

A German Online Survey of People Who Have Experienced Sleep Paralysis

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GM and MF designed the study. MF provided access to the Facebook group “Schlafparalyse” of which he is the founder and administrator. GM analyzed the data and wrote the manuscript. Both authors reviewed and agreed to the published version of the manuscript.

Abstract

We present some key findings from an online survey on isolated sleep paralysis (SP). The aim of our study was to get a differentiated picture of the correlation between the frequency of SP and several phenomena (symptoms, experiences) as well as factors correlated with these phenomena. We also investigated the role of gender in relation to the experience of SP. We used a selected sample of subjects who had had at least one SP experience, with a total of 380 subjects. On average, the participants experienced 10–20 SP episodes. We found high and expected positive correlations between the frequency of SP experiences and the amount of phenomena, emotions, and perceived shapes and forms experienced during SP. An increased frequency of SP also appears to lead to habituation and de-dramatization in some affected individuals. Interestingly, significant correlations are missing where one would have suspected them based on the previous hypotheses. Neither self-perceived general stress nor poor sleep hygiene appeared to influence the frequency of SP. We found highly significant gender differences in some items. Women reported more experienced phenomena and emotions overall, had more frequent SP experiences of the *intruder* and *incubus* type and were significantly more likely to perceive concrete forms such as human figures or people they know. They were also more likely than men to report experiencing fearful emotions, especially the fear of going crazy. Most of these findings were based on exploratory questions; they require replication for validation.

Keywords: frequency, gender, perceptions, emotions, comorbidities, sleep hygiene,

Introduction

Isolated sleep paralysis (SP) is a sensation of being unable to move while falling asleep or waking up. By definition, it is a sleep-related, paralyzing sensation associated with waking consciousness that occurs outside of narcolepsy symptomatology. It is often accompanied by visual and auditory hallucinations, intense feelings of anxiety, and other unpleasant sensations. The most common explanation in sleep medicine is that SP is a superposition or juxtaposition, of REM-related atonia, dream imagery, and wakefulness (Sharpless & Doghramji, 2015, p. 140). Hallucinations and fearful sensations do not always occur. It has a lifetime prevalence of about 8% for the general population (Sharpless & Barber, 2011). There are early reports of this kind of experience in almost all ethnic groups (Sharpless & Doghramji, 2015, pp. 17-54). This suggests that SP is a universal phenomenon with a culture-independent experiential basis (Hufford, 1982). Previous research has provided good insight into the phenomenology of SP (Cheyne, Newby-Clark, et al., 1999), associated variables (Denis et al., 2018), and plausible theories about its (neuro-)physiological basis (see Sharpless & Doghramji, 2015, for an overview). Studies on the prevalence of and beliefs about SP have been conducted in various countries with different ethnicities (e.g. Fukuda et al., 1998; Hinton et al., 2005; Jalal, Romanelli, et al., 2020; Jalal, Sevde Eskici, et al., 2020; Lišková et al., 2016; Wing et al., 1994; Wróbel-Knybel et al., 2020). These studies show a considerable variation in prevalence, ranging from 1.5% to over 60%, depending on the sample. Because of the different survey methods and the possible dependence on other variables, such as the average age of the sample or cultural influences, it is not easy to compare frequencies of SP in different studies. These heterogeneous findings illustrate how little we still know about the prevalence and incidence of SP.

Many of the existing findings on SP are based on data from studies that only distinguish between groups of participants with SP experiences and those without SP experiences, neglecting differences in the frequency of SP experiences, which severely limits the relevance of their results. We examined the diversity of SP experiences rather than making statements about SP in the general population. To obtain a sample with a relatively high frequency of SP, we chose subjects who had had at least one SP experience. Our goals: Our selection sample of subjects who had experienced SP should provide a differentiated

picture of the correlations among the frequency of SP as an independent variable and several phenomena (symptoms, experiences), as well as factors correlated with these phenomena. The gender difference was considered a variable in only a few studies and mostly only with respect to the presence of SP, with inconsistent findings (Denis et al., 2018). Therefore, we wanted to investigate exploratorily what role gender plays in the experience of SP. In addition to these “classical” research questions, we were also interested in different ways of coping with these experiences and in the relationship between the frequency of SP and paranormal beliefs and extraordinary experiences.

This paper presents the evaluation on questions related to the first-mentioned points while the other topics will be covered in further publications. Since the selection criterion in our sample and several of our questions differed significantly from those in many other studies, this was a largely exploratory hypothesis-generating study.

Method

Measures

There exists no single, universally used questionnaire on SP because the measuring instruments are adapted to the respective questions and individual points of interest. We constructed our SP questionnaire on the basis of two existing and frequently applied questionnaires, the *Waterloo Sleep Experience Survey* (WSES; Cheyne & Rueffer, 1999) and the *Unusual Sleep Experiences Questionnaire* (USEQ; Paradis et al., 2009) that best fit our research questions, using some slightly different item formulations. We translated the items into German. Because of our specific interests in coping strategies and beliefs, we added some new items in addition to the “classic” questions that address issues not covered in this paper. Our questionnaire consisted of 35 items. A free-text field following the question “Please describe your strongest and most impressive experience of this kind in your own words” provided qualitative data that allowed us to assess whether the participants’ experiences actually met the definition criteria of sleep paralysis (American Academy of Sleep Medicine, 2014), which was almost always undoubtedly the case.

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We used three other questionnaires to elicit extraordinary experiences, paranormal beliefs, and absorption, but these are irrelevant to the content of this paper.

A final set of 11 items collected sociodemographic data.

Statistical analysis

We used SPSS (version 27; IBM Corporation, USA) for the statistical calculations. Several of our items inquired about changes in experiences, their interpretation, reactions, and attitudes. These questions only make sense for participants who had had more than one or two SPs, which was the case for more than four-fifths of the total sample ($n = 380$). We therefore performed some of the statistical calculations with a reduced sample consisting of participants with three or more SP experiences. The size of this sample was $n = 316$ (male = 173, female = 143). Most of our measures consisted of ordinal scales that only allowed Spearman's rank-order correlation tests. Unless otherwise stated, correlation coefficients in the text are Spearman rank-correlation coefficients. The Mann-Whitney *U*-test was used for group comparisons between the sexes. All significance tests were performed two-sided.

Participants

Selected participants were found by placing an invitation with a link to the online questionnaire on two different websites. The first part of the sample was obtained via several Facebook (FB) groups, mainly a closed FB group "Schlafparalyse" ("sleep paralysis") between mid-April and July 2018. (The latter was founded by one of the authors [M.F.] in 2015.) The second part was obtained via the website "Grenzwissenschaft aktuell" (GW), which provides current news from anomalistics (border areas of psychology and parascience) in July 2018. Included subjects had to have experienced at least one SP. 55 evaluable questionnaires were provided by the FB groups and 325 from the GW website. 44% of the respondents 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 (female = 37.9, male = 39.8). The level of education of the participants was rather high: 57% had a German Fach-/Hochschulabschluss [university degree 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 alone. The study was approved by the local Ethics Committee of the Institute for Frontier Areas of Psychology and Mental Health (IGPP-2021-03).

Results

Frequency of episodes, age, and SP onset

The frequency of SP can be measured in different ways. Cheyne (2005) and Kliková et al. (2020) used frequency groups related to recurrent periods of time (weeks, months, years). This implies that there were no long-range changes. It also easily leads to an overestimation of the absolute numbers of SP. 37.3% of the Kliková et al. sample reported experiencing SP at least once a month, i.e., 60 and more SPs over the preceding five years. According to Sharpless & Doghramji (2015, p. 97–98), only “a minority of individuals” experience a very high frequency of SP. Many reported only rarely having had SP (see also Spanos et al., 1995, and Jalal et al., 2020). Like Spanos et al. and Jalal et al., we also asked for absolute (lifetime episodes) instead of periodic frequencies.

Table 1

On average, the participants experienced 10–20 SP episodes (cf. table 1). The mean age of the first episode was 20.4 years (SD = 10.8), ranging from 2 to 60 years. Our study with a mean age similar to Jalal et al.’s subjects registered 10–20 episodes. There was no significant difference between females and males regarding the frequency and the age of the first episode of SP. We found a weak negative correlation between age and frequency of experienced SP. Younger participants tended to report a higher frequency of SP episodes ($r = -0.130$, $p = 0.011$). The correlation disappeared in the reduced sample of participants with at least three SP episodes ($n = 316$, $r = -0.070$, $p = 0.218$). This largely refutes a significant effect of

age on SP frequency. The time period since the last SP episode varied considerably among our subjects. About 26.2% reported at least one episode during the preceding 30 days. The last episode occurred more than 1 year previously in 45.3% of our subjects. In an optional question we asked at what time the experience had taken place. The answer options were not exclusive. Two thirds stated that they had experienced SP during the night, about 30% during the daytime (naps, etc.), 58.4% while waking up, and 43.7% while falling asleep.

Specific Circumstances

Almost two-thirds (61.6%) of the participants stated that they remembered *specific circumstances* or conditions connected with their SP. Three main factors were mentioned: irregular sleep patterns (31.1%), strong emotional experiences (35.3%), and private and occupational stress situations (36.6%) (see Table 2 for more details).

Table 2

No significant correlations between the frequency of SP and specific circumstances could be found. Considerable gender-related differences were found for the items “Strong emotional experiences” ($z = -2.970$, $p = 0.003$) and “Private and professional stress situations” ($z = -2.782$, $p = 0.004$). A higher percentage of female participants reported an association between their SP and the above-mentioned situations than male participants.

Duration and ending of SP

The estimation of the *duration* of the experience varied widely with an emphasis on “a few minutes” (median = 1–5 minutes; see Table 3).

Table 3

We found a highly significant correlation between the estimation of the (average) duration and the frequency of SP – the higher the frequency, the longer the estimated average duration ($r = 0.193$, $p < 0.001$, $N = 351$). This also applied when we excluded participants with only one or two SP experiences (r

= 0.188, $p = 0.001$, $N = 293$). There was also a small but significant correlation with gender. Females tended to report longer durations of the episode ($z = -2.237$, $p = 0.025$). This is consistent with the findings of a meta-analysis of gender differences in duration judgments (Block et al., 2000).

We asked the participants how their SPs usually ended. Strategies and techniques for ending SP are reported on websites and in the English literature. The main successful strategy was an *effort of will* (61%) followed by a *little movement of a body part* (36%). 40% of the participants stated that the *SP ended by itself*, without their doing anything (Table 4).

Table 4

As expected, we found significant correlations between the frequency of SP and almost all forms of experienced ending of SP except for “ended by itself” and “ended through prayers”. The picture becomes more interesting with the reduced sample of participants with at least three SP experiences ($N = 316$). Highly significant correlations with frequency could be found only for the endings “turned into a dream” ($z = -3.432$, $p < 0.001$) and “I just fell asleep” ($z = -2.899$, $p = 0.004$). This could indicate a habituation effect (de-dramatization of the experience). There were no significant gender differences regarding the ending of SP episodes.

Perceptions

During such episodes of immobility or paralysis, those affected reported various phenomena, perceptions and/or experiences. We asked about the frequency of experiencing phenomena that have been reported in the literature as being characteristic for SP. Table 5 presents the percentages of these kinds of experiences.

Table 5

The feeling of an *invisible presence* in the room (sensed presence) was the most frequently mentioned experience (79% experienced it at least once), followed by *auditory hallucinations* (65.5% at least once), *visual hallucinations* (63.5% at least once), and *tingling, numbness or vibration in one or more parts of the body* (60.5% at least once). Phenomena and experiences linked to *sexuality*, which have historically often been linked to SP (Sharpless & Doghramji, 2015, pp. 17–44), played a minor role in our sample.

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Cheyne and colleagues conducted factor analyses on SP experiences and detected three broad categories which they called the *incubus* (pressure on chest, feeling suffocated) category, the *intruder* (senses presence, visual, auditory, and tactile hallucinations) category, and the *vestibular-motor* (feelings of floating, flying, out-of-body experiences, etc.) category (Cheyne, 2005; Cheyne, Newby-Clark, et al., 1999, 1999; Cheyne, Rueffer, et al., 1999). In our sample, the correlation between the frequency of SP and reported experiences for all three categories ranged from 0.383 to 0.451 ($p < 0.001$ for all).

We found a highly significant correlation between gender and the first two categories. Females reported significantly higher frequencies of *incubus* ($z = -4.292$, $p < 0.001$) and *intruder* experiences ($z = -3.890$, $p < 0.001$). There was only a small but significant correlation with the *vestibular-motor* experience; females also reported higher frequencies ($z = -2.271$, $p = 0.023$). There were only two types of the above-mentioned experiences with no detectable gender difference, the “sensation of hovering, flying, falling, spinning” and “Feeling of leaving the body and/or looking at one's own body from above ('out-of-body experience')”. Although there was no general gender difference in the frequency of SP in our data, females reported experiencing more or more frequently phenomena from the above list.

One of the questions concerning the phenomenology of SP pertained to *perceived shapes and forms*. Multiple entries were possible. Table 6 shows the percentages of respective perceptions.

Table 6

The most frequently mentioned perceived shape was “a dark or gray figure” followed by “indefinite/elusive”. Women were more likely to report such perceptions in most categories ($z = -2.395$, $p = 0.017$, difference over all items). This is in line with the generally higher frequency of reported phenomena mentioned above. The gender differences are significant with the perceptions of a “figure of a person I know” ($z = -2.715$, $p = 0.007$) and “a human figure” ($z = -2.567$, $p = 0.010$). In contrast to these more concrete perceptions, the only category mentioned slightly more frequently by males referred to indefinite and elusive forms. However, this item showed no significant difference between males and

females. Reports in an optional free-text field included light phenomena, hovering objects, transparent vibrating structures, a black, cloudy vortex, etc., which did not match the above-mentioned categories.

One important point stands out when considering the frequency of reporting in the different categories of perceived shapes. Sleep medicine explanatory models of SP assume a desynchronization between the physiological REM sleep state and the waking conscious state. Visual hallucinations are often explained by REM dream images that intrude into the SP awake state. The results of our study show that, in contrast to REM dreams, the vast majority of visual hallucinations during SP involved poorly differentiated shapes and figures, such as dark or gray figures, and only seldom familiar persons, as is common in REM dreams (Hall & Van De Castle, 1966).

Feelings and Emotions

SP is usually accompanied by various *feelings* and *emotions*. Table 7 presents the percentages and frequencies of such experiences. The last column also shows the correlation between feelings/emotions and the frequency of SP in the reduced sample with at least three experienced episodes.

Table 7

Different kind of *fears* and the *sense of powerlessness* were the most frequently experienced emotions/feelings during SP. More than 60% of participants reported that they had had *fear of dying* at least once during such episodes. Combining the first three categories related to fears resulted in only 8.9% who indicated that they had never experienced any type of fear during SP. Only *fear of going crazy* showed a clear gender difference; it was experienced by females significantly more often ($z = -3.657$, $p < 0.001$).

The figures show that negative feelings were dominant in SP for most of the affected persons, but neutral and positive feelings were also experienced by some subjects. About every fifth person experienced a *feeling of happiness* at least once, and 51% developed a *sense of curiosity*. It is not surprising that the occurrence and frequency of most feelings/emotions correlated positively with the frequency of SP because these were not independent variables. Two items lacking positive correlations were residual categories (“other fears”, “other feelings”). The lack of a positive correlation between the frequency of SP and the item *sense of powerlessness* is interesting. The paralysis experience itself is associated with the inability to move, which is closely related to or causes the feeling of powerlessness. This probably represents the basic experience of SP even more than various forms of fear, which generally depend more on interpretations and gained experiences.

Comorbidities

A very inconsistent picture concerning comorbidities associated with SP emerges from the literature. Some studies found correlations between the frequency of SP and PTSD, panic disorder, anxiety-related disorders, depression, and dissociation (cf. Denis et al., 2018; Sharpless & Doghramji, 2015, pp. 115–128). We asked our participants if they suffered from such diseases and whether they were exposed to other stress factors. Table 8 gives an overview of the indicated *comorbidities*.

Table 8

In self-reported comorbidities, a clear distinction must be made between self-assessment and medical diagnosis. The differences between the two items *insomnia* and *nightmares* are especially striking. Both are related to sleep, as is SP, and people suffering from it rarely seem to ask the doctor for a diagnosis and help. In the comparison with the prevalence values in the general population stated in the literature, the large variance in the latter and the lack of a clear understanding of the disease patterns on the part of the participants (self-reports) are problematic. Therefore, the values have to be taken with a grain of salt. The frequency of SP is positively correlated with sleep-related comorbidities; participants with a higher

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frequency of SP tend to suffer more from insomnia ($r = 0.105$, $p = 0.042$), nightmares ($r = 0.137$, $p = 0.008$) and narcolepsy ($r = 0.147$, $p = 0.004$). This relationship can be explained by the similarity of the emotional quality of nightmares and SP. Insomnia may well be a consequence of SP.

Females reported significantly more frequently that they suffered from nightmares ($z = -2.840$, $p = 0.004$), and slightly more frequently that they suffered from anxiety disorder ($z = -2.108$, $p = 0.035$) and post-traumatic stress disorder (PTSD) ($z = -2.132$, $p = 0.033$).

Stress, Sexual Abuse, and Sleep Hygiene

Almost every second participant (46%) stated that s/he had often suffered from *occupational stress*, and 36.5% reported suffering from *private stress*. Females reported *private stress* more frequently than males ($z = -2.901$, $p = 0.004$). The figures appear to be somewhat higher than in the normal German population. 23% of respondents said they had often felt stressed, but they were only very roughly comparable, since the intermediate levels “sometimes” and “rarely” were not asked in our study (Techniker Krankenkasse, 2016). Neither private nor occupational stress turned out to be predictors of the frequency of SP.

The same applies to *sexual abuse* during childhood. No significant correlation with the frequency of SP could be found.

Irregular sleeping habits are considered promoting factors of SP (Denis et al., 2018; Sharpless & Doghramji, 2015: 140f.). Almost 60% of our participants stated that their sleeping habits were rather regular (51.3%) or very regular (7.9%). 31.6% characterized them as rather irregular, and only 9.2% indicated that their sleep habits were very irregular. Sleep habits did not seem to influence the frequency of SP ($r = -0.026$, $p = 0.619$).

Discussion

Our sample of participants with a high average frequency of SP experiences, a fairly balanced gender ratio, and a more representative average age compared to the student samples was well-suited to examine associations between SP frequency and other variables. A differentiated picture of phenomenology only

emerges when a large proportion of the participants have a relatively high frequency of SP experiences since more experiences naturally increase the possibility of experiencing a greater variety of phenomena. The aim of this paper was to present this particular aspect of our broader investigation together with data on the phenomenology of the experiences and on accompanying factors and to compare them with the results of previous studies.

Our study contained a higher percentage of experiential symptoms that often accompany SP than in most other studies (cf. e.g. Cheyne, Newby-Clarke & Rueffer, 1999; Cheyne, Rueffer & Newby-Clarke, 1999; Kliková et al., 2020; Sharpless & Doghramji, 2015, p. 75; Spanos et al., 1995; Wróbel-Knybel et al., 2020). A comparison is difficult due to the different wording of the items. Considering the relatively high mean frequency of SP in our sample, high percentages were to be expected. The more often SPs were experienced, the more often the opportunity arose to experience different phenomena. Our study did not consist of an average population, but of individuals who were tendentially primed by an interest in extraordinary phenomena and experiences. This could also have influenced the high percentages of visual, auditory, and other hallucinations and bodily sensations experienced. The highly significant gender differences between the frequencies of experiencing phenomena in the *intruder* or *incubus* category represent a remarkable result which must be confirmed in further studies. The difference between the *vestibular-motor* category, with a less pronounced gender difference, and the other two is consistent with the findings of Cheyne et al. (1999). It appears that women are more likely to experience SP as what Cheyne et al. call “a superordinate factor consistent with a narrative of nocturnal assault by a malevolent agent” (1999, p. 328). We detected a significant gender difference in terms of perceived shapes and forms.

SP is commonly regarded as a frightening, distressing experience. The percentage of respondents reporting fear or distress during SP typically ranged from 60% to 98% (Sharpless & Doghramji, 2015, p. 87). Our sample was in the upper range with an overall score of 91.1% of participants having experienced some form of fear at least once. Our study distinguished between different forms of fear or anxiety. 61.5% of participants reported fear of dying at least once during SP. We found highly significant gender

differences only in fear of going crazy and the residual fear category “other fears”, reported far more frequently by females. The former is an interesting finding that could provide clues to gendered experiential processing, but needs replication.

A recent study by Kliková et al., (2020) asked if SP could be pleasant. The authors reported that 8.7% of their sample experienced the emotion of joy during SP. Overall, 23% reported SP as an enjoyable experience. In a study by Lišková et al. (2016), the percentage of those who experienced pleasant feelings during SP was 16%. We had two positive emotions on our list: the feeling of happiness and of curiosity, with 19% of participants experiencing the former and as many as 51% experiencing the latter at least once. Consistent with the observations by Cheyne (2005), we found a highly significant correlation between positively connoted feelings and the *vestibular-motor* type of SP experiences. This was not the case for the *intruder* and *incubus* category.

Regarding comorbidities, we found only significant correlations between the frequency of SP and sleep-related disorders. Our data on (self-reported) insomnia compared to the prevalence in the general population did not reveal any abnormality. The percentage of diagnosed narcoleptics in our sample (0.5%) was higher than in the general population (0.025-0.05%; Longstreth et al., 2007), but still very low.

Stress and traumatic experiences are considered predictors for the prevalence of SP (Denis et al., 2018). Having no control group of participants without SP, we could only test for correlations with the frequency of SP to get some indication of the predictive value of these factors. We found no significant correlations between SP frequency and recalled childhood sexual abuse or self-reported general life stress. However, currently experienced situational private or occupational stress seemed to play a role as potential trigger of SP, as indicated by 36.6% of our sample. This is roughly equivalent to the study by Spanos et al. (1995) with 28.7% of the participants reporting having been stressed before their SP episode.

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A further predictor for SP could be found in sleep hygiene. The results of some studies support this hypothesis (Denis et al., 2018). We, however, found no significant correlation between the frequency of SP and the quality of self-reported sleep hygiene. Irregular sleep patterns were reported by 31.1% of our participants as potential triggers of SP. This shows how important it is to distinguish between specific occasions and longer-lasting patterns. Although poor sleep hygiene as a persistent pattern did not predict an increased frequency of SP according to our findings, an irregular sleeping pattern from an acute occasion seems to increase the probability of an SP episode.

The study has several limitations. Because we focused on examining the diversity of SP experiences, how they are dealt with, and how they are interpreted, we did not use a control group of participants without SP. The use of an online questionnaire posted on topic-specific websites limited participants to those interested in the content of these websites. Therefore, we were able to obtain an intended sample of participants with a higher than average SP frequency. This certainly influenced both the interpretation and coping strategies related to SP, but these issues are beyond the scope of this paper. The broad spectrum of our questions on various aspects of the SP experience excluded the use of standardized questionnaires for the survey of comorbidities, life-stress, sleep patterns, and sleep hygiene because the entire online questionnaire would have become too extensive. We gathered self-reported, subjective data, which must be taken into account when interpreting the findings. We decided to take this step because our research questions were largely exploratory in nature.

Conclusion

Our main results were: (1) An increased frequency of SP also increases the variety of phenomena (hallucinations, perceptions, emotions) experienced during SP. This also applies to positive emotions. (2) An increased frequency of SP also appears to lead to habituation and de-dramatization in some affected individuals. This may explain why the SP episodes more often ended by turning into a dream or by the affected person falling asleep again. (3) Positive experiences during SP are more common than generally assumed. (4) The frequently assumed correlation with other disorders could only be identified with sleep-related disorders (narcolepsy, nightmares, insomnia). (5) General sleep hygiene, life stress, and childhood sexual abuse are not predictors of the frequency of SP. (6) Irregular sleeping patterns and stressful situations were cited as situational conditions that preceded SP. Therefore, a distinction should be made between situational and personality-based, more persistent conditions. (7) We found highly significant gender differences in some items. Females reported more experienced phenomena and emotions overall. They more often had SP experiences of the *intruder* and *incubus* type and were significantly more likely to perceive concrete forms, such as human figures or persons they know. They were also more likely than males to report experiencing fearful emotions, particularly the fear of going crazy. Most of these findings were based on exploratory questions; they require replication for validation.

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Tables

Frequency of SP

Frequency of SP	1	2	3–5	6–10	10–20	20–100	> 100	Total %
Total	43 (11.3%)	21 (5.5%)	50 (13.2%)	44 (11.6%)	68 (17.9%)	99 (26.1%)	55 (14.5%)	380 (100%)

Table 1. Frequency of SP (n = 380; female n = 168, male n = 212)

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Specific circumstances

	Female (N= 168)	Male (N = 212)	Total
Changes in life course	36 (21.4%)	28 (13.2%)	64 (16.8%)
Irregular sleep patterns	54 (32.1%)	64 (30.2%)	118 (31.1%)
Irregular working hours	12 (7.1%)	26 (12.3%)	38 (10%)
Strong emotional experiences	73 (43.5%)	61 (28.8%)	134 (35.3%)
Private and occupational stress situations	75 (44.6%)	64 (30.2%)	139 (36.6%)
Does not apply	58 (34.5%)	88 (41.5%)	146 (38.4%)

Table 2. Specific circumstances connected with SP (Multiple entries were possible.)

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Estimated duration of SP

Estimated duration (N = 351)	1-30s	1-60s	1-5 min	1-10 min	1-20 min	>20 min
Percentage	32 (9.1%)	44 (12.5%)	158 (45%)	57 (16.2%)	25 (7.1%)	35 (10%)

Table 3. Estimation of the duration of SP

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Ending of SP episodes

By itself	150 (39.5%)
With a small movement	137 (36.1%)
By another person	48 (12.6%)
Through prayers	30 (7.9%)
By willful effort	230 (60.5%)
Through a special technique	60 (15.8%)
Turned into a dream	81 (21.3%)
I just fell asleep	80 (21.1%)

Table 4. Ending of SP episode(s) (Multiple entries were possible)

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Experiential symptoms during SP

	<i>never</i>	<i>once/rarely</i>	<i>often/always</i>
Pressure on the chest or other parts of the body	143 (37.6%)	114 (30%)	123 (32.3%)
Feeling of suffocation or being choked	218 (57.4%)	83 (21.9%)	79 (20.8%)
Auditory hallucinations	131 (34.5%)	107 (28.2%)	142 (37.4%)
Visual hallucinations	138 (36.3%)	110 (28.9%)	132 (34.7%)
Sensed presence	80 (21.1%)	92 (24.2%)	208 (54.7%)
Feeling of being touched	165 (43.4%)	114 (30%)	101 (26.4%)
Experience of rape (e.g., by a 'demon')	330 (86.8%)	39 (10.3%)	11 (2.9%)
Tingling, numbness or vibration in one or more parts of the body	150 (39.5%)	81 (21.3%)	149 (39.3%)
Sensation of hovering, flying, falling, spinning	171 (45%)	103 (27.1%)	104 (27.9%)
Erotic sensation	316 (83.2%)	49 (12.9%)	15 (3.9%)
Feeling of leaving the body and/or looking down at one's own body from above ('out-of-body experience')	194 (51.1%)	120 (31.6%)	66 (17.4%)

Table 5. Experiential symptoms during SP (Multiple entries were possible.)

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Perceived shapes / forms

	Female (N=168)	Male (N=212)	Total
Indefinite / elusive	47 (28%)	70 (33%)	117 (30.8%)
A dark or grey figure	67 (39.9%)	68 (32.1%)	135 (35.5%)
A human figure	46 (27.4%)	35 (16.5%)	81 (21.3%)
The figure of a person I know	22 (13.1%)	11 (5.2%)	33 (8.7%)
A face	19 (11.3%)	17 (8%)	36 (9.5%)
Eyes	7 (4.2%)	9 (4.2%)	16 (4.2%)
Hands	20 (11.9%)	13 (6.1%)	33 (8.7%)
An animal figure	16 (9.5%)	14 (6.6%)	30 (7.9%)

Table 6. Perceived shapes and forms during SP (Multiple entries were possible)

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Feelings and emotions during SP

	<i>never</i>	<i>once/rarely</i>	<i>often/always</i>	<i>Correlation with the frequency of SPs (N = 316)</i>
Fear of going crazy	208 (54.7%)	89 (23.4%)	83 (21.8%)	r = 0.197; p < 0.001
Fear of dying	146 (38.4%)	112 (29.5%)	122 (32.1%)	r = 0.154; p = 0.006
Other fears	98 (25.8%)	119 (31.3%)	163 (42.9%)	r = 0.000; p = 0.998
Sense of sadness	328 (86.3%)	35 (9.2%)	17 (4.5%)	r = 0.153; p = 0.006
Feeling of anger / rage	285 (75%)	63 (16.6%)	32 (8.4%)	r = 0.200; p < 0.000
Sense of powerlessness	126 (33.2%)	102 (26.8%)	152 (40%)	r = -0.043; p = 0.451
Sensation of pain	290 (76.3%)	63 (16.6%)	27 (7.1%)	r = 0.211; p < 0.001
Feeling of happiness	308 (81.1%)	53 (13.9%)	19 (5%)	r = 0.127; p = 0.024
Sense of curiosity	187 (49.2%)	100 (26.3%)	93 (24.5%)	r = 0.149; p = 0.008
Other feelings	209 (55%)	90 (23.7%)	81 (21.3%)	r = 0.002; p = 0.973

Table 7. Experiences of feelings and emotions during SP (Multiple entries were possible)

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Comorbidities

	I think that I'm suffering from	It has also been medically diagnosed	Prevalence in the general population	
Panic disorder	29 (7.6%)	23 (6%)	1.6-5.2%	Bandelow & Michaelis, 2015
Depression	54 (14.2%)	58 (15.3%)	15.7% (in Germany)	Steffen et al., 2020
Anxiety disorder	53 (13.9%)	36 (9.5%)	14.5-33.5%	Bandelow & Michaelis, 2015
Dissociative disorder	14 (3.7%)	10 (2.6%)	8-18%	Sar, 2011
PTSD	23 (6%)	15 (3.9%)	4-6%	Koenen et al., 2017
Epilepsy	2 (0.5%)	5 (1.3%)	0.6%	Fiest et al., 2017
Narcolepsy	8 (2.1%)	1 (0.3%)	0.025-0.05%	Longstreth et al., 2007
Insomnia	53 (13.9%)	13 (3.4%)	10-40%	Mai & Buysse, 2008
Nightmares (bad dreams)	86 (22.6%)	11 (2.9%)	~ 1-6% (at least once a week)	Sandman et al., 2013

PTSD = post-traumatic stress disorder

Table 8. Comorbidities—self-attributed and medically diagnosed (multiple entries were possible) with comparative values from the general population