Physical pain, mental pain and malaise in dreams

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Summary. Research has been able to show that pain is rare but perceptible in dreams. Three explanations for pain dreams are postulated: incorporation of pain during sleep, memories of self-experienced pain (first-person memories), and pain seen in others (third-person memories). A total sum of 1612 diary dreams assessed from 425 participants within 14 days were analyzed concerning physical pain, mental pain and malaise. The findings partly support the continuity hypothesis, because participants who experienced headaches in waking life tend to have pain dreams more often. On the other hand, high scores of neuroticism predicted the occurrence of mental pain dreams, but not physical pain dreams. A relationship between malaise dreams and malaise in the waking state could not be confirmed. Findings support that pain dreams tend to be based on pain memory rather than on incorporation, whereas unrealistic pain dreams indicate a possible effect of pain seen in others. To expand the present findings, a diary study with a daily checklist eliciting self-experienced pain, illness, injuries, pain seen in others, and pain noticed in media is suggested.

Keywords: Pain dreams; Continuity hypothesis; Physical pain; Mental pain; Malaise

1. Introduction

The long assumed predication that pain is not perceptible in dreams and therefore can be used as proof of being awake has been abandoned in the last years (cf. Zadra, Nielsen, Germain, Lavigne & Donderi, 1998). Research has been able to show that experimentally applied pain while sleeping does not always lead to awakening and that the pain may become incorporated into the dream (Nielsen, McGregor, Zadra, Ilnicky & Ouellet, 1993). But pain sensations in dreams also occur without such stimulation (Zadra et al., 1998). Thus it seems that pain sensation does not go beyond the capabilities of dream-state sensory experiences as stated by Symons (1993).

If participants are simply asked if they ever experienced pain sensations in their dreams, about 48.2 % state that they already felt pain in their dreams at least once (Zadra et al., 1998). Although many participants report at least one pain dream, only about 0.62 % of recorded dreams in home log studies contain unambiguous reference to pain sensations (Zadra et al., 1998). These findings indicate that pain dreams are indeed very rare, but happen to a considerable number of people at least once in their lives. Given that few participants noted continuing pain after awakening, but some explicitly noted that the pain was not present after awakening, these sensations are probably not always caused by "real" perceived pain during sleep (Zadra et al., 1998).

There are several possible explanations for the occurrence of pain dreams. According to the continuity hypothesis (Schredl, 2003) it would be plausible that those who suffer from pain more often in waking life might also be confronted with pain in their dreams more often. Raymond, Nielsen, Lavigne and Choiniere (2002) studied this expected relationship by investigating hospitalized burn victims. With a proportion of 30% pain dreams of all reported dreams, the burn victims showed a significantly higher rate of dreamed pain than healthy controls (Raymond et al., 2002). As the dreamed pain did not always correspond to the injured body locations or the areas where patients reported pain during the night and upon awakening, it might refer to first-person pain memories acquired during the preceding days or earlier (Raymond et al., 2002). The study found that patients who reported pain dreams stated marginally higher pain during procedures and this is considered as a hint for a "possible continuity between awake and dreamed pain intensity (p.768)" (Raymond et al., 2002). This finding provides evidence for the continuity hypothesis: experienced pain in waking life might influence the occurrence of pain dreams. However, since the patients suffered pain constantly during the study, the alternative explanation of incorporating pain sensations that occurred during sleep into the dream cannot be ruled out (cf. Nielsen 1993). Additionally, patients were explicitly asked to estimate the pain intensity in their dream after awakening on a self-rating scale and pain dreams were categorized based on these ratings (Raymond et al., 2002). However, 13 of these dreams did not include explicit references to experienced pain (Raymond et al., 2002) and the differences between the frequency of pain dreams in this study and studies using dream content analysis by an independent judge (e.g. Zadra et al., 1998) might be due to this methodical difference.

Overall, the basic idea of first-person pain memories being responsible for pain dreams is plausible since Jantsch and colleagues (2009) could show the existence of a reliable long-term memory for experimentally induced pain sensations. This would also explain the rarity of reported pain dreams in healthy controls since pain is rare in their everyday experience (cf. Schredl & Hofmann, 2003).

First-person pain memories may not be the only factor that influences the occurrence of pain sensations in dreams because some dreamers report pain they had never experienced in real life (e.g., in an unrealistic fight situation)

(Schredl, 2011). Supporting this line of thinking, Danziger, Faillenot and Peyron (2009) found out that people with congenital insensitivity to pain show patterns of brain activation in shared-circuits for self and other pain while seeing pain in other persons. This finding leads to the assumption that pain seen in others or in media, so to say third-person pain memories, might also account for dreams with pain sensations (Borsook & Beccera, 2009).

To summarize, the occurrence of pain in dreams could be explained by (A) incorporation of real pain during sleep into the dream, (B) first-person pain memories and (C) third-person pain memories. These theories may all apply without mutually excluding one another. To test these theories it would be desirable to study factors which might influence the frequency of pain dreams.

The present study targets the relationship between waking-life pain experiences and the occurrence of pain dreams. In line with the continuity hypothesis it was hypothesized that people who feel pain in their daily life more often might have a higher probability of experiencing pain dreams.

In addition, reports of "mental pain" in dreams were studied (e.g., feeling emotionally hurt, heartache due to feelings of mourning, sadness or disappointment, but not physical pain). According to the continuity hypothesis, the occurrence of mental pain dreams should correspond to waking-life experiences. Since high neuroticism scores are associated with dysphoric feelings, anxiety and stress (McCrae & Costa, 2003), we would expect to find more references to mental pain in dream reports of people with high neuroticism scores.

Lastly, "malaise" (e.g. queasiness, vomiting) in dream reports was also studied. Since malaise is seen as belonging to the construct of somatization (Thomas & Locke, 2010), we would hypothesize, in line with the continuity hypothesis, that people with a high score on the malaise items of the SCL 90-R somatization scale, would tend to experience more malaise dreams.

2. Methods

2.1. Measurement Instruments

2.1.1 Dream diary

The dream diary consisted of 7 pages and the participants were instructed to keep it near the bed so that it could be easily reached after awakening. Within a 14-day period, they were supposed to note every night in which they remembered a dream and report all dreams of the night as completely as possible (on a maximum of five mornings per person). After recording the dreams, two four-point rating scales were presented to elicit the intensity of positive and negative emotions (0 = none, 1 = mild, 2 = moderate, 3 = strong).

2.1.2 Dream content analysis

In line with the basic principles of dream content analysis (Schredl, 2010), explicit rules were defined before the independent judge started rating whether unambiguous references of experienced physical pain, mental pain or malaise were present in the dream reports. The dream was only rated as a physical pain dream when an explicit statement expressed physical pain experienced by the dream ego, such as "it hurts" or "I felt pain / I ached", but not when

the described dream content suggested pain experiences, such as "we had a bloody fight". Pain experienced by other dream characters was not coded. Equally, a mental pain dream was only rated, when pain-related words were used to characterize the mental state (e.g., "it hurts", "it gave me heartache", or "a crying fit"), but not when a statement only expressed sadness. When an action or feeling was described which clearly suggested malaise, like vomiting or dizziness, malaise was rated as being present.

2.1.3 Symptoms Checklist-90-Revised

The Symptoms Checklist 90-Revised (SCL 90-R) by Derogatis (1977) assesses the subjective perceived physical and psychical impairment within the last seven days. Ninety different specific physical and psychical impairments are listed and the participant is asked to estimate how much he suffered from this symptom on a 5-point-scale from "not at all" to "very strong". In our analysis, we included the four pain related items (i.e., how much have you been bothered by: headaches; pains in heart or chest; pains in lower back; soreness of your muscles), the subscale of somatization (i.e., how much have you been bothered by: feeling of faint; nausea; having a lump in one's throat) and the general symptomatic index (GSI) which indicates the general stress level. The internal consistencies of the scales for the German version lie between $\alpha = .75$ and $\alpha = .97$ (Franke, 1995).

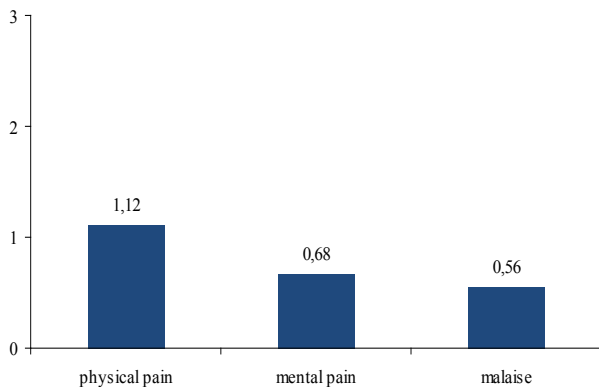#### 2.1.4 NEO-Personality Inventory-Revised

Neuroticism has been assessed with the German version of the NEO-Personality Inventory-Revised (NEO-PI-R) by Ostendorf and Angleitner (2003). The scale for neuroticism consists of 48 items (e.g. I am not easily concerned or I am feeling often tensed and nervous) and the participant was supposed to state his extent of agreement towards these statements on a 5-point-scale from "strongly disagree" over "neutral" to "strongly agree". The internal consistence of the neuroticism scale amounts to $\alpha = .92$ (Ostendorf & Angleitner, 2003).

2.2. Procedure and Participants

Four hundred fifty-seven participants, for the most part psychology students, were recruited at the universities of Mannheim, Heidelberg and Landau. The study was carried out under the title "Sleep, dreams and personality" and participants got an allowance of 20€ or course credit for participation. They were subjected to a battery of questionnaires and given a dream diary which they were to complete over a 2-week period. Four hundred and forty-four participants (376 women, 68 men) with a mean age of 23.5 ± 5.7 years returned their materials to the experimenters. Four hundred twenty-five of the participants reported at least one dream in the two week period. An average number of 3.79 ± 13.6 dreams have been recalled by each participant and a dream report consisted of averagely 148.98 ± 98.90 words. Altogether a total of 1612 dreams were included in the analysis.

The dream reports were typed into a Word file (Microsoft) and the number of words was assessed for each dream in order to control this variable in the regression analysis. Then an independent judge rated the dreams which were randomly ordered to avoid possible biases by the knowledge of which dream belonged to which person. The rating data was entered into an Excel file (Microsoft) and statistical

Figure 1. Prevalence of reported physical pain, mental pain and malaise dreams in %.

Table 1. Location of physical pain in pain dreams (N = 18) in comparison to previous findings in home dream reports (N=18) by Zadra and colleagues (1998).

Location of pain	Frequency	Frequency obtained by Zadra et al., 1998
arm	5 (28%)	2 (11%)
feet	3 (17%)	1 (6%)
hand	1 (6%)	1 (6%)
neck	1 (6%)	-
abdomen	1 (6%)	2 (11%)
teeth	1 (6%)	1 (6%)
nose	1 (6%)	-
genital area	1 (6%)	-
chest	-	5 (28%)
back	-	2 (11%)
legs	-	1 (6%)
groin	-	1 (6%)
not specified	4 (22%)	12 (11%)

analyses were carried out with the SAS 9.2 software package for Windows. For each dream whether it was categorized as physical pain and/or mental pain and/or malaise dream or none of them was coded. A participant has been coded as having had a physical and/or mental pain and/or malaise dream if she/he reported such a dream at least once. The self-rating data for the occurrence and intensity of emotions were added for each dream. Mann-Whitney-U-tests were used to compare the emotional quality of pain dreams to non-pain dreams. For testing the hypotheses, logistic regression analyses were carried out to include all variables of interest.

3. Results

The prevalence of reported physical pain, mental pain and malaise dreams is summarized in figure 1.

3.1. Physical pain

Overall, 18 dreams (1.12% of all reported dreams) containing physical pain could be clearly identified. These 18 dreams were reported by 17 participants (4.00% of all participants who reported dreams). The actions or situations leading to pain varied between the participants. Only having one's skin burned and being bitten (by a dog or once by a vampire) occurred repeatedly, namely three times each (17%). Other mentioned pain sources were: being cut in a gladiator fight, hurting feet due to uncomfortable shoes, jumping three floors down, tweaking like the feeling when one's hair is pulled, a thumb pressed into one's abdomen, a chain round the teeth, a tingling in the left hand, being violently kept, feeling the execution of a suicide, stepping on the accelerator with a feet in plaster, stepping into shards and being hit by a plate in the face. The described locations

of pain are listed in Table 1, where a frequent appearance of extremities can be noticed. Also remarkable is that explicitly noted references to continuing pain sensations after awakening were only made in one dream report (6%).

In order to get an impression of the subjective experience of pain dreams, we compared the average experienced emotions in pain dreams with the averaged emotions in dreams without the occurrence of pain sensations in a descriptive approach. The results of the Mann-Whitney-U-test are shown in Table 2 and reveal that pain dreams tend to be perceived as implying more negative emotions than dreams without pain sensations.

3.2. Physical pain dreams and waking pain

The participants rated their general pain levels with an average of 0.75 ± 0.64, headaches with 1.04 ± 0.97, pains in heart or chest with 0.23 ± 0.62, pains in lower back with 0.97 ± 1.09, and soreness of muscles with 0.73 ± 0.99. The average neuroticism score was 100.12 ± 23.33 and the average stress level, reflected by GSI score, was 0.60 ± 0.44.

The relationship between possible influencing variables stated in the hypotheses above and the occurrence of physical pain dreams has been examined by logistic regression analysis. As presented in Table 3, the association between pain in general and physical pain dreams is not significant.

Table 2. Comparison of the emotional quality of dreams with and without physical pain sensations.

Variable	Physical Pain dreams (N = 17)	Dreams without physical pain (N = 1528)	Statistical test (Z =)	p -value[1]
positive emotions	1.12 ± 0.86	1.33 ± 1.05	-0.8	.2227
negative emotions	2.12 ± 0.99	1.53 ± 1.08	2.2	.0131

Note. Missing values of emotion-ratings, [1] p-values are one-tailed.

Table 3. Logistic regression analyses for the occurrence of physical pain dreams

Variables	Standardized coefficient	Wald χ^2	p -value
Age	-.00475	0.0	.9735
Gender (1 = female)	-.0135	0.0	.9305
Dream recall	.2510	2.7	.1026
Number of words	.1342	1.4	.2435
pain in general	.1304	1.1	.1509[1]

Note. n varies because of missing values. [1] p-values are one-tailed

3.3. Mental pain

Explicit references to mental pain were found in eleven dream reports (0.68% of all reported dreams) which stemmed from ten participants (2.35% of all participants who reported dreams). All these participants were female, but the gender difference is not significant ($\chi^2 = 1.8$, $p = .1778$). The sources of pain are demonstrated in Table 4. In one dream report (9.10%) there was noted continuing mental pain after awakening as the participant felt tears on her cheek.

Only one person reported both physical and mental pain, namely in the same dream. In this dream, the dream-self met a good friend of hers who committed suicide, causing the mental pain. The friend described how she killed herself and the dream-self experienced it as if the suicide has been happening to her, thus causing physical pain.

In Table 5 the results of the Mann-Whitney-U-test are shown in order to demonstrate the emotional quality of mental pain dreams in comparison to dreams without references to mental pain. It is seen that mental pain dreams are judged as being accompanied with significantly more negative emotions than other dreams.

3.4. Mental pain dreams and waking neuroticism stress

Average neuroticism and GSI scores can be found in the physical pain section. The results of the logistic regression analyses in Table 6 indicate the existence of a relationship between the average number of words in a participant's dream reports and the occurrence of mental pain dreams. The association between neuroticism scores and the occurrence of mental pain dreams is marginally significant.

A high intercorrelation was found for neuroticism and GSI scores ($r = .557$, $p = <.0001$, N = 421). If neuroticism and GSI are not tested together, but individually in logistic regression analyses, the results for age, dream recall and

Table 4. Causes for mental pain in pain dreams (N = 11)

Cause for mental pain	Frequency
loss of a loved person	5 (45%)
conflict with boyfriend	3 (27%)
being taunted by a loved person	2 (18%)
feelings of an ex-boyfriend which one cannot return	1 (9%)
being lied to	1 (9%)
impossibility to get a message from a close friend	1 (9%)

Note. Some dreams included several listed causes.

number of words remained quite similar, whereas the association between neuroticism and mental pain dreams becomes significant (standardized coefficient: .4106; $\chi^2 = 5.3$, $p = .0210$, one-tailed) and the association between the GSI score and mental pain dreams marginally significant (standardized coefficient: .2797; $\chi^2 = 3.8$, $p = .0505$, one-tailed).

3.5. Malaise

Nine participants (2.21% of all participants who reported dreams) made references to feelings of malaise in one of their dreams, thus altogether nine malaise dreams (0.56% of all reported dreams) were examined. Malaise dreams, just like mental pain dreams, have only been reported by female participants. Again, the gender difference is not significant ($\chi^2 = 1.6$, $p = .2017$). The character of the described malaise can be taken from Table 7.

Only one participant reported a physical pain dream as well as a malaise dream. There was no overlap between mental pain and malaise dreams.

The difference between perceived emotions in dreams with occurrence of malaise and dreams without such characteristics are described in Table 8 by using the Mann-Whitney-U-test. Malaise dreams were, comparable to physical and mental pain dreams, accompanied by more negative emotions than dreams without notions of malaise.

3.6. Malaise dreams and waking somatization

Participants rated an average of 0.51 ± 0.45 for the somatization scale, with an average value of 0.43 ± 0.80 for faint, 0.69 ± 0.98 for nausea and 0.39 ± 0.76 for having a lump in one's throat.

The results of logistic regression analysis, presented in

Table 5. Comparison of the emotional quality of dreams with and without mental pain sensations.

Variable	Mental Pain dreams (N = 10)	Dreams without mental pain (N = 1535)	Statistical test (Z =)	p -value[1]
positive emotions	1.50 ± 1.43	1.33 ± 1.05	0.47	.3542
negative emotions	2.50 ± 0.97	1.53 ± 1.08	2.5	.0022

Note. Missing values of emotion-ratings, [1] p-values are one-tailed.

Table 6. Logistic Regression Analyses for the Occurrence of mental pain dreams.

Variables	Standardized coefficient	Wald χ^2	*p*-value
Age	.0861	0.3	.5843
Dream recall	.0478	0.1	.8169
Number of words	.3235	5.7	.0171
Neuroticism	.3661	2.4	.0600[1]
GSI	.0982	0.3	.2992[1]

Note. n varies because of missing values. [1] *p*-values are one-tailed

Table 7. Types of malaise in malaise dreams (N = 9).

Type of malaise	Frequency
stomach cramp	2 (22%)
vomiting	2 (22%)
fainting / dizziness	2 (22%)
ravaged by disease	2 (22%)
breathing problems	1 (11%)
constant malaise	1 (11%)

Note. Some dreams included several listed types.

Table 9, could detect a relationship between dream recall frequency and the occurrence of malaise dreams.

When the three malaise items of the somatization scale were tested individually, the association between each of these items and the occurrence of malaise dreams were also not significant. The association between neuroticism (standardized coefficient: .0275; $\chi^2 = 0.0$, $p = .8889$) or GSI score (standardized coefficient: .0647; $\chi^2 = 0.1$, $p = .7287$) and malaise dreams was not significant as well.

4. Discussion

The findings of our study indicate that physical and mental pain dreams and malaise dreams are rare but a relationship to waking life for some topics seems plausible.

The rate of 1.12% physical pain dreams of all reported dreams is comparable to the frequency of 0.56% obtained by Zadra and colleagues (1998) in their dream log study. Since the investigation of pain dreams has not been the primary goal of our study, the participants were not asked specifically for pain sensations in dreams. On the one hand, this might have lead to an underestimation of the occurrence of pain dreams, because the validity of dream content analysis is limited since Schredl and Erlacher (2003) showed the underestimation of bizarreness in dreams by external judges, in contrast with self-ratings by the dreamer. On the other hand, it might be an advantage that participants were not biased towards reporting pain because explicit questions concerning pain sensations in dreams may focus the participants on pain experiences and thus increase their occurrence in dreams (cf. Schredl, 2008). Another possible bias could be the problem of recalling the bodily sensations that occurred in the dream accurately after awakening, so that an explicit question might cause participants to affirm pain sensations in dreams which contained actions that might be associated with pain although they actually did not really feel the pain (cf. Zadra et al., 1998). Each explanation might at least partly explain the high prevalence of pain dreams in hospitalized burn victims, obtained by Raymond and colleagues (2002) who used a self-rating scale for pain intensity in dreams.

Predominantly realistic physical pain causes were reported in our study, similar to the findings concerning diary dreams by Zadra and colleagues (1998). This could be considered as support for the continuity hypothesis (Schredl, 2003) since the majority of dreamed pain sensations may reflect first-person pain memories. Only one person in the present study reported an ongoing pain after awakening and, thus, it is unlikely that pain in dreams were always incorporations of real pain present during sleep.

The Mann-Whitney-U-test was used in a heuristic or explorative way to get an impression of the subjective perception of pain dreams by the dreamer himself. As expected, physical pain dreams were more negatively toned than the average dream reported in our study.

Statistical analyses did not reveal an association between the sum score of the four pain related items and the occurrence of physical pain dreams. Additional testing revealed a significant relationship between being bothered by headaches in the waking state and the occurrence of pain dreams. Headaches might be perceived as being particularly disturbing for students (being "mental workers") and therefore relevant to the participant, which increases the probability of being taken up in a dream (Schredl, 2008).

Regarding the location of pain, the high number or reference to extremities was notable. This might lead to the assumption that pain dreams reflect memories of pain caused by injuries rather than by diseases because injuries might primarily affect extremities. As the pain-related items of the SCL-R-90 assess general pain of a body area but not pain due to injuries, it would be useful to investigate the relation-

Table 8. Comparison of the emotional quality of dreams with and without sensations of malaise.

Variable	Malaise dreams (N = 9)	Dreams without malaise (N = 1536)	Statistical test (Z =)	*p*-value[1]
positive emotions	0.89 ± 1.05	1.33 ± 1.05	- 1.3	.0978
negative emotions	2.78 ± 0.44	1.53 ± 1.08	3.5	.0003

Note. Missing values of emotion-ratings, [1] *p*-values are one-tailed.

Table 9. Logistic Regression Analyses for the Occurrence of malaise dreams.

Variables	Standardized coefficient	Wald χ^2	*p*-value
Age	-.1904	0.4	.5131
Dream recall	.4977	6.3	.0119
Number of words	-.0648	0.1	.7600
Malaise items of somatization scale	-.0839	0.1	.6431[1]

Note. n varies because of missing values. [1] *p*-values are one-tailed.

ship between waking pain due to injuries and pain dreams in particular.

The prevalence of explicitly mentioned mental pain in the dream reports (0.68%) was also very low. As expected, mental pain dreams were accompanied by more negative emotions than dreams without mental pain.

Mental pain in dreams was only reported by female participants. Although the gender difference was not significant, it could be hypothesized that this result might be explained by gender-specific modes of expression since women are often found to be more skillful in language usage (cf. Feingold, 1993) and reporting mental pain is a rather metaphoric mode of expression. It would be interesting to test this hypothesis of a difference in narrative style between dream reports by male and female participants. Furthermore, there is literature indicating that women suffer more from psychological distress than men (Vingerhoets & van Heck, 1990) or at least tend to report more psychological distress such as anxiety and tension (Strickland, 1988).

Nearly half (45%) of the mental pain dreams included the loss of a loved person. In some cases it referred to a person who already passed away in real life, in other cases to a friend who is actually still living. Schredl, Ciric, Götz and Wittmann (2004) already found dreams of a person now alive being dead more often in women. Other sources of mental pain were interpersonal conflicts and feelings of taint, which also fits with the typical dreams more often reported by females (Schredl et al., 2004). Even though the associations were significant for each variable alone, the relationship between neuroticism, GSI score and the occurrence of mental pain dreams was not very strong in the combined analysis; a fact which might be explained by their large shared variance. As people with high neuroticism scores tend to experience more feelings of anxiety and stress (McCrae & Costa, 2003), the association between neuroticism and the occurrence of mental pain dreams supports the continuity hypothesis and fits perfectly to the causes of mental pain reported by the participants.

Malaise also occurred very rarely in dreams. Like mental pain, malaise in dreams has only been reported by females. Even though the gender difference is not significant, it fits with the findings that women tend to report more minor symptomatic symptoms and illnesses in waking-life (Vingerhoets & van Heck, 1990; Strickland, 1988). Additionally, the norm value for the somatization scale in the SCL-90-R differs in this respect (Franke, 1995).

Comparable to physical and mental pain, dreams containing malaise were rated as being accompanied by more negative emotions than dreams without.

Neither the summarized malaise items of the SCL 90-R somatization scale, nor the single items were associated with the occurrence of malaise in dreams. It might be that malaise dreams occur in periods when a person really feels ill and this person not necessarily tends to high somatization or malaise in general. To test this hypothesis, participants would have to fill in a daily health-checklist while keeping their dream diaries.

To summarize, the findings partly support the continuity hypothesis because participants who experienced headaches in waking life tend to have pain dreams more often, whereas high scores of neuroticism predicted the occurrence of mental pain dreams, but not physical pain dreams. Our study does not support the incorporation hypothesis as physical and mental pain was often not present after awakening. It is very plausible that first-person pain memories are reflected in pain dreams because most of the experienced physical and mental pain situations as well as malaise were rather realistic. However, some dreams included unrealistic pain which has never been experienced by the dreamer and this asks for an alternative explanation, i.e. third-person pain memories, formed by pain seen in others (real life or media), might also cause pain dreams. To expand the present findings, a diary study with a daily checklist eliciting self-experienced pain, illness, injuries, pain seen in others, and pain noticed in media is suggested.

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