Occasional nightmares defined as repeated occurrences of extended, extremely dysphoric, and well-remembered dreams [2] are common in childhood and adolescence [29]. Several researchers [4, 50] differentiated between nightmares as disturbing dreams that awaken the sleeper and bad dreams defined as disturbing dreams that do not awaken the sleeper. Although bad dreams are conceptualized as less distressing than nightmares [13], the overlap between emotional intensity and themes like physical aggression towards the dreamer [21, 51] between these two dream types is considerable. Moreover, it has to be noted that studies eliciting bad dreams and nightmares simultaneously has so far only been carried out in adults, and Simard et al. [46] raised the question whether children can differentiate between distressing dreams that awaken the dreamer and distressing dreams that do not awaken the dreamer. Interestingly, the ICSD-3 (International Classification of Sleep Disorders) focus on the distress part of nightmares and bad dreams (dreams that often result in awakening) as the key criterion of diagnosing a nightmare disorder [2]. Thus, the overview will focus on nightmares, but it should be kept in mind that the broader category of distressing dreams is equally suited but not well studied.

The prevalence of frequent nightmares, typically defined as one nightmare or more per week, is estimated to be around 5% in children [1, 14]. Nightmare etiology is best explained by a diatheses-stress model, i.e., genetics, trait factors, as well as state factors contribute to the occurrence of nightmares [8, 13]. Most of the research looking into factors associated with nightmares, however, has focused on young adults [8, 13]. Two studies in children indicate that nightmare frequency is stable over time [35, 46], i.e., showing trait-like characteristics, and a familiar aggregation of nightmares was found by Li et al. [14], supporting the diathesis framework. In addition, trait anxiety and emotional problems [16, 34, 42] and stressors [30, 31] are associated with heightened nightmare frequency in children. So far, the relatively small number of studies on nightmare etiology in children focusing on nightmare is in line with the findings in adults [13, 27].

From a clinical viewpoint, nightmares must cause clinically significant distress, e.g., mood disturbances due to persistence of nightmare affect, bedtime anxiety, intrusive nightmare images during the day, in order for a nightmare disorder to be diagnosed (ICD 10: F51.5; [2]). Therefore, nightmare research should not focus solely on nightmare frequency but also on factors associated with nightmare distress [38, 40]. In adults, nightmare distress is moderately associated with nightmare frequency but also to other factors like neuroticism—using a regression analysis to statistically control for the direct effect of neuroticism on nightmare frequency, i.e., nightmare frequency and neuroticism contribute independently to nightmare distress [38]. Whereas questionnaires measuring nightmare distress have been developed for adults (Nightmare Distress Questionnaire, NDQ; [3]) and adolescents [24], similar instruments for children are lacking. In a sample of 60 children, aged 5–11 years, Mindell and Barrett [16] elicited nightmare distress via a single question asking whether nightmares are "very scary", "a little scary", or "not scary at all" and found that nightmare distress was related to trait anxiety in the same way nightmare frequency was. The authors, however, did not determine whether nightmare frequency and trait anxiety contributed independently to nightmare distress. So far, systematic studies investigating factors that are associated with nightmare distress in children are still lacking.

Several books [9, 44, 47] address the effect of culture on dreaming. Systematic quantitative studies, however, are relatively rare. In a U.S. American sample, ethnicity was related to dream sharing frequency wherein citizens of Hispanic background talked more often about their dreams than white persons and a more positive attitude towards dreams were found in black vs. white persons [5, 32]. Regarding typical dreams, themes like falling, being chased, and failing an examination are found in all cultures [28] but there are also differences, e.g., many more snake dreams in a Jordanian sample [17] when compared to Western cultures [18, 33]. In Brazilian dreams more depression-related dream topics were found [48]—reflecting a typical Brazilian phenomenon called "saudade", i.e., a different attitude and handling of sadness and loneliness. A United Arab Emirates (UAE) dream sample contained significantly more religious/spiritual imagery than the Canadian dream sample [22]. Domhoff [6] described, for example, that
the physical aggression percent is lower in Dutch males and females compared to US American males and females. Based on this brief overview, effects of culture on dreaming have become evident. Whether nightmare frequency and/or nightmare topics are modulated by culture have not been studied systematically, solely Rek et al. [19] reported that a small sample (N = 38) of non-White participants reported more nightmares that the majority of UK citizens (N = 808).

The present study reanalyzing the data set of Schredl et al. [42] was carried out to answer the question as to whether bad dream frequency and trait anxiety contribute independently to distress due to bad dreams operationalized as bedtime anxiety frequency—as has been reported in adults [38]. In an exploratory fashion it was studied whether bad dream frequency and/or bad dream themes differ regarding the cultural backgrounds of the children’s parents.

Methods

Participants

The sample included 624 school-aged children (284 girls, 340 boys) with the mean age of 12.45 ± 1.33 years (range 10–16 years). Participants were recruited in four different schools, “Gymnasium” (n = 88), “Realschule” (n = 207), “Gesamtschule” (n = 169), and “Hauptschule” (n = 160). Within the German school education, the highest level is “Gymnasium” and “Hauptschule” is the lowest level with “Realschule” and “Gesamtschule” in-between; the “Integrierte Gesamtschule” includes children that could be in all three school types (“Hauptschule”, “Realschule”, and “Gymnasium”) and, thus, as a group are in-between. Unfortunately, the information regarding the levels of the different classes that were included was not collected. The parents of 384 participants were both German while, in 55 cases, one parent was German with the other parent having another nationality. The parents of the other children (n = 181, 4 missing values) had other nationalities: Turkey (n = 24), Poland (n = 25), Romania (n = 15), Bosnia (n = 14), Italy (n = 14), Croatia (n = 13), Russia (n = 12) were those most often reported. Both parents being non-European was extremely rare: Iran (n = 2), USA (n = 1), Afghanistan (n = 1), Chile (n = 1), Pakistan (n = 1), Thailand (n = 1), and Vietnam (n = 1).

Dream questionnaire

The dream questionnaire for children and adolescents entitled “Traumfragebogen für Kinder und Jugendliche” (“Dream questionnaire for children and adolescents”) was developed by the author. The question about bad dream frequency was presented as follows: “Some children and adolescents often have bad dreams at night, while others rarely have bad dreams. How is it for you?” The answering categories were: “I experience bad dream often (once a week or more often)”, “I experience bad dreams now and then (several times a year)”, “I experience bad dreams quite rarely (about once a year or less frequently)”, and “I cannot recall having a bad dream.”

Bedtime anxiety was elicited with the item “When you go to bed at night, are you afraid of dreaming something bad?” with the categories “Yes, almost always”, “Yes, sometimes”, and “No”. The instruction for recording the most recent bad dream was as follows: “You probably have had a bad dream. If you can recall such a dream, please write down the dream as completely as possible.”

Anxiety questionnaire

The participants completed the “Angstfragebogen für Schüler” (“Anxiety Questionnaire for School-aged Children”) [49]. The questionnaire encompasses 50 Yes/No items that are grouped into four categories: examination anxiety (15 items), e.g., “I worry about an unexpected test”, trait anxiety (n = 15), e.g., “I am often nervous”, reluctance to go to school (n = 10), e.g., “Thinking about school in the morning makes me grumpy”, and social desirability (n = 10), e.g., “I always tell the truth.” Cronbach’s alpha for the scales ranged from α = 0.72 (reluctance to go to school) to α = 0.85 (examination anxiety). The retest correlations (one month) were also high (r = 0.67 to r = 0.77). Validity studies, e.g., other tests and teacher estimates, showed satisfactory findings [49]. The trait anxiety score showed a high correlation to neuroticism (r = 0.61) compared to only r = 0.37 for examination anxiety and neuroticism, even though the scales are closely interrelated (r = 0.55).

Dream content analysis

Each dream was rated for the presence of specific themes, e.g., “Being chased”, “Something scary”, “Falling”, “Being hurt or killed”, and “Other dream characters were hurt and/or killed”. Each theme was binary coded, and it was possible that dreams included more than one topic. The exact agreements for 159 dreams evaluated by two independent judges ranged from 80.5% (Being chased) to 95.6% (Falling).

Procedure

After receiving permission from regional education authorities, the various schools were contacted. Several teachers were approached. The children received information about the study and were told that they have to return parental written consent in order to participate in the study. Only children whose parents provided the consent were included. Overall, the return rate was very high (above 90% in most classes). The test session was done in the classroom and completed questionnaires were collected by the experimenters. Part of the data have been presented in [42] and [41] with a focus on trait anxiety and bad dream frequency and gender differences. For the present analyses, bad dream frequency, frequency of bed-time anxiety and the most recent dream were included. As trait anxiety was most closely related to neuroticism which is associated with nightmare frequency [13], this variable was selected. In order to include school type in the analysis they were ranked according to their educational level (1 = “Hauptschule”, 2 = “Realschule”, “Gesamtschule”, and 3 = “Gymnasium”). The sample was divided into two groups based on the nationality of the parents:
Bad dreams, bedtime anxiety, and trait anxiety in school-aged children

Results. About 11% of the participants reported frequent bad dreams; 3.5% reported frequent bedtime anxieties due to bad dreams. Similar to the findings in adults, distress due to bad dreams was not only related to bad dream frequency but also to trait anxiety—controlling for the direct effect of trait anxiety on bad dream frequency, i.e., bad dream frequency and trait anxiety contributed independently to bedtime anxiety due to bad dreams. In the exploratory part, the cultural background of the children’s parents showed only minor effects on bad dreams. Conclusion. Similar to nightmare studies in adults, bad dream frequency and trait anxiety contributed independently to bad dream distress. Based on the current diagnostic criteria of the nightmare disorder, it would be interesting to have the opportunity to treat children with significant distress due to nightmares or bad dreams and study the long-term benefit—given that many adult nightmare sufferers reported that their nightmares started in childhood.

Keywords
Nightmares · Nightmare effects · Childhood · Neuroticism · Nightmare treatment

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The ordinal regression for bad dream frequency indicated that bad dream frequency decreases with age (very small effect), girls tend to report more bad dreams than boys (small effect), and trait anxiety was related to bad dream frequency (medium-sized effect; Table 3). Bedtime anxiety also decreased with age (even though bad dream frequency was statistically controlled; Table 3). Interestingly, trait anxiety and bad dream frequency contributed independently (both with medium effect sizes) to bedtime anxiety.

The only variable associated with reporting a bad dream (logistic regression with \( N = 610 \)) was bad dream frequency (standardized estimate = 0.5701, \( \chi^2 = 90.7, p < 0.0001 \)), whereas age (standardized estimate = -0.0385, \( \chi^2 = 0.4, p = 0.5373 \)), gender (standardized estimate = 0.0689, \( \chi^2 = 1.7, p = 0.1905 \)), school type (standardized estimate = 0.0931, \( \chi^2 = 3.1, p = 0.0804 \)), and nationality of the parents (standardized estimate = -0.0063, \( \chi^2 = 0.0, p = 0.9033 \)) did not contribute. Word count (parametric regression using the square-root transformed variable, \( N = 377 \)) was associated with age (standardized estimate = -0.1182, \( t = 2.3, p = 0.0248 \)) and gender (standardized estimate = 0.1150, \( t = 2.2, p = 0.0257 \)) but not with school type (standardized estimate = 0.0360, \( t = 0.7, p = 0.4934 \)) or nationality of the parents (standardized estimate = -0.0041, \( t = -0.1, p = 0.9357 \)). Younger participants and girls tended to report longer dreams.

In Table 4, the most frequent dream themes are depicted (cf. [41]). The five logistic regression analyses with four variables (age, gender, school type, nationality of the parents [binary]) entered simultaneously yielded five significant results (\( p < 0.05 \)). The dream theme of being chased declined with age, and women tend to report more bad dreams with other dream characters being hurt and/or killed. Children attending schools with higher educational levels are more likely to report bad dreams of being hurt or killed. Lastly, children with at least one non-German parent more often report dreams of being chased but less often dreams including something scary.

### Discussion

The present findings showed that trait anxiety and bad dream frequency contributed independently to bedtime anxiety due to bad dreams. This is in line with findings in adults [38]. The exploratory analyses regarding possible cultural effects due to a non-German nationality of at least one of the parents showed no effects on bad dream frequency, solely dreams of being chased are more prominent in children with at least one parent of non-German origin.

Several methodological issues have to be taken into consideration. First, bad dream frequency was measured retrospectively which led to an under-estimation because Zadra and Donderi [50] demonstrated that nightmare frequency and bad dream frequency were higher in young adults if they kept a dream log compared to the figures obtained by retrospective measures. However, Zunker et al. [52] showed that the effect of this difference between diary and questionnaire measures (here nightmare frequency) was quite small (d = 0.101). Moreover, the correlation patterns between these two types of nightmare measures with psychopathology indices were very similar [50]. Thus, the current findings should not have been affected by applying the retrospective method. The prevalence rate of frequent bad dreams was twice as high as the prevalence of frequent nightmares reported in the literature [1, 14]—supporting the idea that bad dreams include nightmares and also distressing dreams that do not cause awakenings [20]. On the other hand, bad dream frequency was strongly related to bedtime anxiety, supporting the view that it is very important to focus on the distress aspect of bad dreams and/or nightmares and not solely on the awakening criterion [2]. In order to elucidate this issue further, it be necessary to carry out studies in children eliciting bad dream frequency and nightmare frequency—even though this might be a difficult task for children [46], more difficult than for adults [4]. Analyzing the bad dream topics, however, indicated that most of these dream reports—elicited as most recent bad dream—included typical nightmare topics like “Being chased”, “Falling”, and “Other persons hurt or killed” (cf. [21, 25, 39]). Thus, the question as to whether children are able to differentiate between bad dreams and nightmares in the same way young adults do is still unanswered. Interestingly, social desirability was related to trait anxiety, i.e., children with high social desirability reported lower trait anxiety scores but social desirability was not related to reporting bad dream frequency or bedtime anxieties related to bad dreams. One might speculate that having bad dreams in childhood/adolescence is more acceptable than to often experience anxiety symptoms in waking life. Overall, almost all children/adolescents brought the parental written consent to the test session; the drop-out rate could be estimated to be below 5%. The schools themselves were located in two cities (Mannheim, Karlsruhe), both cities with about 300,000 inhabitants. It would be very interesting to carry out large-scaled studies including urban and rural areas. In addition, the cultural background of the parents in this sample did not vary very much; most of the families had European backgrounds that might not be very different from the German culture. Again, large-scale cross-cultural studies on nightmare frequency and nightmare topics are still lacking.
Table 3  Ordinal regression analyses for bad dream frequency and bedtime anxiety

| Variable                      | Bad dream frequency |         | Bedtime anxiety |         |
|-------------------------------|---------------------|---------|-----------------|---------|
|                               | SE  | \( \chi^2 \) | \( p \) | d     | SE  | \( \chi^2 \) | \( p \) | d     |
| Age                           | 0.786 | 0.933 | 0.383 | 0.017 | 0.179 | 0.861 | 0.661 | 0.023 |
| Gender (1 = female, 0 = male) | 0.392 | 0.525 | 0.019 | 0.031 | 0.523 | 0.019 | 0.031 | 0.523 |
| School type                   | 0.253 | 0.343 | 0.045 | 0.015 | 0.104 | 0.187 | 0.052 | 0.015 |
| Nationality of the parents    | 0.041 | 0.062 | 0.077 | 0.032 | 0.347 | 0.077 | 0.077 | 0.077 |
| Trait anxiety                 | 0.295 | 0.412 | <0.001 | 0.540 | 0.437 | 37.6 | <0.001 | 0.515 |
| Social desirability           | -0.037 | 0.7 | 0.391 | 0.068 | 0.112 | 3.3 | 0.069 | 0.148 |
| Bad dream frequency           | - | - | - | - | 0.473 | 42.8 | <0.001 | 0.552 |
|                                | \( N = 606, R^2 = 0.1354 \) |         | \( N = 605, R^2 = 0.2773 \) |         |

**Table 4**  Bad dream themes

| Variable                        | Total sample (\( N = 381 \)) (%) | Children with foreign parent(s) (\( N = 145 \)) (%) | Children with German parents (\( N = 233 \)) (%) |
|---------------------------------|-----------------------------------|-----------------------------------------------|-----------------------------------------------|
| Being chased                    | 42.26                             | 44.10                                         | 38.63                                         |
| Something scary                 | 19.69                             | 14.48                                         | 23.18                                         |
| Falling                         | 10.50                             | 8.97                                          | 11.16                                         |
| Being hurt or killed            | 20.47                             | 18.62                                         | 21.89                                         |
| Other dream characters          | 18.90                             | 20.00                                         | 18.03                                         |

About 11% of the school-aged children reported frequent bad dreams; about twice as high as the prevalence rate of frequent nightmares [1, 14]. The gender difference (girls reporting more bad dreams than boys) is in line with meta-analytic findings for gender differences in nightmare frequency [43]. Similarly, the positive correlation between trait anxiety and bad dream frequency which was reported previously [42] fits the diastasis-stress model of nightmare etiology [8]. One might speculate whether all children with frequent bad dreams should be considered for treatment—as there are effective and simple interventions for coping with nightmares [15, 45]. Taking the diagnostic criteria of the nightmare disorder into account [2], the group of children with frequent bedtime anxieties (3.5% of the sample) could very likely receive a diagnosis of a nightmare disorder. Given the stability of nightmare frequency [35, 46] and the reports of adult nightmare sufferers often stating that their nightmares started in childhood [10, 12], it would be very instructive to carry out interventional studies, i.e., treating nightmares in children, and to investigate whether this treatment shows beneficial long-term effects. The decrease of bad dream frequency, and especially bedtime anxiety with age, clearly indicated that there is also spontaneous alleviation of nightmares/bad dreams, i.e., not every child with frequent nightmares will still experience them in young adulthood. Given that the prevalence of frequent nightmares in adults are also about 5% [23, 25, 26], however, it can be assumed that a substantial percentage of children with frequent nightmares may develop a chronic condition.

Similar to the findings in adults [38], distress due to bad dreams is not only related to bad dream frequency but also to trait anxiety—even if the effect of trait anxiety on bad dream frequency was controlled for in this regression analysis, i.e., bad dream frequency and neuroticism contributed independently to bedtime anxiety due to bad dreams. Thus, the finding of Mindell and Barrett [16] reporting similar correlations between nightmare distress, nightmare frequency, and trait anxiety could be confirmed and expanded, showing that trait anxiety adds to nightmare distress independently. From a clinical viewpoint it can be recommended that children with frequent bad dreams/nightmares and high trait anxiety should be treated for their nightmare/bad dream condition. In the present study, the only distress criteria used was bedtime anxiety related to bad dreams; it would be very interesting to study other effects of bad dreams/nightmares on daytime mood and functioning in children/adolescents—comparable to the study that Köthe and Pietrowsky [11] carried out in adults.

The effect of the parental country of origin on dreaming was small in this study, possibly due to the restricted variation of cultural background. The higher percentage of being chased dreams (an intensified version of the something scary dreams) in children with at least one non-German parent might reflect the process of acculturation, i.e., the process of settling into the new country’s culture. These exploratory analyses raised more questions than provided answers; nevertheless, the effect of culture on nightmares and bad dreams should be studied in the future. Another accidental finding was that girls more often reported dreams in which others are hurt and/or killed. As girls tend to report higher empathy scores [7], it would be interesting to test whether the occurrence of this nightmare topic is related to empathy measures.

Overall, the findings of the present study indicated that children can suffer from bad dreams, operationalized as frequent bedtime fear due to these bad dreams, especially if they also show high
trait anxiety. Given the stability of nightmare frequency in childhood [35, 46] and adulthood [36, 37], it would be beneficial to study the prevalence and correlates of nightmare disorder in children and adolescents more intensely, and—if necessary—intervene with the very effective Imagery Rehearsal Therapy [45].

Corresponding address

Michael Schredl, Ph.D.
Sleep Laboratory, Central Institute of Mental Health, J5, Medical Faculty Mannheim, Heidelberg University
68159 Mannheim, Germany
Michael.Schredl@zi-mannheim.de

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Compliance with ethical guidelines

Conflict of interest. M. Schredl declares that he has no competing interests.

Informed parental written consent was obtained from all individual participants included in the study. The approval of the school authorities was obtained, but an approval by an ethics committee was not necessary. All studies discussed were in accordance with the ethical standards indicated in each case.

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Wie Schlafentzug die Depression durchbricht

Schlaf und Depression hängen eng zusammen: Schlaf oder im Bett dösen kann nicht zu Erholung, sondern sogar zu einer Verschlechterung der depressiven Symptome führen. Dies zeigt die neue Studie des Forschungszentrums Depressionshilfe der Stiftung Deutsche Depressionshilfe.

Eine neue Analyse von Längsschnittdaten, die von der Stiftung Deutsche Depressionshilfe zusammen mit IT-Partnern erhoben wurde, zeigt wie eng der Zusammenhang zwischen Schlaf und Stimmung ist. Im Rahmen eines vom Bundesministerium für Bildung und Forschung geförderten Pilotprojektes (STEADY-Projekt) dokumentierten 22 An einer Depression erkrankte Studenten ihr Bett- und Schlafverhalten an durchschnittlich 173 Tagen mithilfe einer App. Die Daten zeigen: Bei 11 dieser PatientInnen geht in statistisch signifikanter Weise eine längere Bett- oder Schlafszeit mit einer Verschlechterung der Depression einher. Wobei bei 6 von ihnen eine vorhergehende längere Bettzeit zu mehr depressiven Symptomen führte und diese damit möglicherweise sogar verursacht wurden. „Wenn Betroffene bei sich den Zusammenhang zwischen Depression und Bettzeit verstehen, dann können in Rücksprache mit dem Behandler daraus ganz individuelle Therapieempfehlungen abgeleitet werden. Beobachtet ein Patient beispielsweise, dass er nach längerer Bett- oder Schlafzeit noch erschöpfter fühlt, so kann eine Verkürzung der Bettzeit auf circa 8 Stunden sinnvoll sein“, erläutert Prof. Ulrich Hegerl, Vorsitzender der Stiftung Deutsche Depressionshilfe und Inhaber der Senckenberg-Professur an der Universität Frankfurt/M. Die Ergebnisse zeigten, dass die Stoffeinfluss der Depression auf die Stimmungszustände und den Schlaf verursacht werden können. Die App soll 2021 kostenfrei zugänglich sein.

Wieso können längere Bettzeiten eine Depression verstärken?

Depressive Menschen sind häufig von einer chronisch erhöhten Wachheit betroffen. PatientInnen fühlen sich dauerhaft angespant wie vor einer Prüfung, können nicht entspannen und kommen trotz Mündigkeit nur schwer zur Ruhe. Die Betroffenen steuern gegen, indem sie sich zurückziehen und alle weiteren äußeren Reize wie z.B. soziale Kontakte oder laute Musik vermeiden. Sie neigen dazu, früher ins Bett zu gehen, morgens länger liegen zu bleiben und sich auch tagsüber hinzuzulegen – immer in der Hoffnung, zu entspannen und wieder zu Kräften zu kommen. Allerdings beginnt ein Teufelskreis: Denn Schlaf führt bei vielen Betroffenen zu einer Zunahme der Depression, da nach dem Schlaf die Wachheit gestärkt und die Anspannung besonders hoch ist. Bei vielen PatientInnen sind deshalb morgens die Depressionssymptome am stärksten.

Schlafentzug wirkt antidepressiv

Schlafentzug hilft, einer erhöhten Wachheit entgegenzuwirken und wirkt schlafämpfernd. Der Schlafentzug ist eine etablierte Behandlungsform der Depression, die in vielen Kliniken angeboten wird. PatientInnen bleiben eine ganze Nacht oder die zweite Nachthälfte wach und sollen auch den nächsten Tag über nicht schlafen. Die Mehrheit der Betroffenen erlebt dabei, dass sich in den frühen Morgenstunden die Stimmung plötzlich aufhebt und die oft seit Monaten bestehende Er schöpfung und auch die Hoffnungslosigkeit abklingen. Dieser Effekt hält jedoch nur bis zum nächsten Schlaf an. „Der Schlafentzug zeigt den Erkrankten, dass die Depression durchbrochen werden kann und vermittelt dadurch wieder Hoffnung“, erläutert Hegerl. Auch Sport ist eine gute unterstützende Maßnahme bei Depression, da Bewegung müde macht und der hohen Wachheit entgegenwirkt.

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