for the hypnotic suggestibility condition. In the modified version of the CURSS, instructions and cues for goal-directed fantasies are removed (Comey & Kirsch, 1999). In addition to the range of suggestions covered by the CURSS, that it can be administered to groups, and the possibility of administering it with and without

a hypnotic induction, it fitted our needs given that it is brief, taking approximately 30 min to administer the scale with hypnosis (and less time without the hypnosis components), which means that we could assess groups of people on the same set of items with and without a hypnotic induction in a single session (to avoid the session being unreasonably long and tedious). We also wanted to be able to carry out this suggestibility assessment within a single session as a number of participants would also be selected on the basis of their scores for another experiment that included multiple laboratory visits. The hypnotic induction included suggestions for relaxation, to experience pleasant mental imagery, and to enter hypnosis (for details see Kirsch et al., 1993).

2.4. Procedure

The online questionnaire component was advertised to Psychology students at University of Strathclyde via SONA (<https://www.sona-systems.com/>), where participants voluntarily chose to complete the study to gain class credit. The study was also advertised on posters around the University of Strathclyde campus and within some lectures.

The questionnaires were delivered via the Qualtrics online platform (Qualtrics, Provo, UT). Participants were first briefed on the study and asked for consent to participate, for data linkage to other studies and for future contact for study invitations. Personal and contact information was collected (to allow invites and enable data linkage), as was demographic information (e.g., age and gender). The personality scales were then presented, with the TAS, DES, and CEQ ordered randomly and the RTS presented last.

The CURSS screening component was also advertised via SONA. In small groups, participants were briefed on the study, asked for consent, and provided with two CURSS response booklets that also requested demographic information (e.g., personal and contact information, age, sex). For counterbalancing, the conditions (hypnotic suggestibility and imaginative suggestibility) were randomised. WJM also collected additional imaginative suggestibility data in a teaching session (participants could provide consent for data retention, linkage to other psychological research studies and future contact).

There was no mention of suggestibility screening or hypnosis in the information provided on the questionnaires, nor was there any mention of the questionnaires, in the information provided on the suggestibility screenings.

An audio recording was played to deliver the seven suggestions, after which participants completed the CURSS response booklet to reflect on their performance and experience. An audio recording was also used to administer the induction for the hypnosis condition.

3. Results

Summary descriptives for the questionnaires and the suggestibility measures can be found in Table 1. Considering first how the personality questionnaire scores in our sample compared with others, we found the mean TAS score to be 17.24 (SD = 7.02). Glisky et al. (1991) reported the mean TAS scores across three samples to be 20.01–20.60 (SD = 5.79–6.21). Our sample had a mean DES-II score of 22.48 (SD = 13.36), whereas the median DES score of Bernstein and Putnam's undergraduate sample was 14 (1986) and the mean score of another late adolescent sample was 23.8 (Carlson & Putnam, 1993). In our sample, the CEQ mean was 10.54 (SD = 4.42), and in an undergraduate sample described in the article covering development of the scale, it was 8.3 (SD = 3.9) (Merckelbach et al., 2001). Bearing in mind our RTS had 16 items, our sample had a mean of 6.12 (SD = 3.70), and Rasch-scaled mean 22.75 (SD = 4.20), whereas Cooper and Thalbourne (2005) reported a general public sample with a RTS (17-item) Rasch-scaled mean of 24.98 (SD = 3.93). For the CURSS hypnotic suggestibility scores, we found the mean score for the Objective responses to be 2.53 (SD, 1.71) and the mean for the subjective response to be 7.13 (SD = 4.10). Spanos, Radtke, Hodgins,

Stam, and Bertrand (1983) found the means for those types of responses to be 2.16 (SD = 1.6), and 6.51 (SD = 4.35), respectively (they did not provide normative data for involuntariness). In summary, on the instruments used in the study, our sample scored fairly typically.

As expected, transliminality (as measured with Rasch-scaled scores) correlated with absorption ($r = 0.77$), fantasy proneness ($r = 0.68$) and dissociation ($r = 0.48$); all $p < 0.001$ (see Table 2). Similar findings in terms of which correlations were significant were found regardless of whether the transliminality raw score or Rasch-scaled score was used. It should be noted that the transliminality questionnaire and these scales were administered within the same study, so context effects may apply here.

As for the correlations between the personality traits and the suggestibility measures, obtained in different study scenarios to minimise context effects, the results varied (see Table 2). Absorption and fantasy proneness did not correlate significantly with any of the imaginative suggestibility measures (objective, subjective, involuntariness). For the hypnotic suggestibility measures, absorption was significantly positively correlated with the experiential measures (subjective, $r = 0.20$; involuntariness, $r = 0.19$), but although of a similar but slightly weaker magnitude, did not correlate significantly with the objective measure ($r = 0.16$). Fantasy proneness was significantly positively correlated with the hypnotic suggestibility objective ($r = 0.19$), subjective ($r = 0.21$) and involuntariness measure ($r = 0.28$). Dissociation was significantly correlated with the involuntariness scores (imaginative suggestibility, $r = 0.19$; hypnotic suggestibility, $r = 0.24$), whereas the correlations, for example, with subjective response scores (imaginative and hypnotic), although they approached a similar magnitude ($r = 0.15$ and $r = 0.14$, respectively) did not reach significance.

On the relationship between transliminality and imaginative suggestibility, a significant positive correlation was observed with the subjective suggestibility measure ($r = 0.19$). In relation to hypnotic suggestibility, transliminality was significantly positively correlated with all three measures (objective, $r = 0.21$, subjective, $r = 0.23$, involuntariness, $r = 0.24$).

Application of the hypnotic induction was associated with higher scores on the objective ($t(242) = 4.47$, $p < .001$; $d = 1.52$), subjective ($t(242) = 8.16$, $p < .001$; $d = 3.70$) and involuntariness ($t(242) = 7.51$, $p < .001$; $d = 3.50$) measures (see Table 1), with the largest effect sizes of these differences evident for the experiential, rather than behavioural (objective) scores. The only questionnaire that correlated significantly with these difference (hypnotisability) scores was CEQ (see Table 2), where higher fantasy proneness was associated with both greater increases in objective response ($r = 0.21$) and feelings of involuntariness, due to hypnosis ($r = 0.21$).

Multiple regression modelling (forward selection) was used to explore how well the combinations of questionnaire scores could predict the various suggestibility scores. Multicollinearity diagnostics were performed for all models. As all variance inflation factors were found to be below 10 (the highest was 2.65) and all tolerance values were >0.2 , this satisfied the guidelines outlined by both Myers (1990) and Menard (2010), and we proceeded with the analyses. The results closely reflected the correlation analyses (see Table 3). For imaginative suggestibility, there were no significant predictors for the objective measure, whereas transliminality served as a single significant predictor for the subjective measure, and dissociation served as a single predictor for the involuntariness measure. For hypnotic suggestibility, transliminality was a significant predictor for both the objective measure and the subjective measure, whereas fantasy proneness was the sole predictor for the involuntariness measure. The same multiple regression model design was used in order to predict the suggestibility difference scores (hypnotisability measures derived from subtracting the imaginative suggestibility scores from the hypnosis suggestibility scores) using the questionnaire scores. Fantasy proneness emerged as a single significant predictor for both the objective and involuntariness hypnotisability scores.

4. Discussion

The correlations between transliminality and the other personality questionnaires, and between suggestibility and absorption, fantasy proneness and dissociation were observed at broadly similar levels to those in previous studies that have used these measures. To our knowledge, this is the first study that has investigated the relationship between transliminality and suggestibility (either imaginative or hypnotic). We found that transliminality, although significantly correlated with all hypnotic suggestibility measures and with the imaginative suggestibility measures' subjective score, showed only weak association.

Overall, the strength of the correlations between transliminality and absorption, fantasy proneness and dissociation were reasonably consistent with the findings of previous studies, and like in other studies that administered the questionnaires within the same context, a correlation between transliminality and absorption of $r = 0.77$ was found in this study while Evans et al. (2019) found a correlation of $r = 0.72$; for transliminality and fantasy proneness a correlation of $r = 0.68$ was found in this study while Thalbourne (1998) found a correlation of $r = 0.77$; a correlation between transliminality and dissociation of $r = 0.60$ was found in this study while previous studies have reported correlations of $r = 0.47$ (Thalbourne, 1998) and $r = 0.595$ (Evans et al., 2019).

Similarly, the correlations between suggestibility measures and absorption, fantasy proneness and dissociation were similar in magnitude to those found in previous studies measuring these relationships and avoiding context effects, as was done in this study. The strength of the correlations between hypnotic suggestibility and absorption that we found are consistent with the meta-analytic findings of Council et al. (1996), who reported absorption to be significantly correlated with hypnotic suggestibility subjective measures ($r = 0.09$, study range $r = -0.015$ to 0.31) and objective measures at $r = 0.12$ (study range -0.16 to 0.27) when measures were acquired in a separate context.

Fantasy proneness was significantly correlated with all the hypnotic suggestibility measures, but none of the imaginative suggestibility measures. Numerically we found the correlations with experiential measures to be slightly stronger in magnitude than the objective measure. This pattern of findings is consistent with previous research. For example, Silva and Kirsch (1992) found the strength of correlations between the ICMI and the CURSS measures (while avoiding context effects) follow a similar pattern, with the experiential measures having higher magnitude correlations (CURSS-Involuntariness $r = 0.36$; CURSS-subjective, $r = 0.34$) than the CURSS-Objective measure ($r = 0.29$). Likewise, Braffman and Kirsch (2001), with context effects avoided in approximately half of their sample, found a higher correlation between the ICMI measure and CURSS hypnotic suggestibility ($r = 0.34$), than imaginative suggestibility ($r = 0.27$). These differences are subtle and in our investigation the correlations between the various hypnotic suggestibility measures and fantasy proneness were not significantly different when assessed with z-transformation. Future large-scale studies or meta-analyses may shed light on the consistency of these patterns.

Dissociation was correlated significantly with the involuntariness suggestibility measures. Also in this case, the magnitudes of many of the correlations obtained in our study broadly mirror those obtained by previous studies, some of which have found weak significant correlations between dissociation and suggestibility (e.g., Sapp and Hitchcock (2002) who found a correlation between the DES and HGSHS:A of $r = 0.14$) and others who have found non-significant correlations of similar magnitude (e.g., those found by Silva and Kirsch (1992): DES and CURSS:O, $r = 0.15$, CURSS:S, $r = 0.17$, CURSS:I, $r = 0.16$). Terhune et al. (2011) previously flagged that inconsistencies across studies could be due to heterogeneity in those high in hypnotic suggestibility (e.g., the existence of a dissociative sub-group). Feelings of involuntariness underpin the classical suggestion-effect (Weitzenhoffer, 1974) and the concept of dissociation has formed the basis of the hypnosis theories of neodissociation (Hilgard, 1973) and dissociated control (Woody &

Bowers, 1994), although see commentaries such as those by Kirsch and Lynn for discussions of strengths and weaknesses (Kirsch & Lynn, 1998a, 1998b). Our findings suggest that the relationship between dissociative tendencies and higher capacity to experience involuntariness, although significant, is weak.

At the group level, the presence of a hypnotic induction was linked to higher objective, subjective and involuntariness response, with larger effect sizes evident for the experiential measures. This is a typical group-based finding, but it should be noted that this effect was not universal across individuals and for a number of people hypnotic induction was associated with a decrease in suggestibility score, whether it is for the objective, subjective or involuntariness measures (ranges reported in Table 1). There were also people who reported a subjective response to suggestion, but who did not respond objectively. We intend to investigate these responses further, and these analyses will be the focus of a separate paper.

As for the primary objective of this investigation, to test the relationship between transliminality and suggestibility, we found that in relation to imaginative suggestibility, transliminality was significantly, but weakly correlated with the subjective suggestibility score. On the other hand, transliminality was significantly correlated with all of the hypnotic suggestibility variables, but again the correlations were weak. Notably, the correlations between transliminality and the suggestibility measures (objective and subjective) were also numerically of greater magnitude than those found between suggestibility and the measures that have previously frequently been studied (absorption, fantasy proneness and dissociation). Correlations of higher magnitude numerically were found between transliminality and the experiential measures as opposed to the objective suggestibility measures. These differences in the strengths of the correlations were not confirmed statistically when z-transformation was used, and again future research is needed to confirm whether the differences are reliable or not.

Although we investigated transliminality specifically, the strengths of the correlations found are reasonably similar in magnitude to the correlations that have been previously reported between hypnotic suggestibility and boundary thinness (Barrett 1989, as cited in Cardena & Terhune, 2014; Kunzendorf & Maurer, 1989; Rader et al., 1996). Likewise, although our correlations are close in magnitude, the pattern of findings are in concordance with Cardena and Terhune's (2014) hypothesis that higher correlations might be found between boundary thinness and subjective measures due to participant compliance not being as influential on these measures. They found that boundary thinness is more closely associated with a subjective rather than objective measure of hypnotic responding (although they found BQ to be significantly associated with a subjective hypnotic measure only, and not with the objective measure).

The multiple regression modelling from the current study showed that taken together, the personality questionnaires explained no >8% of the variance on any of the suggestibility measures. Transliminality, however, did emerge as the best predictor (singly with no more variables being entered into the models), for the subjective imaginative suggestibility measure and for both the objective and subjective hypnotic suggestibility measures. Overall, the pattern of results suggests that transliminality appears to serve only as a weak predictor of suggestibility, but given the composition of the scale (e.g., it contains items to assess both absorption and fantasy proneness), it appears able to outperform some more traditional measures, which measure these concepts with more separation.

The multiple regression modelling also showed that out of the hypnotisability measures (hypnotic – imaginative suggestibility), fantasy proneness was the best single predictor for the objective score and involuntariness score. Relatedly, Braffman and Kirsch (2001) also found fantasy proneness to correlate with hypnotisability (hypnotic suggestibility while imaginative suggestibility was controlled) on the objective measure.

In terms of recent proposals to explain response to hypnotic

Table 2

Pearson correlation matrix showing the relationships between the personality trait, transliminality and suggestibility (hypnotic and imaginative) measures. The p-values are adjusted according to the False Discovery Rate multiple comparison correction (note: a table with uncorrected p-values can be found in the Supplementary materials).

Variable		1	2	3	4	5	6	7	8	9	10	11	12	13
1. TAS														
2. DES-II	n	456												
	Pearson's r	0.494***												
	p-Value	<0.001												
	Upper 95 % CI	0.561												
	Lower 95 % CI	0.422												
3. CEQ	n	456	456											
	Pearson's r	0.712***	0.579***											
	p-Value	<0.001	<0.001											
	Upper 95 % CI	0.754	0.637											
	Lower 95 % CI	0.664	0.514											
4. RTS (16 Item)	n	456	456	456										
	Pearson's r	0.774***	0.492***	0.686***										
	p-Value	<0.001	<0.001	<0.001										
	Upper 95 % CI	0.809	0.558	0.732										
	Lower 95 % CI	0.735	0.419	0.635										
5. RTS (16 Item, Rasch scaled)	n	456	456	456	456									
	Pearson's r	0.772***	0.480***	0.679***	0.984***									
	p-Value	<0.001	<0.001	<0.001	<0.001									
	Upper 95 % CI	0.806	0.548	0.726	0.987									
	Lower 95 % CI	0.732	0.406	0.627	0.981									
6. CURSS Imaginative (Objective)	n	140	140	140	140	140								
	Pearson's r	0.063	0.043	0.030	0.071	0.074								
	p-Value	0.491	0.644	0.738	0.435	0.422								
	Upper 95 % CI	0.227	0.207	0.195	0.235	0.237								
	Lower 95 % CI	-0.104	-0.124	-0.136	-0.096	-0.093								
7. CURSS Imaginative (Subjective)	n	140	140	140	140	140	328							
	Pearson's r	0.161	0.155	0.099	0.198*	0.194*	0.534***							
	p-Value	0.078	0.093	0.272	0.031	0.033	<0.001							
	Upper 95 % CI	0.319	0.312	0.261	0.352	0.349	0.607							
	Lower 95 % CI	-0.005	-0.012	-0.068	0.033	0.029	0.452							
8. CURSS Imaginative (Involuntariness)	n	140	140	140	140	140	328	328						
	Pearson's r	0.099	0.185*	0.128	0.144	0.143	0.658***	0.751***						
	p-Value	0.272	0.043	0.163	0.119	0.119	<0.001	<0.001						
	Upper 95 % CI	0.260	0.340	0.287	0.302	0.302	0.715	0.795						
	Lower 95 % CI	-0.068	0.019	-0.039	-0.023	-0.023	0.592	0.700						
9. CURSS Hypnotic (Objective)	n	127	127	127	127	127	243	243	243					
	Pearson's r	0.159	0.132	0.191*	0.211*	0.213*	0.596***	0.330***	0.419***					
	p-Value	0.100	0.168	0.045	0.028	0.027	<0.001	<0.001	<0.001					
	Upper 95 % CI	0.324	0.299	0.354	0.371	0.374	0.671	0.438	0.518					
	Lower 95 % CI	-0.016	-0.044	0.018	0.038	0.041	0.508	0.213	0.310					
10. CURSS Hypnotic (Subjective)	n	127	127	127	127	127	243	243	243	243				
	Pearson's r	0.199*	0.141	0.212*	0.221*	0.226*	0.331***	0.566***	0.519***	0.597***				
	p-Value	0.038	0.145	0.028	0.022	0.019	<0.001	<0.001	<0.001	<0.001				
	Upper 95 % CI	0.360	0.307	0.372	0.381	0.385	0.439	0.646	0.605	0.672				
	Lower 95 % CI	0.025	-0.034	0.039	0.049	0.054	0.215	0.474	0.421	0.509				
11. CURSS Hypnotic (Involuntariness)	n	127	127	127	127	127	243	243	243	243	243			
	Pearson's r	0.194*	0.240*	0.278**	0.236*	0.239*	0.381***	0.489***	0.629***	0.694***	0.836***			
	p-Value	0.043	0.012	0.003	0.014	0.013	<0.001	<0.001	<0.001	<0.001	<0.001			
	Upper 95 % CI	0.356	0.398	0.431	0.394	0.397	0.484	0.579	0.699	0.754	0.871			
	Lower 95 % CI	0.021	0.069	0.109	0.065	0.067	0.268	0.387	0.546	0.623	0.794			
12. hyp_minus_img_Obj	n	127	127	127	127	127	243	243	243	243	243	243		
	Pearson's r	0.148	0.131	0.214*	0.173	0.172	-0.428***	-0.202**	-0.262***	0.471***	0.308***	0.362***		

(continued on next page)

Table 2 (continued)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
p-Value	0.123	0.170	0.027	0.073	0.074	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Upper 95 % CI	0.314	0.298	0.374	0.337	0.336	-0.319	-0.078	-0.141	0.564	0.417	0.467	0.417	0.467
Lower 95 % CI	-0.027	-0.045	0.041	-0.001	-0.002	-0.526	-0.320	-0.376	0.367	0.189	0.248	0.243	0.248
n	127	127	127	127	127	243	243	243	243	243	243	243	243
13. hyp_minus_img_Subj													
Pearson's r	0.050	0.017	0.130	0.030	0.037	-0.174*	-0.409***	-0.246***	0.319***	0.521***	0.419***	0.550***	0.550***
p-Value	0.613	0.852	0.171	0.745	0.699	0.012	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Upper 95 % CI	0.222	0.190	0.297	0.203	0.210	-0.049	-0.299	-0.124	0.427	0.607	0.518	0.632	0.632
Lower 95 % CI	-0.126	-0.158	-0.046	-0.145	-0.138	-0.294	-0.509	-0.361	0.201	0.423	0.310	0.455	0.455
n	127	127	127	127	127	243	243	243	243	243	243	243	243
14. hyp_minus_img_Invol													
Pearson's r	0.137	0.115	0.207*	0.128	0.133	-0.227***	-0.223***	-0.267***	0.422***	0.494***	0.581***	0.723***	0.777***
p-Value	0.156	0.226	0.031	0.175	0.165	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Upper 95 % CI	0.304	0.283	0.368	0.296	0.300	-0.104	-0.100	-0.146	0.520	0.583	0.659	0.778	0.822
Lower 95 % CI	-0.038	-0.061	0.034	-0.047	-0.042	-0.343	-0.339	-0.380	0.312	0.392	0.492	0.657	0.722

* p < .05.
 ** p < .01.
 *** p < .001.

suggestion, [Martin and Pacherie \(2019\)](#) outline the “Predictive Coding Model”. According to this model, responses to suggestions (they focus predominantly on motor suggestions in their paper) occur due to predictions about sensory input that are made by the brain (priors), their potential mismatch to actual sensory input, and because of the prediction error that is created given this mismatch, a process of “active inference” ([Friston, 2010](#)) minimises error by modifying the sensory input through action. In the case of suggested perceptual alterations, for example, positive hallucinations, the authors suggest that these may be produced by a strong weighting being given to the prior and that this can overcome the prediction error that is generated given the available sensory evidence (or lack of). For full details of the proposed means in which the model operates see [Martin and Pacherie \(2019\)](#) and also [Jamieson \(2016\)](#) for an alternative explanation for response to suggestion that is based also on predictive coding, but which has different assumptions. Martin and Pacherie comment that variation in suggestibility level across people might rely, for example, on their ability to assign weight to their prior predictions. Given that the strength of the correlations we found between transliminality and suggestibility were weak, it is difficult to place with any confidence the role that transliminality might play within these frameworks. It may be the case that when exposed to suggestions, people who are high in transliminality (who score higher, for example, in fantasy proneness, absorption, magical thinking) may have a slightly enhanced ability (or propensity) to weight priors more strongly, even when these run counter to the available sensory input, and this helps to achieve the suggested response. Speculatively, and also in reference to Martin and Pacherie's Predictive Coding Model, hyperaesthesia, as captured as an element of the transliminality concept, might contribute to feelings of involuntariness in responding, as it could lead to unusually high precision sensory input that is not attenuated during response (and as typically would be during a voluntary response).

Our study has a number of strengths. First, the personality questionnaires were administered in a separate context to the suggestibility screening, which is important, as studies have highlighted the potential for inflated correlations, if components from questionnaires/tests overlap, and lead to alterations in participant response patterns (e.g., [Council, 1993](#)). Second, experiential response to suggestion (subjective; involuntariness) were also tested in addition to objective responses, a methodological choice that offers a richer insight, for example, into the classical-suggestion effect, and the subjective measures may, therefore, be less likely to be prone to compliance effects. Third, hypnotic and imaginative suggestibility were both assessed, so that the relationship with transliminality could be explored independently, but further to that, so that a difference score (hypnotisability score) could be calculated to test whether transliminality is linked to an increase in response when given a hypnotic induction.

There are a number of limitations that should also be acknowledged, and these should be noted when designing future research studies in this area. This study did not administer the transliminality questionnaire in a different context to the other personality questionnaires, to assess also the context effects that might apply there; instead our study focused on keeping the suggestibility screening out of context. This would be a useful methodological improvement in future studies. An additional limitation was that our transliminality score had a maximum of 16, rather than 17, which should be standard. Future studies can ensure that the full questionnaire is administered and the error in [Lange et al. \(2000\)](#), which was brought to light in [Houran, Thalbourne, and Lange \(2003\)](#), be noted and accounted for. Within the paper, on a number of occasions we outline numerical differences in the magnitude of some correlations, and point towards where there is overlap between these with previous literature, but it should be noted that when these correlations are compared to one another after z-score conversion, the differences are not statistically different. We include commentary on this within the above text, but wish to reiterate here that additional studies are required to investigate these patterns further and to provide checks

Table 1

Showing the descriptive statistics for the personality trait, transliminality and suggestibility (hypnotic and imaginative) measures, in addition to the difference scores for the suggestibility measures.

Measure	Sample size	Mean (SD)	Range
1. TAS	456	17.24 (7.02)	0 to 34
2. DES-II	456	22.48 (13.36)	1 to 69
3. CEQ	456	10.54 (4.42)	0 to 25
4. TSR (16ITEM)	456	6.12 (3.70)	0 to 16
5. TSR (16ITEM-RASCH)	456	22.75 (4.20)	13.7 to 35.0
6. CURSS imaginative (objective)	328	2.02 (1.60)	0 to 7
7. CURSS imaginative (subjective)	328	5.07 (3.70)	0 to 18
8. CURSS imaginative (involuntariness)	328	2.58 (3.48)	0 to 16
9. CURSS hypnotic (objective)	243	2.53 (1.71)	0 to 6
10. CURSS hypnotic (subjective)	243	7.13 (4.10)	0 to 18
11. CURSS hypnotic (involuntariness)	243	4.62 (4.34)	0 to 18
12. Hypnotic minus imaginative (objective)	243	0.44 (1.52)	-3 to 5
13. Hypnotic minus imaginative (subjective)	243	1.94 (3.70)	-8 to 18
14. Hypnotic minus imaginative (involuntariness)	243	1.69 (3.50)	-9 to 15

Table 3

Multiple regression models (forward selection): for all models, the available predictors were absorption, fantasy proneness, dissociation, and transliminality (16 item Rasch-scaled).

Dependent variable	Variables retained	Sample size	R	R ²	F	p-Value
CURSS imaginative (objective)	None	140	NA	NA	NA	NA
CURSS imaginative (subjective)	RTS	140	0.194	0.038	5.392	0.022*
CURSS imaginative (involuntariness)	DES-II	140	0.185	0.034	4.864	0.029*
CURSS hypnotic (objective)	RTS	127	0.213	0.045	5.957	0.016*
CURSS hypnotic (subjective)	RTS	127	0.226	0.051	6.759	0.010*
CURSS hypnotic (involuntariness)	CEQ	127	0.278	0.077	10.479	0.002**
CURSS hypnosis – imaginative (objective)	CEQ	127	0.214	0.046	5.973	0.016*
CURSS hypnosis – imaginative (subjective)	None	127	NA	NA	NA	NA
CURSS hypnosis – imaginative (involuntariness)	CEQ	127	0.207	0.043	5.572	0.020*

NA: Not applicable.

Note: In none of the models was there more than a single significant predictor variable.

** p < .01 level (2-tailed).

* p < .05 (2-tailed).

on their reliability. This study also used group suggestibility screening and, although at a cost to time and resources, individual screenings might assess suggestibility more accurately. We chose to use the (modified) CURSS, which is a brief quick to administer scale that offers reasonable coverage of different types of suggestions, but other scales that can provide better hypnotic suggestibility response profiling might prove useful when investigating associations. For example, although a single factor solution reflecting a general trait of hypnotic suggestibility has been reported (Woody et al., 2005), suggestibility may also be broken down into separate components or divided based on latent structure and these solutions, when considered alongside the general trait, appear to fit the data better (e.g., Woody et al., 2005; Zahedi & Sommer, 2022). Analyses have also demonstrated that those people that score highly in hypnotic suggestibility can be heterogeneous (e.g., Acunzo et al., 2020; Terhune, 2015). For this reason, approaches such as stratification or further modelling which is based on response to different subsets of suggestions might be useful when carrying out investigations to assess associations (as in e.g., Reshetnikov & Terhune, 2022). Another potential limitation of the CURSS is that due to item content it tends to deliver a positively-skewed distribution with fewer people scoring high in suggestibility compared to low (Council, 1999), whereas other suggestibility scales can offer more normal distributions. Further to this, studies with large sample sizes could ensure numbers of participants are balanced across suggestibility levels. Future studies of this nature might also consider variables such as sex and whether this impacts the relationships between variables, and also whether the observed relationships extend to the general population. A further limitation is that some personality questionnaires have overlapping items, and although this would not affect the relationships with suggestibility, it may influence the correlations with one another. For example, although the CES was designed to try to avoid overlap with other

personality measures such as, for example, propensity for dissociation, there is overlap in some items (e.g., two items overlap with items on the DES; Merckelbach et al., 2001).

5. Conclusions

In summary, this investigation has provided a comprehensive test of the relationships between transliminality and other personality traits (absorption, dissociation and fantasy proneness), and has demonstrated, by collecting the personality trait questionnaire responses and the suggestibility screening in separate studies, and later combining the data (to avoid context effects), that transliminality is only weakly associated with hypnotic suggestibility (objective, subjective and involuntariness response) and with imaginative suggestibility (subjective response). When combined with the other variables that have been studied extensively in relation to hypnotic suggestibility (absorption, dissociation, fantasy proneness), transliminality did emerge, however, individually, as the best predictor for the subjective imaginative suggestibility measure and for both the objective and subjective hypnotic suggestibility measures, which speaks to the item composition of the transliminality scale. Transliminality, which may be taken as the threshold of permeability for information flowing into or out of consciousness might, therefore, be one weakly predisposing factor for hypnotic suggestibility (along with other factors such as the expectancy of response), and from the patterns of correlations, it appears that this greater permeability is more closely linked to experiential facets of hypnotic responding compared to overt behavioural response. Results such as these also point towards the importance of measuring suggestibility along different dimensions, instead of relying on behavioural response alone.

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.actpsy.2024.104125>.

CRedit authorship contribution statement

Abbie J. Irving: Formal analysis, Writing – original draft. **Niia Nikolova:** Formal analysis, Investigation, Methodology, Writing – review & editing. **Susan Robinson:** Writing – review & editing. **Iris Ionita:** Investigation, Writing – review & editing. **Steve W. Kelly:** Conceptualization, Writing – review & editing. **Irving Kirsch:** Funding acquisition, Methodology, Writing – review & editing. **Giuliana Mazzoni:** Funding acquisition, Writing – review & editing, Methodology. **Annalena Venneri:** Funding acquisition, Writing – review & editing, Methodology. **William J. McGeown:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

We have shared a link to the data within the manuscript.

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