

Sleep Paralysis and Extraordinary Experiences¹

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Abstract: We investigated sleep paralysis (SP) with an online questionnaire. Our sample consisted of 380 participants who experienced at least one SP. In this paper, we present the relation of SP to extraordinary experiences, paranormal beliefs, and absorption. We used a German questionnaire, *Fragebogen zur Phänomenologie außergewöhnlicher Erfahrungen* (PAGE-R-II), to assess the extent to which people with SP have had other extraordinary experiences, a German translation of the *Belief in the Supernatural Scale* (BitSS), and a German version of the *Tellegen Absorption Scale* (TAS). Our hypotheses regarding a positive correlation between the frequency of SP and certain forms of extraordinary experiences, paranormal/supernatural beliefs, and absorption were only partially confirmed. We found an expected significant correlation between the frequency of SP and the expression on the PAGE dimensions “Dissociation” and “External,” but not between SP frequency and the other scales. The group (55%) reporting paranormal experiences during SP had highly significant higher mean scores on the PAGE, BitSS, and TAS. There were also significant correlations between the applied scales and specific hallucinatory perceptions and emotions, which leads us to believe that two main types of experiencing SP may exist: one mainly connected with typical negative emotions and a more external focus of experience, and another characterized by positive emotions and more internally experienced perceptions. This hypothesis requires further investigations.

Keywords: sleep paralysis, paranormal beliefs, absorption, extraordinary experiences, paranormal experiences, anomalous experiences, hallucinations, REM sleep

Highlights

- The frequency of sleep paralysis (SP) episodes is highly correlated with the frequency of other specific extraordinary experiences outside of SP.

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- There were no significant correlations between the frequency of SP episodes and supernatural beliefs and absorption.
- Participants who reported many extraordinary experiences in general tended to interpret some experiences during SP as paranormal.
- Our evidence leads to the hypothesis of two types of experiencing SP: one mainly connected with typical negative emotions and a more external focus of attention, and another characterized by positive emotions and associated with more internally experienced perceptions of the vestibular-motor kind.

Isolated sleep paralysis (SP) is a phenomenon that usually occurs while falling asleep or waking up. The affected person is in a waking state but cannot move. In sleep medicine, SP is classified as a REM-related parasomnia (American Academy of Sleep Medicine, 2014). As in narcolepsy, in which SP occurs as an accompanying symptom, isolated SP is thought to be directly connected with REM sleep. Mahowald and Schenck (2005, p. 1279) point out that the investigation of sleep disorders has led to important basic assumptions about the general nature of sleep, including the ideas that sleep may not be a global, but rather a local, brain phenomenon, and that wakefulness, NREM sleep and REM sleep are not mutually exclusive states (see also Leschziner, 2019). The assumption is that it occurs because of a desynchronization of physiological characteristics of REM sleep (muscular atonia) and the state of consciousness (waking) (Sharpless & Doghramji, 2015). There are records of this kind of experience from early testimonies of human culture and almost all ethnic groups (Adler, 2011, pp. 8–58; Sharpless & Doghramji, 2015, pp. 17–54). This suggests that SP is a phenomenon with a culture-independent experiential basis (Hufford, 1982). The definition of isolated SP (i.e., not as a symptom of narcolepsy) is a sleep-related, paralytic sensation combined with waking consciousness. Research shows an unclear picture of lifetime prevalence because of lack of standardized surveys. Sharpless and Barber (2011) estimated a lifetime prevalence of about 8% for the general population. However, the numbers vary considerably depending on the population group and ethnicity. In an African sample, the prevalence was 40% of the general population and 31% in the Asian general population. In student samples, it was consistently above 30% (Sharpless & Barber, 2011).

SP, usually experienced as very unpleasant and anxiety-producing, can be accompanied by perceptions understood as hallucinations from the perspective of conventional medicine. According to Sharpless and Doghramji (2015, pp. 76–83) about 80% of all SP experiences are accompanied by such hallucinations, divided into four categories:

- auditive hallucinations (e.g., humming, hissing, hearing voices, screams, scratching noises),
- perception of a presence (“sensed presence”; the intense feeling of a presence in the room, mostly perceived as malignant, along with a feeling of an acute threat to one’s own security),
- tactile and kinesthetic hallucinations (perception of heat or cold, pressure or weight, classically on the chest, but also on other parts of the body; feelings of being touched, sometimes even strangled; feelings of falling, flying, hovering, or turning),
- visual hallucinations (perception of objects and entities of various kinds: animals, demons, ghosts, humanoid entities, aliens, “shadow people”).

Factor analyses on SP hallucinations by Cheyne and colleagues revealed three broad categories: the *Incubus* (pressure on chest, feeling suffocated); the *Intruder* (sensed presence, visual, auditory, and tactile hallucinations); and the *Vestibular-Motor* (tingling, feelings of floating, flying, out-of-body experiences, and the like) factors (Cheyne, Newby-Clark, et al., 1999; Cheyne, Rueffer, et al., 1999; Cheyne, 2005). The first two factors are highly correlated, while their correlations with the third one are moderate (Cheyne, Rueffer, et al., 1999).

The often bizarre and disturbing quality of the experience, the lack of well-known cultural patterns of interpretation in Germany, and the accompanying somatic and mental circumstances place SP experiences into the realm of extraordinary experiences and altered states of consciousness, often interpreted as an indication of the paranormal (Cheyne, Newby-Clark, et al., 1999; Hufford, 1982, 2005; Jalal et al., 2020; Sharpless & Doghramji, 2015, pp. 17ff.).

We consider SP to be an extraordinary, or exceptional – both terms are used synonymously – experience (ExE). The definition of ExEs is difficult. Belz and Fach (2015) define them as “deviations from what might be



referred to as ordinary experiences consistent with the reality-model that individuals develop to cope with their inner and outer world. ExE serves as an umbrella term for occurrences that are labeled as paranormal, psychic, spiritual, transcendental, supernatural, magic, etc.” (p. 365). However, the deviations that characterize ExEs do not necessarily concern the reality-model but primarily the realm of everyday experiences (see Mayer & Schetsche, 2019, for details). Anomalous experience is another term also broadly used synonymously to ExE. We follow Cardeña, Lynn and Krippner’s definition of an anomalous (or extraordinary, or exceptional) experience “as an uncommon experience (e.g., synesthesia), or one that, although it may be experienced by a significant number of persons (e.g., psi experiences), is believed to deviate from ordinary experience or from the usually accepted explanations of reality according to Western mainstream science” (Cardeña et al., 2014, p. 4). Furthermore, we consider SP to take place in an altered state of consciousness (ASC) (cf. *ibid.*, pp. 4–5). Not all ExEs have to take place in ASC. Déjà-vus, for example, are experienced during the ordinary waking state. SPs, on the other hand, are clearly related with falling asleep, waking up, or drowsiness. It is crucial to understand that sleep paralysis as such (i.e., the atonia during REM sleep) is far from being extraordinary or unexplained. What is extraordinary is the “the juxtaposition of the atonia and dream imagery (i.e., hallucinations) of REM sleep with wakefulness” (Sharpless & Doghramji, 2015, p. 140) and thereby the experience of the paralysis (cf. Adler, 2011, p. 79).

It is not surprising that SP experiences are assumed by many Western scientists to be one of the sources and causes of human belief in ghosts because of these special properties (e.g., Hufford, 2005). SP are also closely linked to out-of-body experiences (Blackmore, 1999; Hufford, 2005; Raduga et al., 2020), lucid dreams (Denis & Poerio, 2016), and encounters with aliens (Blackmore, 1998; Clancy, 2005) and other entities (Sharpless & Doghramji, 2015). Thus, there is a particularly close connection between SP, extraordinary dreams (including lucid dreams and false awakenings), out-of-body experiences, sleep-related hallucinations, and alien abduction experiences. These experiences are not only similar in terms of their context of occurrence (all of them can be sleep-related), but they can be easily confused with each other and even partially merge into each other. There have been different attempts to explain the underlying mechanisms for these correlations. The neurophysiological basis is that NREM sleep, REM sleep, and waking consciousness are not mutually exclusive (Mahowald & Schenck, 2005; Terzaghi et al., 2021). In addition to the fact that the conflicting information

resulting from the intermingling of REM dream content, paralysis, and waking consciousness may lead to cognitive dysfunction, the frightening quality of SP may lead to OBEs as dissociative reactions to maintain identity integrity (Blackmore, 1982, pp. 240–252). Denis and Poerio pointed out that both SP and lucid dreams, “can be conceptualized as dissociated rapid eye movement (REM) states” (Denis & Poerio, 2016: 38). This seems to explain well the correlation and the reported transitions from one state to another. Reports of alien abductions have many similar elements to reports of SP episodes, such as perception of gray figures, strange body sensations, inability to move, OBEs, and intense fear (Clancy, 2005), which may explain the reported correlations.

The relation between SP and ExEs has been rarely studied systematically. From a sleep medicine perspective, the specific quality of the experiences is considered hallucinatory and harmless. Cultural studies approaches to SP provided interesting data on historical and culture-dependent as well as culturally independent aspects of this phenomenon (Adler, 2011; Hufford, 1982; Jalal et al., 2014, 2015; Sharpless & Doghramji, 2015, Yoshimura, 2015). Sceptically oriented papers presented SP as a conventional explanation for some sorts of paranormal beliefs and ExEs such as alien abductions (Blackmore, 1998; French, 2009). Belz and Fach (2012, 2015) took a different approach by including SP as a specific ExE among others in their model of fundamental categories of exceptional phenomena. They developed a category system based on their understanding of ExEs as deviations in the affected person’s model of reality. They theoretically derived four classes of ExEs, assigned to the four quadrants formed by the dimensions “external–internal” and “coincidence–dissociation.” Note that the term dissociation is not used in a clinical sense but phenomenologically. It describes the separation of things that belong together and means psychophysical dissociations such as out-of-body experiences, automatisms, and paralyse. In contrast to “external” and “internal” phenomena, “coincidence” and “dissociation” do not describe extraordinary phenomena per se, but rather relations between phenomena experienced as extraordinary (*ibid.*, pp. 371). Belz and Fach arrange the two dimensions orthogonally, creating a field of four quadrants. ExEs can be assigned to these quadrants based on their specific characteristics. In their model, SP is placed in the quadrant built by the external and the dissociation poles, i.e., experienced as external and disconnected from normal body function. This classification, validated with cases from their counseling practice as well as with four other samples (Fach, 2018), can be tested with a selected sample of SP experiencers to provide insights into the nature of SP in relation to other ExEs.

In the field of ExEs, the question of the relation between personal or culturally mediated beliefs and subjective experiences is of central importance. Do experiences lead to beliefs or are certain beliefs necessary to have corresponding experiences? Experiences have to be culturally encoded in order to be communicated. Which ExEs or phenomena can be reported at all, in which terms, and on what basis of interpretative framework is therefore always dependent on cultural discourses that deal with the accepted order of reality (Mayer & Gr nder, 2011). SP as an experience was considered entirely dependent on a cultural interpretive framework before David Hufford found a new understanding of the SP and published a seminal book on his findings (Hufford, 1982). He challenged the prevailing *cultural source hypothesis* of the time, which considered culturally transmitted ideas and narratives to be the source of, for example, belief in ghosts. His research on SP led him to the *experiential source hypothesis*, which assumes certain experiences, such as those typically made during SP, as an important cause for the culturally independent development of belief in ghosts. The two hypotheses are not mutually exclusive but explain different sub-aspects of experiences and accounts. Questions about the expression of supernatural beliefs and certain personality traits associated with ExEs can provide valuable clues to better understand SP, how it is interpreted by individuals, and how this may be influenced by, or influence, personal beliefs.

Previous studies on the correlation of paranormal beliefs and the occurrence and frequency of SP have yielded inconsistent findings (Denis & Poerio, 2016; Denis et al., 2018). Considering that a connection between SP experiences and the development of belief in ghosts is claimed, the investigation of a possible connection between belief in paranormal and SP is obvious. It seems a better strategy is to examine this question not by distinguishing a group with SP from a control group without SP, but by a correlation with the frequency of SP (a person who experiences SP only once may be more like the control group without SP than the group with frequent SP in terms of potential development of paranormal beliefs). SP can also be part of more complex events, such as a poltergeist case involving a number of different paranormal phenomena, as reported by Hufford (1982, pp. 172ff.). Therefore, an exploratory investigation into paranormal events associated with SP is of interest.

Absorption is a personality trait that plays a special role in connection with ExEs, e.g., out-of-body experiences and apparitions (Carde na & Alvarado, 2014; Holt et al., 2012; Irwin, 1985; Irwin & Watt, 2007; Kerns

et al., 2014). Both kinds of experiences are considered to be part of the phenomenology of SP (Hufford, 1982). Absorption is associated with openness to experience enabling a person to become absorbed in their mental imagery and fantasy (Roche & McConkey, 1990). The question is whether people with higher levels of absorptive capacity are more likely to experience SP and whether the experiences are richer than those with lower levels on the absorptive scale. Previous studies found a positive correlation between SP and absorption, although the data base is thin (Abrams et al., 2008; Li skov  et al., 2016; McNally & Clancy, 2005).

We conducted an extensive online survey of SP targeting a number of objectives. Many previous studies on SP have distinguished only between individuals with and without SP, without considering the frequency of these experiences. This significantly limits the validity of such examinations, because many affected persons experience SP only rarely or even only once (Sharpless & Doghramji, 2015, pp. 93ff.). We limited our sample to individuals with at least one SP experience. In addition, we were interested in “classical” research questions on SP, i.e., phenomenological aspects in relation to frequency and gender, as well as comorbidities. The results of this first part of the evaluation, some of which are highly descriptive, are published in Mayer and Fuhrmann (2021). Furthermore, our interest was in coping strategies with these experiences. This part of evaluation will be the topic of another paper. Large parts of the qualitative data are still awaiting analysis.

We hypothesized positive correlations between the frequency of SP and the experience of “External Phenomena” and “Dissociation Phenomena,” according to the classification of Belz and Fach (2015). We also expected higher absorption scores in individuals with more frequent SP and a positive correlation between beliefs in the paranormal and the frequency of SP. In addition to these hypotheses, we exploratorily examined possible connections between these constructs and other aspects of SP such as experienced perceptions, feelings and emotions during SP, and their interpretations.

Method

Participants

Our data pool consisted of 55 questionnaires from one sample, (FB) and 325 from another (GW). Sociographic data on age, gender, education, living situation, and religiosity were evaluated through 11 questions: 44% of the

participants were female, and 56% male. The mean age was 39 years (SD = 12.42; range from 18 to 77 years) with no significant gender difference. The level of education of the respondents was rather high: 57% had a German Fach-/Hochschulabschluss [university and/or a technical college degree], 26.5% a German Realschulabschluss [secondary school certificate], and only 9.5% a German Hauptschulabschluss [basic school qualification]. Almost 68% were employed, about 10% were students or undergoing professional training, 7% were retired, and 5.5% were unemployed or unable to work; 63% lived with a permanent partner, and 37% lived without. 35.5% of the sample endorsed an unbound spirituality or religion, 25% declared themselves Christians, 25% atheists, and another 19.5% agnostic.

Measures

Sleep paralysis. SP is an experience, not a personality trait or behavior. SP questionnaires are therefore geared towards a phenomenological survey of the phenomena experienced and the accompanying circumstances. Two questionnaires are mostly used and have served as the basis for many subsequent questionnaire studies. Cheyne and his team developed the *Waterloo Sleep Experience Survey* (WSES, Cheyne & Rueffer, 1999) with 27 items, which several other surveys refer to. Paradis et al. (2009) put the *Unusual Sleep Experiences Questionnaire* (USEQ) with 43 items together. We created our own questionnaire by taking items from these two questionnaires and adding some items of our own, given our emphasis on interpretation, coping strategies, and paranormal aspects. We did this because neither questionnaire offered the exact combination of items we needed to investigate our questions. We translated the items of these two questionnaires into German using some slightly different item wording to make the questionnaire homogeneous (Mayer & Fuhrmann, 2021). Our questionnaire on SP consisted of 35 items. Several items were supplemented with a field for a free text commentary. Thus, we got also qualitative data. The introductory question was: *Have you ever had the experience when you wake up or when you fall asleep, including before or after a nap, that you cannot move and feel paralyzed, although you were aware of your surroundings and felt awake?* (All translations made by the authors). With a free text field following the question *Please describe your strongest and most impressive experience of this kind in your own words*, we were able to assess whether the participants' experiences actually met the definition criteria of sleep paralysis.

Extraordinary experiences. We used a newly revised version of the German *Fragebogen zur Phänomenologie außergewöhnlicher Erfahrungen* (PAGE-R-II, in press; see Fach et al., 2013, for the first, longer version) to investigate the extent to which people with SP have had other ExEs. This questionnaire consists of 20 items covering experiences of supposedly paranormal phenomena, such as apparitions, telepathy, clairvoyance, premonition, and precognitive dreams, but also phenomena like strange perceptions (e.g., hearing inner voices), cognitions (e.g., thought intrusions), and automatisms (e.g., spontaneous and uncontrolled body movements). These items are assigned to the above-mentioned categories formed by the internal–external and coincidence–dissociation dimensions and measure the frequency of these experiences on a five-point scale ranging from “never” to “often.” The internal consistency of the PAGE-R-II is very good on the global scale (Cronbach's $\alpha = .86$ to $.89$, depending on the sample), good or satisfactory on the subscales ($\alpha = .66$ to $.84$, depending on the subscale and the sample) (Fach, 2022).

Paranormal and Supernatural Beliefs. While the PAGE-R-II asks about experiences, the Belief in the Supernatural Scale (BitSS; Schofield et al., 2018) measures corresponding beliefs. This recently developed scale avoids some problems with the Revised Paranormal Belief Scale (rPBS; Tobacyk, 2004) by making a better distinction between religious, supernatural, and paranormal beliefs. We translated the scale into German. It has a five-factor structure composed of “mental and psychological phenomena,” “religious beliefs,” “psychokinesis” (psychically affecting matter), “supernatural beings,” and “general paranormal perceptions” and consists of 44 items with a seven-point scale assessing agreement with the statements ranging from “strongly disagree” to “strongly agree.”

Absorption. We used a German translation (Ritz et al., 1993) of the Tellegen Absorption Scale (Tellegen & Atkinson, 1974) to measure the personality trait absorption. This questionnaire includes 34 items with a five-point scale measuring agreement with the statements ranging from “is not true for me” to “is completely true for me.”

Procedure

A link to the online questionnaire was placed on different websites. The first sample was obtained via several Facebook (FB) groups, mainly a closed FB group “Schlafparalyse” (“sleep paralysis”) between mid-

April and July 2018. The second was obtained via the website “Grenzwissenschaft aktuell” (GW), which provides current news from anomalistics (border areas of psychology and parascience), in July 2018. The questionnaire was presented as “You may have experienced not being able to move when you fall asleep or wake up, as if you were paralyzed. This experience is not as unusual as you might think. The phenomenon described here is sleep paralysis or sleep paralysis (SP)” to then describe SP and present the authors of this paper. Data collection was carried out using the online questionnaire tool LimeSurvey. The data was collected using pseudonyms. Only the IP was recorded to weed out any duplicate data records. Participants provided informed comment and had the opportunity to make comments. The study was approved by the local Ethics Committee of the Institute for Frontier Areas of Psychology and Mental Health (IGPP-2021-03).

Analysis

We used SPSS (version 27) and depending on the research question, we selected the entire ($N = 380$) or a reduced sample ($N = 316$) of those participants with at least three SP experiences as the basis for statistical calculations. The latter we did with items which inquired about changes in experiences, their interpretation, reactions, and attitudes. Most of our measures allowed only Spearman’s rank-order correlation tests, so we calculated Spearman’s r for all correlations. The Mann-Whitney non-parametric U -test was used for group comparisons. We performed two-sided significance tests because many of the previous findings were inconsistent, and agreed to a significance level of .05.

Results

SP and ExEs in General

Many of the perceptions and sensations during an SP episode are part of the spectrum of ExEs recorded by the PAGE. A positive correlation between the frequency of SP episodes using seven options (see Mayer & Fuhrmann, 2021) and the global score of the PAGE was confirmed (Table 1). The categorization of Belz and Fach places SP into the quadrant built by the poles “external phenomena” and “dissociation phenomena.” Therefore, we expected a significant correlation of SP frequency with these two subscales, which was confirmed. The results suggest that the experience of SP cannot be limited to the quadrant of dissociative and exter-

nal phenomena as it is assumed by Belz and Fach. In particular, those with a higher frequency of SP tended to experience more internal phenomena.

Table 1

Correlations Between Frequency of SP and PAGE-II-R ($N = 380$)

	SP
PAGE global scale	$r = .21^{***}$
External phenomena	$r = .14^{**}$
Internal phenomena	$r = .17^{***}$
Coincidence phenomena	$r = .06$
Dissociation phenomena	$r = .33^{***}$

$p \leq .01^{**}; p \leq .001^{***}$

SP is often accompanied by specific perceptions. Our questionnaire asked how often participants experienced the following (types of) perceptions during SP: pressure on the chest or other parts of the body, the feeling of suffocation or being choked, auditory hallucinations, visual hallucinations, a sensed presence, the feeling of being touched, experience of rape (e.g., by a “demon”), tingling, numbness or vibration in one or more parts of the body, the sensation of hovering, flying, falling, spinning, erotic sensations, and the feeling of leaving the body and/or looking down at one’s own body from above (“out-of-body experience”). We assigned these perceptions to the three SP hallucination factors Incubus, Intruder, and Vestibular-Motor (V-M), according to the model by Cheyne and collaborators (Cheyne, Rueffer, et al., 1999), which we were able to reproduce in our factor analysis. The two items “experience of rape” and “erotic sensation,” not included in Cheyne et al.’s factor analysis, were assigned to the Incubus factor in a 3-factor model. The correlations between the three factors found in the original study were largely confirmed in our study. All of them were moderately correlated, with the highest correlation between the Incubus and Intruder factors. Cheyne, Rueffer, et al. concluded from their results “that Intruder and Incubus together constitute a superordinate factor consistent with a narrative of nocturnal assault by a malevolent agent” (ibid., p. 328). However, further exploratory analyses led us to continue with a 4-factor model proposed by factor analysis, which confirms the three factors found by Cheyne, Rueffer et al. and the two added items form a separate factor *Sexuality and Sexualized Violence*.

There were moderate to large correlations with all PAGE subscales (Table 2). This is not surprising as the variety of extraordinary perceptions during SP suggests so. A more interesting picture emerges when the magnitude of the correlations is considered against the background of Belz and Fach's model, which assigns SP to the "External" Dissociation" quadrant. Although the Intruder experience fits this model, we could only determine this to a limited extent for the Incubus factor and not at all for the V-M factor. The correlation with the "Dissociation" subscale ($r = .41$) was higher than with the other subscales but the difference of the correlations of Incubus/External ($r = .3$) and Incubus / Internal ($r = .25$) is low (Fisher's $z = .67$, $p = .5$). There were no significant differences in the correlations between the V-M factor and the PAGE subscales.

Table 2

Correlations Between SP Hallucination and PAGE-II-R Subscales (N = 380)

	Incubus	Intruder	Vestibular-Motor	Sexuality and Sexualized Violence
External phenomena	$r = .5^{***}$	$r = .5^{***}$	$r = .30^{***}$	$r = .19^{***}$
Internal phenomena	$r = .2^{***}$	$r = .3^{***}$	$r = .36^{***}$	$r = .22^{***}$
Coincidence phenomena	$r = .18^{***}$	$r = .24^{***}$	$r = .30^{***}$	$r = .15^{**}$
Dissociation phenomena	$r = .37^{***}$	$r = .56^{***}$	$r = .36^{***}$	$r = .23^{***}$

$p \leq .01$ **, $p \leq .001$ ***

SP and Belief in the Supernatural

Previous research on the relation between SP and paranormal beliefs yielded inconsistent results (Denis et al., 2018). Denis & Poerio (2016) reported a weak but significant positive correlation ($r = .06$; $p < .05$) between the frequency of SP and paranormal beliefs as measured with the rPBS (Tobacyk, 2004). Accordingly, we hypothesized a positive correlation to BitSS scores (Schofield, et al., 2018) but could not find any in the global scale or in the subscales. The frequency of SP episodes seems not to be influenced by the kind of beliefs measured by the BitSS and/or vice versa.

Examination of the association between religious, supernatural, and paranormal beliefs and experienced symptoms of SP revealed some weak but significant correlations with both the "Supernatural Entities" and the "Common Paranormal Perceptions" subscales. The first includes the belief in ghosts, demons, angels, divine beings, the devil, etc., and the latter belief in the efficacy of astrology, card readings, psychics who can predict

the future, haunted buildings, etc. (see Table 3). These two subscales could be assigned to the field of esoteric or somehow alternative worldviews. Traditional religious beliefs and beliefs in psi phenomena such as psychokinesis and extrasensory perception correlated least with SP hallucination factors.

Table 3

Correlations between SP Hallucination Factors and Belief in the Supernatural (N = 380)

	Incubus	Intruder	Vestibular-Motor	Sexuality and Sexualized Violence
BitSS (global)	$r = .05$	$r = .04$	$r = .10$	$r = .04$
BitSS – Mental and Psychic Phenomena	$r = .03$	$r = .02$	$r = .18^{**}$	$r = .05$
BitSS – Religious Beliefs	$r = .02$	$r = -.03$	$r = .02$	$r = .00$
BitSS – Psychokinesis	$r = .04$	$r = .04$	$r = .09$	$r = .05$
BitSS – Supernatural Entities	$r = .08$	$r = .14^{**}$	$r = .13^{**}$	$r = .05$
BitSS – Common Paranormal Perceptions	$r = .11^*$	$r = .13^{**}$	$r = .15^{**}$	$r = .11^*$

$p \leq .05$ *, $p \leq .01$ **

SP and Absorption

We expected a positive correlation between the frequency of SP and absorption based on a few previous findings in SP research but also because absorption is linked to several anomalous experiences (see Cardena et al., 2014), but found no significant correlation with TAS scores, $r = .10$, $p = .054$. A somewhat different picture emerged when the correlations between TAS and the three SP hallucination factors are considered. Here we found small to moderate significant correlations, $r = .17$, $p \leq .001$ with Incubus, $r = .29$, $p \leq .001$ with Intruder, $r = .33$, $p \leq .001$ with Vestibular-Motor, and $r = .13$, $p \leq .05$ with Sexuality and Sexualized Violence. The highest correlation was between TAS and the V-M type. Incubus type experiences are associated with strong bodily sensations, which are very different from vestibular-motor bodily sensations. Absorption mainly targets mental processes, which seem to fit better with the latter.

Table 4 shows that at the level of single experiential phenomena the highest correlation of the TAS was with out-of-body experiences (OBEs). With the exception of this correlation, we found only weak correlations, but most of them highly significant. The "experience of rape" and "erotic sensation" were reported least frequently. The correlations found should therefore be treated with caution. The most remarkable result besides the correlation to OBEs is the non-significant and almost not-existent positive correlation between the TAS score

and the symptom “feeling of suffocation or being choked.” In a sense, these two experiences (the latter and OBEs) could be understood as poles of the dimension of body-relatedness or physicality of the symptoms on the list.

Table 4

Correlations between TAS and SP Experiential Phenomena (Multiple Entries Possible) (N = 380)

	% Participants	Spearman's <i>r</i>
Pressure on the chest or other parts of the body	62%	.18***
Feeling of suffocation or being choked	43%	.07
Auditory hallucinations	65.5%	.18***
Visual hallucinations	64%	.15***
Sensed presence	79%	.19***
Feeling of being touched	57%	.14**
Experience of rape (e.g., by a 'demon')	13%	.09
Tingling, numbness or vibration in one or more parts of the body	6.5%	.17***
Sensation of hovering, flying, falling, spinning	55%	.19***
Erotic sensation	17%	.11*
Feeling of leaving the body and/or looking down at one's own body from above ('out-of-body experience')	49%	.31***

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

Feelings and Emotions During SP

Our questionnaire asked about the frequency of specific feelings or emotions during SP, on a five-point scale from “never” to “always” (see Table 5). The main emotions were different types of fear and feeling powerless. Only 9% of participants reported never feeling any type of fear and 33.2% did not feel powerless during SP (see Mayer & Fuhrmann, 2021 for details).

We found many highly significant correlations between PAGE scores and experiencing different emotions, with the highest ones for “fear of going crazy” and “fear of dying.” The only emotion that did not correlate to the PAGE global score is the “sense of powerlessness.” This is interesting because it is also the only one without a significant positive correlation to the frequency of SP episodes. One could speculate whether this feeling represents a very basal experience of SP that hardly depends on personality differences or differences in experience.

There were also several high correlations between TAS score and emotions or feelings during SP as can be seen in Table 5. The two highest ones were to “sense of sadness,” and the “feeling of going crazy.” There were no significant positive correlations between the global BitSS score and emotions or feelings. Individual religious, supernatural, or paranormal beliefs seem to have no effect on emotional experiences during SP episodes or vice versa.

Although we obtained an overall homogeneous picture, there are some notable individual results, such as the high correlation of PAGE coincidence and “sense of powerlessness,” uncorrelated with all other PAGE scales and TAS. Two of the listed emotions, “feeling of happiness” and “sense of curiosity,” are positively connoted. Both had a highly significant positive correlation to PAGE “Internal” but were not significantly correlated to PAGE “Dissociation” and only weakly with PAGE “External.” The two latter PAGE scales are typically linked with SP according the model of Belz and Fach (2015). This may indicate that there are two main types of experiencing SP: a “classic” one associated with anxiety and an external attentional focus, and another one with more inward focus, more often associated with positive feelings.

Table 5

Correlations Between Feelings and Emotions During SP and PAGE and TAS (N = 380)

	P global	P external	P internal	P coincidence	P dissociation	TAS
Fear of going crazy	$r = .31$ ***	$r = .26$ ***	$r = .24$ ***	$r = .17$ ***	$r = .3$ ***	$r = .23$ ***
Fear of dying	$r = .26$ ***	$r = .23$ ***	$r = .18$ ***	$r = .16$ **	$r = .23$ ***	$r = .17$ ***
Other fears	$r = .16$ **	$r = .12$ *	$r = .11$ *	$r = .07$	$r = .24$ ***	$r = .08$
Sense of sadness	$r = .22$ ***	$r = .14$ **	$r = .2$ ***	$r = .18$ ***	$r = .21$ ***	$r = .23$ ***
Feeling of anger / rage	$r = .18$ ***	$r = .08$	$r = .17$ ***	$r = .06$	$r = .26$ ***	$r = .04$
Sense of powerlessness	$r = .07$	$r = .01$	$r = .01$	$r = .13$ **	$r = .07$	$r = .08$
Sensation of pain	$r = .22$ ***	$r = .18$ ***	$r = .21$ ***	$r = .11$ *	$r = .22$ ***	$r = .14$ **
Feeling of happiness	$r = .16$ **	$r = .12$ *	$r = .22$ ***	$r = .12$ *	$r = .09$	$r = .17$ ***
Sense of curiosity	$r = .13$ **	$r = .11$ *	$r = .21$ ***	$r = .04$	$r = .09$	$r = .15$ **
Other feelings	$r = .14$ **	$r = .04$	$r = .18$ ***	$r = .14$ **	$r = .09$	$r = .16$ **

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

This hypothesis was supported by the correlations of SP hallucination factors and reported positive emotions (Table 6). Both showed a highly significant correlation to the V-M factor and the Negative/Positive Sexual Experience factor, which were significantly higher than the correlations with the Incubus factor and the Intruder factor. Significance of differences of correlations between V-M factor and Intruder factor for “feeling of happiness”: $z = 2.76, p = .006$; for “sense of curiosity,” $z = 2.36, p = .018$. It is important to note that the highly significant positive correlation between positive emotions and the factor Sexuality and Sexualized Violence is due only to the item “erotic sensations” and not to the item “experience of rape.”

Table 6

Correlations between SP Hallucination Factors and Positive Emotions during SP (N = 380)

	Incubus	Intruder	Vestibular-Motor	Sexuality and Sexualized Violence
Feeling of happiness	$r = -.01$	$r = .1^*$	$r = .30^{***}$	$r = .29^{***}$
Sense of curiosity	$r = .03$	$r = .09$	$r = .26^{***}$	$r = .23^{***}$

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

To explore this hypothesis, we ran two factor analyses (principal component analyses, varimax rotation) with the reduced sample of participants with at least 3 SP experiences ($N = 316$). With this sample, we were able to use the frequencies of the experienced phenomena and emotions, which were available on ordinal scales, for the factor analyses (although an interval scale level is normally required for a factor analysis, we believe the procedure is justified, because considering the large N , the differences between the calculation with interval and ordinal scales are likely to be very small). With a first factor analysis, we reduced the 10 items of the list of “feelings and emotions” to 3 factors: the “Fear–Pain” factor consisting of the three items “fear of going crazy,” “fear of dying,” and “sensation of pain”; the “Happiness–Curiosity” factor including the 2 corresponding items; and the “Other Fears–Feelings” formed by “other fears,” “other feelings,” “sense of sadness,” “sense of powerlessness,” and “feeling of anger/rage.” We then computed a factor analysis on the hallucination factors, the emotion factors, the four subscales of the PAGE, and the TAS. We got a 3-component solution. As seen in table 7, loadings of component 1 mainly result from PAGE and TAS scales; loadings of component 2 result from hallucination factors Incubus and Intruder and emotion factor Fear–Pain; loadings of component 3 result from hallucination factor Negative/Positive Sexual Experience and emotion factor Happiness–Curiosity. The interesting

point with respect to the thesis is that the V-M factor loads significantly on all three components, and equally on components 1 and 3. Both show a low loading of fear. Component 3 displays a high loading of Happiness–Curiosity, component 1 high loadings of PAGE internal, PAGE coincidence, and TAS. This suggests (at least) two general types of SP experiences as suggested above.

Table 7

Rotated Component Matrix

	Component		
	1	2	3
Incubus	.38	.70	.16
Intruder	.28	.68	.24
Vestibular-Motor	.42	.30	.42
Neg/Pos Sexual Experiences	-.01	.25	.74
Fear–Pain	.14	.74	-.06
Happiness–Curiosity	.22	-.35	.78
Other Fears–Feelings	.16	.47	-.12
PAGE external	.64	.33	.23
PAGE internal	.77	.21	.15
PAGE coincidence	.82	.09	-.02
PAGE dissociation	.47	.51	.18
TAS	.80	.09	.03
Explained variance	24%	20%	13%

Paranormal Experiences During SP

We asked our participants if they had experienced things that they would call “paranormal” in the absence of the notion of a natural explanation and 55% of the participants answered the question in the affirmative. There was a small but significant difference between the affirmative and non-affirmative group with respect to frequency of SP – more SP episodes related to more paranormal experiences ($z = -2.34, p = .02$), and a highly significant difference regarding all PAGE scores (for the global scale: $z = -8.62, p < .001$). Participants who reported many ExEs tended to interpret (some) experiences during SP as paranormal. There were also highly significant differences between the affirmative and non-affirmative group regarding their scores on all BitSS subscales (for the global scale: $z = -5.85, p < .001$) and the TAS scale ($z = -4.28, p < .001$). Higher scores of belief in the supernatural and absorption tended to lead to a paranormal interpretation of experiences during SP.

Participants could add a comment to the question about paranormal experiences during SP in a free-text field. We did not specify categories for paranormal phenomena because we could not expect a corresponding prior knowledge, and 56% ($N = 214$) used the free-text field for a description of the ExE interpreted as paranormal. We analyzed these texts and, if possible, assigned the mentioned phenomena to known parapsychological phenomenon classes, such as apparition, precognition, out-of-body experience, etc., as well as to the categorization of experiential symptoms commonly used in SP (auditory phenomena, visual phenomena, etc.). In some cases, the assignment could only be made based on the information in the introductory free-text question of the questionnaire (“Please describe your strongest and most impressive experience of this kind in your own words”) because reference is made to it or the comment alone was too unclear. Although most of the mentioned experiences could be considered hallucinatory from a neutral scientific perspective, the participants interpreted them as paranormal experiences. Table 8 shows the frequencies of different kinds of allegedly paranormal phenomena.

Table 8

Experiences During SP Interpreted as Paranormal

	Percentage
Apparition	28%
Auditory phenomena	20%
Out-of-body experience	18.5%
Sensed presence	15.5%
Tactile phenomena	15%
Visual phenomena	12.5%
Kinesthetic phenomena	12.5%
Psychokinesis	6.5%
Other reality	6.5%
Telepathy	2.5%
Precognition	1.5%
UFO / Alien Abduction	1.5%
Mind control	1%
Olfactory phenomena	1%
Other	1%

The categories are of course not mutually exclusive. “Apparitions,” for example, are visually perceived and thus also visual phenomena. Perceiving the room full of red light is a visual phenomenon, but not an apparition. If possible, we have assigned the reported phenomenon to the more specific category. Often more than one phenomenon was mentioned in the comments. The most reported phenomena were apparitions (28%) and auditory phenomena such as hearing voices, laughter, noises etc. (20%). Both belong to the most reported experiential symptoms of SP, together with “sensed presence.” The last-mentioned was experienced by 79% of the participants at least once; auditory hallucinations by 65.5%, and visual hallucinations by 63.5% (see Mayer & Fuhrmann, 2021, for details). It seems that visual experiences in the form of figures (human beings, dark grey figures, figures of other entities, etc.) during SP are most likely to lead to a paranormal interpretation: 49% of participants reported an OBE at least once and 18.5% interpreted it as paranormal. Experiences that can be assigned to the “classical” parapsychological categories were mentioned rarely.

Interpretation of the SP

We asked participants, whether they had heard of or knew about these or similar experiences before their own first SP experience, and whether they already had a name for this phenomenon, and 86% had not heard of it, and 91% did not know the term sleep paralysis. It is obvious that the interpretation and understanding of phenomena can change with increasing knowledge and experience. Two questions were about such changes: “Immediately after the first experience of this kind, what did you think it was, what caused it, and what was it related to?” and “If you feel differently about SP today, which of the following statements applies to your assessment today?” Table 9 shows that with increasing knowledge and experience supernatural interpretations as well as the fear that it is the expression of a mental and/or physical illness decreased. For many, this apparently leads to a de-dramatization of the experience. We can see that after the first experience only 10.5% interpreted the experience as SP, while at the time of the survey this was the case for 63%. However, more than a third still has a different interpretation.

Table 9*Interpretation of SP Experience After First Time and Currently (Percentages)*

	After 1st experience (%)	Current (%)
It was a dream	33.5	10
It was an apparition or another supernatural entity	28.5	18
It was an alien abduction	8.5	2.5
Something was physically wrong with me	29	7.5
Something was mentally wrong with me	23	12.5
It's related to a sexual abuse experience	1	1
It's related to a physical abuse experience	1.5	.5
It is related to the consumption of alcohol or other drugs	5.5	5
No clue	11.5	9
I didn't / don't think about it	5	3.5
It was a sleep paralysis	10.5	63
Other	17.5	15

There was a weak significant negative correlation between frequency of SP and prior knowledge of SP: Participants with few SP experiences were more likely to have foreknowledge of SP than those who experienced SP more frequently ($r = -.19, p < .001$). Consistent with this, they were much more inclined to interpret the first SP episode as sleep paralysis than were individuals with more frequent SP ($r = -.21, p < .001$).

Two anomalistic interpretations were on the list of causes for the paralysis experience, namely that it was caused by an apparition or another supernatural being, or by alien abduction. Both decreased significantly during the period between the first experience and the time of the survey. The alien abduction interpretation dropped down from 8.5% to 2.5%, and the apparition/supernatural entity interpretation from 28.5% to 18%. The latter interpretation was more consistent than the former and remained at a relatively high level (see Table 8). We examined our data in terms of the direction of changes in interpretation after the first time to the time of the survey: 7% of participants changed their interpretation from “alien abduction” to another item on the list, and 1% from another item to “alien abduction, with no significant correlation with frequency of SP; 18% of partic-

ipants changed their interpretation from “apparition/supernatural entity” to another item, and 7% in the other direction, in both cases, uncorrelated to prior knowledge of SP. There was a weak correlation with frequency of SP which becomes significant if we look at the reduced sample with at least three SP episodes, $r(314) = .12, p = .03$. A proportion of participants with more frequent SP tended to move from a conventional explanation or “not-knowing” position to a supernatural explanation of their experiences. This is a remarkable finding. However, no explanation can be derived from the data. A look into the qualitative data revealed that belief in ghosts and demons might play a role. The post hoc analysis indeed showed a significant difference in BitSS scores between the groups that changed the interpretation regarding apparitions or supernatural entities as the cause of the SP experience. Participants ($N = 380$) who changed their understanding toward being caused by such entities had significantly higher global BitSS scores than participants who changed their interpretation in the other direction, from caused by supernatural entities to a conventional cause, $z = -2.04, p = .04$; this difference is particularly clear for the subscale “supernatural entities,” $z = -2.79, p = .005$. Of course, no causal relation can be derived from this result. Belief in supernatural entities could support a supernatural interpretation of SP but the nature of SP experiences could also further or reinforce supernatural beliefs.

Gender Differences

There was a significant difference between males and females in terms of the mean scores of Incubus, $z = -4.67, p < .001$ and Intruder, $z = -3.89, p < .001$. Females estimated the duration of SP episodes to be longer on average and reported more phenomena (for details see Mayer & Fuhrmann, 2021). In addition, the females of our sample had higher mean scores on the global PAGE scale and on all subscales, as well as on the TAS scale. The relation between the TAS and SP hallucination factors revealed an interesting gender difference. Absorption was significantly correlated with the Intruder factor among males, $r(210) = .36, p < .001$, but not among females, $r(166) = .14, p = .070$. Females had higher scores on the BitSS subscales except for the “Religious Beliefs” subscale. The subscale “Common Paranormal Perceptions” showed a significant difference between males and females, the latter achieving higher scores (Table 10).

Table 10

Gender Differences ($m = 212, f = 168$) in PAGE, BitSS, and TAS scores (Females Had Higher Scores)

	Z
PAGE (global)	-2.97**
PAGE – External phenomena	-2.29*
PAGE – Internal phenomena	-1.67
PAGE – Coincidence phenomena	-3.75***
PAGE – Dissociation phenomena	-1.23
BitSS (global)	-2.21*
BitSS – Mental and Psychic Phenomena	-2.39*
BitSS – Religious Beliefs	-.37
BitSS – Psychokinesis	-1.82
BitSS – Supernatural Entities	-1.9
BitSS – Common Paranormal Perceptions	-5.16***
TAS	-4.22***

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

Regarding paranormal experiences during SP, only among males was there a significant difference between the group that answered in the affirmative to the item about paranormal experiences and the group that did not, $z = -5.12, p < .001, n = 212$. A gender difference was also seen for BitSS and PAGE scores. The general positive correlation between paranormally interpreted experiences and BitSS was much more pronounced among males than females: males (212), $z = -5.36, p = < .001$; females (168), $z = -2.7, p = .007$. The same is true for the PAGE scores, although the correlation is significant for both males and females (for the global PAGE score: males (212), $z = -7.43, p = < .001$; females (168), $z = -4.56, p < .001$ (Table 11).

Discussion

Belz and Fach's model places SP in the quadrant formed by external phenomena and dissociation phenomena. According to this model, we hypothesized higher positive correlations between SP frequency and scores on PAGE subscales "External" and "Dissociation" than on the other two subscales. This hypothesis was only partially confirmed. While we indeed found the highest correlation to the expression on the "Dissociation" pole, we could not find a significant difference between the correlations to the "External" and "Internal" poles. Together with some other findings from our study, these results suggest that the phenomenology of SP is more complex

Table 11

Experiences Interpreted as Paranormal – Group Differences Separated by Gender

	Males	Females
TAS	-5.12***	-.8
PAGE (global)	-7.43***	-4.56***
PAGE – External phenomena	-7.3***	-4.34***
PAGE – Internal phenomena	-5.65***	-3.91***
PAGE – Coincidence phenomena	-5.154***	-2.22*
PAGE – Dissociation phenomena	-5.76***	-4.089***
BitSS (global)	-5.36***	-2.7**
BitSS – Mental and Psychic Phenomena	-5.29***	-2.75**
BitSS – Religious Beliefs	-3.47***	-1.19
BitSS – Psychokinesis	-5.1***	-2.78**
BitSS – Supernatural Entities	-5.86***	-2.8**
BitSS – Common Paranormal Perceptions	-5.91***	-3.01**

$p \leq .05$ *; $p \leq .01$ **; $p \leq .001$ ***

than assumed in Belz and Fach's model. SP characterized by the V-M type and accompanied by positive emotions may have a stronger internal experiential quality, whereas Belz and Fach's model describes mainly the intruder and incubus type of SP with a strong association with experiences of fear, pain, and other negative emotions. It is important to keep in mind that the four PAGE scales are highly correlated with each other, i.e., a person with many ExEs usually has not only one quadrant occupied (in our sample the correlations between the PAGE scales are between $r = .48, .58$). SP is only one ExE of many. Synchronistic experiences experienced by many are located, for example, at the coincidence pole.

Additional hypotheses concerned paranormal and supernatural beliefs and absorption. Based on prior research, we expected a significant positive correlation with SP frequency in both cases, but did not find significant correlations with BitSS or TAS.

However, in exploratory analyses we found a positive correlation between absorption and the frequency of experienced phenomena during SP, grouped under SP hallucination factors. The highest correlations occurred with the V-M factor, and, at the level of single items, with out-of-body experiences. The latter is consistent with

previous research (Cardeña & Alvarado, 2014). Individuals with a high TAS score tend to experience more phenomena during SP, especially of the V-M type. One could interpret this to mean that the (neuro-)physiological aspect of SP, which is reflected in the frequency of SP, is very basic and has little to do with personality traits as measured with the TAS. In contrast, the question of *how* SP is experienced, i.e., *what* is perceived, how the perceptions are experienced on an emotional level, and how they are dealt with, depends more on personality traits (here measured with the TAS) and other ExEs (here measured with the PAGE).

The correlations between the SP hallucination factors and the BitSS global scale were not significant. We found weak but partly significant positive correlations with the subscales “Common Paranormal Beliefs” and “Supernatural Entities.” Individuals with SP who have stronger belief in ghosts, demons, angels, divine beings, the devil, the efficacy of astrology, card readings, psychics who can predict the future, haunted buildings, etc. reported more SP hallucination factors phenomena. The link between beliefs and experiences poses a difficult problem. Are beliefs the result of experience, or do pre-existing beliefs foster corresponding experiences, or are beliefs and experiences independent? The problem of the relation between experience and beliefs is well known and the scientific debate about it has been stimulated by the phenomenon of SP. Hufford’s *experiential source hypothesis* was groundbreaking in this regard (Hufford, 1982). For instance, Cassaniti and Luhrmann (2014) examined the reciprocal influences of physiologically-based experience and culturally mediated narratives and interpretations in a cross-cultural comparative study of spiritual experiences that included questions about SP. Subsequently, many reductionist models have been developed to understand the origin of supernatural beliefs, which see the sole cause in evolutionary experiential and brain-based structures (e.g., Craffert et al., 2019). Jalal presented an experientially-based Panic-Hallucination Model of SP. According to his model, “somatic symptoms, coupled with the awareness that one is paralyzed, can activate a host of psychological symptoms; including fear and worry that are worsened by catastrophic cognitions about the attack (e.g., ‘I am dying’). This in turn may generate an amygdaloid fight-flight reaction and panic-like arousal” (Jalal, 2016, p. 2). The accompanying hallucinations are interpreted according to the socio-cultural framework of the experiencer. The weak correlations between hallucination factors and the subscales “Common Paranormal Beliefs” and “Supernatural Entities” of the BitSS can only be interpreted as a weak indication of a possible causal relation, although the direction cannot be inferred. A large part was gained through a website reporting news from different areas of

anomalistics. The readership is very heterogeneous due to the breadth of the range of topics and the rather neutral reporting and even skeptics can get information there. One might assume, as one of the reviewers did, that the sample would have elevated scores in the paranormal belief scales compared to the general population because they are interested in the content of such a website. This seems to be not the case. The average values of our sample are in the same range as those of the two samples from a university setting used for the validation of the BitSS (Schofield, E-Mail from February 1, 2022). However, this problem plays a minor role in the investigation of the connection between the frequency of SP and supernatural beliefs. More frequent SP should reinforce or solidify supernatural beliefs according to the experiential source hypothesis. The absence of significant correlations between supernatural beliefs and frequency of SP in our study tend not to support the assumption that SP is a major source of human belief in ghosts – at least this is true for our sample coming from a secular Western society.

At the level of single items, out-of-body experiences stood out, with significant positive correlations to all subscales except “Religious Beliefs.” There were no significant correlations of single items with “Religious beliefs” at all except “Visual Hallucinations,” which had a weak negative correlation to this subscale. This is partly consistent with results by Tobacyk and Mitchell (1987) who compared OBE experiencers and non-experiencers with respect to various personality traits including paranormal beliefs. They used the *Paranormal Belief Scale* (PBS; J. Tobacyk & Milford, 1983) and found significant differences between OBE reporters and nonreporters in the overall PBS score and in several subscores, with the former scoring higher. The “Traditional Religious Beliefs” subscale, which is comparable to the “Religious Beliefs” subscale of the BitSS, showed no difference between groups, consistent with our results. In summary, the link between SP and paranormal or supernatural beliefs remains unclear.

The connection between supernatural beliefs and experiences interpreted as paranormal during SP is plausible. A more pronounced belief in the supernatural makes it easier to interpret strange experiences as paranormal. The positive correlations between PAGE scores and paranormal experiences during SP are also understandable because PAGE asks about experiences that tend to be interpreted as paranormal. Therefore, the strong correlation with paranormal beliefs is not surprising.⁴ The connection found between TAS and paranormal experiences is somewhat less self-evident. Why should higher absorption, i.e., an openness to delve into mental

imagery and fantasy, tend to lead to paranormal interpretations of strange experiences? Is it because this openness allows for a worldview that is not confined within the boundaries of a physicalist worldview that dominates Western academic science? The results regarding gender differences might provide some interesting clues. Females had higher TAS scores than males. Looking at the association between TAS and paranormal experiences during SP separated by gender, we found a highly significant association only among males. The correlations between paranormal experiences during SP and supernatural beliefs and ExEs (PAGE) were also notably higher in males than females. Furthermore, absorption was significantly correlated with the Intruder factor only in males. Taken this all together suggests that the males differed more regarding paranormal experiences than the females which are generally more open to paranormal experiences and supernatural beliefs – the latter mainly regarding the subscale “Common Paranormal Perceptions.”

This brings us to the limitations of this study. Because of our special interests, we did not use a control group of participants without SP. We also obtained our selected sample via participation calls on topic-specific websites. Thus, our sample is far from being representative of the general population. For instance, the gender effects we found could partly be due to the composition of the group of males in our sample. About 62% of the participants in the GW sample (N = 325) were male, whereas this was the case for only about 22% of the FB sample (N = 55). The website “Grenzwissenschaft aktuell” is aimed at people who have a special interest in the border areas of psychology and parasciences. Although the contributions on the website are of a popular-scientific nature and do not only appeal to scientifically educated persons, the author tries to convey as neutral and differentiated a point of view as possible. Therefore, among the readership one can assume both rather skeptically minded people and believers, who are, however, all interested in extraordinary phenomena and do not represent an average population. The FB sample could be much more homogeneous because the FB groups involved have a much narrower range of interests that are closely related to the SP phenomenon. Therefore, generalizability of the results to the normal population is limited. We gathered self-reported, subjective data, which must be taken into consideration when interpreting the findings.

There are also limitations at the level of statistics. Large parts of the study were exploratory, so many tests were conducted. This increases the probability of an alpha error, whose estimation is difficult because

many variables are not independent, such as the subscales of the PAGE from the global scale. The same applies to feelings, emotions, and some perceptions that occur during a SP. Therefore, a Bonferroni correction would have led to overly conservative estimates. For further formation of hypotheses, readers may consider only correlations significant at the .01 level. As for our hypotheses, we are on the safe side as the two confirmed hypotheses have an alpha error of less than 1% and the other two were not confirmed.

In general, we would like to make two further points to consider when interpreting the results: (1) When you study ExEs, you are dealing with generally rare to very rare experiences. This does not mean, however, that they are not relevant to the lives of those affected. Quantitative evaluations are possible even for rare events, but one should not overestimate the accuracy of statistical results. Frequency estimates of ExEs in particular, which are supposed to span an entire lifespan, are subject to large uncertainties because, for rare events, memory may become inaccurate or fail with increasing temporal distance. Nevertheless, quantitative analyses can provide valuable clues to understanding the phenomena under study. (2) We decided to use a selected sample without a control group due to the nature of the phenomenon under study and the research questions we chose to examine. This gave us a natural bias with respect to some of the variables studied, some of which are highly correlated with each other, e.g., the scales of the PAGE with the TAS and the BitSS. Due to the greater homogeneity of the sample with respect to ExEs that included SP as a selection criterion, lower correlations were to be expected than if we had worked with a control group without SP. Therefore, we also consider low correlations as relevant if they are highly significant.

Although our hypotheses were only partially confirmed, the exploratory evaluation revealed some interesting correlations with these variables. We found a significant association between the PAGE dimension “Internal,” the V-M factor, absorption, and the two emotions with positive connotations “Feeling of Happiness” and “Sense of Curiosity.” This, along with some other evidence from our data, leads us to propose that there could be two types of SP: one mainly connected with typical negative emotions and an external focus, which falls into the quadrant of the PAGE model built by the poles “external phenomena” and “dissociation phenomena”; another one, which can be accompanied also by positive emotions and is associated with more internally experienced perceptions of the vestibular-motor kind, and which falls into the quadrant of the PAGE model

formed by the poles “internal phenomena” and “dissociation phenomena.” However, a clear assignment to the quadrants of the PAGE model is only possible at a theoretical level, since SP represents only one of a multitude of phenomena measured by the PAGE and the SP experiencers have usually experienced other EXEs as well. To further explore the question of an external or internal focus of the experience of SP more research with targeted questions is needed.

SP is a fascinating phenomenon associated in many ways with other extraordinary experiences, altered states of consciousness, and the field of anomalistics. In any case, a mere reduction to a neurophysiological phenomenon based on a desynchronization of physiological REM sleep state and waking consciousness does not do justice to the variety of different ways of experiencing SP. Hallucination-like experiences during SP cannot be understood simply as dream images intruding waking consciousness because REM dream content is usually different from the shapes and forms perceived during SP (Mayer & Fuhrmann, 2021). The thesis that the hallucinatory experiences during SP form the basis of human belief in ghosts and demons is too simplistic. Even though the neurophysiological core of SP is now quite well researched and some plausible explanatory models of etiology are available, many questions regarding the experience, interpretation, coping, and cultural embeddedness remain open. The results of our study contribute to a more nuanced picture of SP.

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