Exploring the emotional and thematic matrix of dreams during war: the role of anxiety and depression

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Abstract

Dreams serve as a psychological space where the human mind grapples with burdensome issues, and war undoubtedly falls into that category. Inspired by Charlotte Beradt's work on analyzing dreams during the Third Reich, we collected dreams from a sample of Polish individuals (N = 90) during the outbreak of war in March 2022. Our objective was to identify the most intense emotions conveyed through these dreams and investigate differences in both emotional intensity and dream content between individuals with high levels of anxiety and closely related depression, and those with lower levels of anxiety. We employed a mixed-method study design. The prevailing emotions observed in the dreams were surprise, fear, and sadness. Interestingly, the dreams of participants with higher levels of anxiety exhibited less surprise compared to the comparison group. Additionally, we found that dreams reported by individuals with higher levels of depression conveyed a greater sense of sadness than those in the comparison group. Content analysis revealed that anxious individuals' dreams prominently featured horror, which evoked feelings of powerlessness rather than surprise. In contrast, the dreams of non-anxious individuals exhibited a dynamic narrative with numerous twists and turns, creating a simultaneous presence and absence of threats. Consequently, the resulting vagueness and uncertainty likely contributed to the element of surprise.

Keywords Dreams · War · Poland · Anxiety · Depression · Basic emotions

When faced with an unbearable and emotionally challenging reality, dreaming is often considered a refuge for dealing with the threats of waking life. It is speculated that dreams serve as a reflection of real experiences, as proposed by the continuity hypothesis of dreaming (Domhoff, 1996). Alternatively, some propose that dreaming functions as a virtual reality model of the world, facilitating the development of waking consciousness, as suggested by the discontinuity hypothesis (Hobson, 2009, 2014). During sleep, the brain's generative model works on predicting waking experiences, which are later tested while awake (Hobson et al., 2014). Thus, dreaming can potentially prepare us to respond to waking life occurrences (Snyder, 1966; Hobson et al., 2014)

and aid in problem-solving and providing explanations (Barrett, 2007).

Dreaming is commonly regarded as a realm where the human mind grapples with burdensome issues (Meyer, 2021). Undoubtedly, war constitutes such a burden—a state of armed conflict among different groups, characterized by terror, casualties, and constant insecurity (Schredl & Piel, 2006). The actual stressors experienced in waking life are related to the frequency of nightmares, which are easily remembered dreams accompanied by intense unpleasant emotions (Belicki, 1992).

Nightmares exist on a continuum between bad dreams (without awakening) and nightmares (with awakening) (Zadra & Donderi, 2000). Emotions and thoughts present in dreams and waking life are interconnected, although dreams encompass more than conscious experiences. Importantly, elements of the waking world appear in dreams but are detached from their waking context, as explained by Voss and colleagues (2010), indicating that they lack their usual waking function. The content of dreams influences how people feel upon awakening, and conversely, one's mental

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health or mood during waking life can influence the types and content of dreams (Rimsh & Pietrowsky, 2020).

Various personal characteristics have been found to correlate with nightmare frequency. For instance, general psychological disorders, as measured by the General Health Questionnaire, have been associated with an increased frequency of nightmares (Chivers & Blagrove, 1999). Additionally, individuals with heightened levels of anxiety tend to have dreams that involve a higher proportion of adverse events, aggressive acts, and negative emotions such as sadness (Gentil & Lader, 1978). However, Schredl (2003) suggests that while state factors and trait factors (e.g., neuroticism) may influence nightmare frequency, the impact of current stress is most relevant in predicting bad dreams.

Dreams are reflective of various dimensions, including personal factors such as personality traits, as well as interpersonal factors related to individual dyadic or group experiences, including societal influences (Foulkes, 1990; Lawrence, 2003).

Unveiling collective experiences: dreams as a window into group and society

Dreaming serves as a psychological process that internally analyzes everyday experiences (Gabbard & Ogden, 2009). According to Bion, it encompasses thoughts that are unthinkable for the dreamer (Schneider, 2010). On one hand, dreams bring forth unconscious or unthought-of issues from our memories (Freud, 1901/2012). On the other hand, dreaming fuels our thinking processes and enriches communication with oneself and others (Bion, 1962; Lawrence, 2003).

Nightmares and bad dreams can evoke fear in the dreamer (Wood & Bootzin, 1990). However, dreams are often shared with others, and listeners can also respond with their own emotional reactions. In early 20th-century Europe, Charlotte Beradt played the role of such a listener. In her book "The Third Reich of Dreams" (1968), she uncovered the power of dreams experienced by people living under Hitler's dictatorship. It all began around 1933 when Beradt herself was awakened by a nightmare, leading her to wonder if others had similar dreams (Beradt, 1943). Motivated by this curiosity, she embarked on collecting dreams from ordinary people, amassing over 300 of them. Prior to publishing her book, she conducted a semi-qualitative analysis, categorizing the dreams into specific themes: dreams involving authorities, laws, and commands; dreams marked by shame and fear; dreams of individuals working in underground settings; dreams that anticipated the future; and dreams reflecting subconscious desires. Beradt (1943) observed that only a few dreams were related to revenge, indicating the

deep-seated fear experienced by individuals, even within their dreams. Surprisingly, many women shared similar dreams of Hitler approaching them and stating that one's religious or political affiliations did not matter to him. This theme of reconciliation prevailed over retaliatory feelings.

According to Hobson (2009), dreams share more commonalities than differences among individuals. During REM sleep, for example, humans collectively pursue shared goals, such as the development of consciousness. In contemporary research, dreams are being analyzed as a source of information about groups or societies through approaches like the social dreaming matrix (Lawrence, 2003, 2006).

The social dreaming matrix involves a group of individuals coming together with the purpose of sharing their dreams. Typically, these individuals gather in the same physical space and express their dreams and associations related to them (Ofer, 2019). Moderators then analyze these dreams and formulate hypotheses regarding general themes. The underlying concept is that members of a group or society are interconnected by a shared reality (group level). However, individual perceptions of the external world vary due to differences in personality or individual experiences (individual level). Moreover, the impact of personal characteristics is influenced by stressful events and what are known as "strong situations" (Snyder & Ickes, 1985; Sherman et al., 2012), which further shape individual behavior.

Current study

Problem statement

Undoubtedly, war can be described as a "strong situation" due to its ability to elicit heightened awareness and, above all, fear of death (Pyszczynski et al., 2021). Inspired by Berandt's approach (1968), we decided to collect dreams from individuals who were directly impacted by the war, specifically the Polish population, in the immediate aftermath of the Russian invasion of Ukraine in March 2022. Poland shares a 535-kilometre border with Ukraine, which also serves as an external border for the entire European Union. Since the first day of the Russian invasion, the possibility of an attack on Poland has been widely discussed in the media by politicians and military experts.

Purpose of the paper

Our primary objective was to identify the most intense emotions conveyed through the dreams of Polish individuals during these uneasy and anxious times. Additionally, in line with the psychological approach to dreams (Schredl, 2010; Schredl & Piel, 2006), which examines how dream content

relates to waking-life experiences and individual characteristics, we aimed to investigate differences not only in the intensity of emotions experienced in dreams but also the content of those dreams between individuals with high levels of anxiety and those with low levels of anxiety.

War creates a profound sense of uncertainty about the future, and anxiety is closely associated with the anticipation of negative events and the preparation for them (Barlow, 2004). Individuals with heightened anxiety levels may experience dreams containing a greater proportion of adverse events, aggressive acts, and negative emotions such as sadness (Gentil & Lader, 1978). Rimsh and Pietrowsky (2020) noted that while there is a connection between anxiety and dream content, further studies are needed to gain a more precise understanding of the function of dreams. Additionally, as anxiety, often considered as a trait, can lead to depression (Wetherell et al., 2001), we compared the intensity of emotions presented in dreams between individuals with high versus low levels of depressive symptoms.

Methods

Study design

The study was conducted in Poland, and data collection began on March 17, 2022, lasting approximately three weeks. This time period was less than a month after Russia had attacked Ukraine, marking the outbreak of war in Europe.

Participants were recruited through social media platforms, where an invitation was posted, stating: "We invite you to participate in a survey to explore your dreams during wartime. The survey is brief and requires a moment of reflection." The study originally involved 102 participants (N female = 87; N male = 13; N other = 2). However, 12 individuals were excluded from the analysis due to insufficient descriptions of their dreams, such as responses like "I don't remember" or "I haven't dreamt anything lately."

Participants

The online study involved 90 participants (N female = 80; N male = 10; N other = 2), ranging in age from 15 to 62 (M = 33.34; SD = 10.31). The majority of participants were either students (22%) or individuals with higher education (63%), and 78% of them were in informal relationships or married. Additionally, 42% of participants reported having children. At the start of the survey, respondents were informed that participation was voluntary and anonymous.

Procedure and measures

Psychological outcomes were assessed through a combination of qualitative and quantitative methods, employing a mixed-method study design.

Dream narratives were collected with an instruction: "*Please, close your eyes and try to recall your recent dream (e.g. from yesterday, last week, or last month). Maybe it is the last dream you dreamt, or on the contrary, any of your earlier dreams that appear in your imagination, but for some reason they are important to you. Once you have recalled your dream, remember as many of its details as possible. Then open your eyes and describe it below in such a way that someone who reads about it can easily picture it (in at least a few sentences)".*

The quantitative analysis of dream narratives was performed based on the Coding System by five peer judges, who rated the intensity of six basic emotions in each of the dreams (Ekman, 1999). They were asked: "*To what extend does this dream evoke in you the following emotions: sadness, anger, fear, enjoyment, surprise and disgust?*", where 0 denotes *"absolutely disagree, no emotion at all"*, and 4 denotes *"absolutely agree, this emotion for sure"*. In addition, the judges determined the overall emotional climate of the dream (positive affect and negative affect) on a scale of 0 to 4.

The qualitative analysis of dream narratives was performed by the same five peer judges. Dream categories were identified using thematic analysis (Braun & Clarke, 2006). This inductive approach aims to identify themes from qualitative data through iterative processes of familiarisation, coding, theme development, defining themes and reporting. To do so, we applied the multiple readings of qualitative data by an 'interpretive community' (Taylor et al., 1996) of five coders (all psychologists) who were different regarding life experiences. Given that the goal of the present investigation was also to elucidate the themes that characterise the dream narratives reported by the individuals with different anxiety levels, the thematic analysis was conducted not only for the whole sample but also separately for each group of participants. All coders were blind to the groups.

Apart from the qualitative methods, to capture individual differences in depression and anxiety (within the last week) we used the Polish translation (Majkowicz et al., 1994) of the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983). The questionnaire consists of 14 items (7 per each trait) where participants were asked to read each of them and mark the appropriate answer that came closest to how they had felt during the last week. In both cases, items were added up and were consistent with previous research (Wichowicz & Wieczorek, 2011), the internal consistency

for the depression ($\alpha = 0.87$) and anxiety ($\alpha = 0.76$) aspects was good.

To distinguish Anxiety and Depression levels, the sample was divided into two groups based on the following HADS categories (Snaith & Zigmond, 1994): scores from 1 to 7 for non-clinical group ($n_{A-} = 36$; $n_{DEP-} = 56$) and higher for the group with anxiety disorder or depression in varying degrees of intensity ($n_{A+} = 54$; $n_{DEP+} = 34$).

Analysis of qualitative and quantitative data

The intraclass correlation coefficients (ICC) and further statistical analyses were calculated using IBM SPSS Statistics 28. Thematic analyses were performed using MAXQDA 2020.

Results

Descriptive analysis. Interrater reliability

In the first step, the qualitative analysis of dream narratives was performed by five peer judges. As the constructs of emotions were rated on a 5-point ordered scale (0–4), the Intraclass Correlation Coefficient (ICC) was chosen for assessing interrater reliability (Shrout & Fleiss, 1979). The ICC determines the compliance of five judges' ratings. The consistency of assessments of judges inside measurements and differences between them was expected. For sadness scale the ICC(2,5) = 0.92, for the anger scale the ICC(2,5) = 0.88, for the fear scale the ICC(2,5) = 0.95, for the enjoyment scale the ICC(2,5) = 0.95, for the surprise scale the ICC(2,5) = 0.87, for the disgust scale the ICC(2,5) = 0.91, for the positive affect scale the ICC(2,5) = 0.94 and for the negative affect scale ICC(2,5) = 0.94, which constitutes a very good level of agreement in all cases (Cicchetti, 1994;

Orwin, 1994). All scores of emotions were averaged between the coders and used as total scores in further analyses.

Results on correlations between the intensity of emotions and anxiety/depression

Table 1 displays Spearman's correlations, means, and standard deviations for the variables. The results indicate significant positive correlations among sadness, anger, fear, disgust, and negative affect, while enjoyment and positive affect exhibited a strong positive correlation. Surprise was found to be positively correlated with anger, fear, disgust, and negative affect, thus supporting the appropriate classification of basic emotions into positive and negative valence categories.

Moreover, there was a significant correlation between anxiety and sadness, indicating that higher levels of anxiety were associated with an increased presence of sadness in dreams. At a statistical trend level, anxiety was also positively associated with fear and negative affect. Interestingly, no significant correlation was observed between depression and the emotions present in dreams.

To identify which emotions, prevail in the dreams of Poles during the outbreak of war we compared the intensity of sadness, anger, fear, disgust and enjoyment using a one-way univariate repeated-measures ANOVA. The analysis revealed significant differences in intensity of different emotions, $F(1, 89) = 547,57$; $p < .001$, $\eta 2 = 0.86$. Means are presented in Fig. 1. Post-hoc tests (Bonferroni correction) revealed that the intensity of surprise and fear was the highest followed by sadness ($p < .05$). Whereas the intensity of disgust, anger and enjoyment was lower than intensity of sadness, fear and surprise.

To verify whether intensity of anxiety and depression differentiate the emotions appearing in the dreams, the U Mann-Whitney test was performed (Table 2). It turned out that, at the level of statistical trend, less surprise appears in

Table 1 Spearman's correlations between variables, means and standard deviations

|	1	2	3	4	5	6	7	8	9	10
1. Sadness										
2. Anger	0,56**									
3. Fear	0.42**	0.57**								
4. Enjoyment	-0.53**	-0.50**	-0.57**							
5. Surprise	0.27	0.25*	0.43**	-0.07						
6. Disgust	0.40**	0.62**	0.59**	-0.50**	0.38**					
7. Positive affect	-0.63**	-0.52**	-0.65**	0.90**	-0.11	-0.55**				
8. Negative affect	0.70**	0.69**	0.84**	-0.70**	0.34**	0.68**	-0.80**			
9. HADS_ANX	0.26*	0.06	0.16	-0.10	-0.17†	0.16	-0.15	0.20†		
10. HADS_DEP	0.17	-0.01	0.04	0.02	-0.16	0.06	-0.01	0.06	0.75**	
M	1.55	0.94	2.08	0.81	2.15	0.65	0.93	2.57	8.32	6.54
SD	1.16	0.91	1.40	1.07	1.01	0.91	1.10	1.25	4.09	4.52

† $p \leq .10$, * $p \leq .05$, ** $p \leq .01$
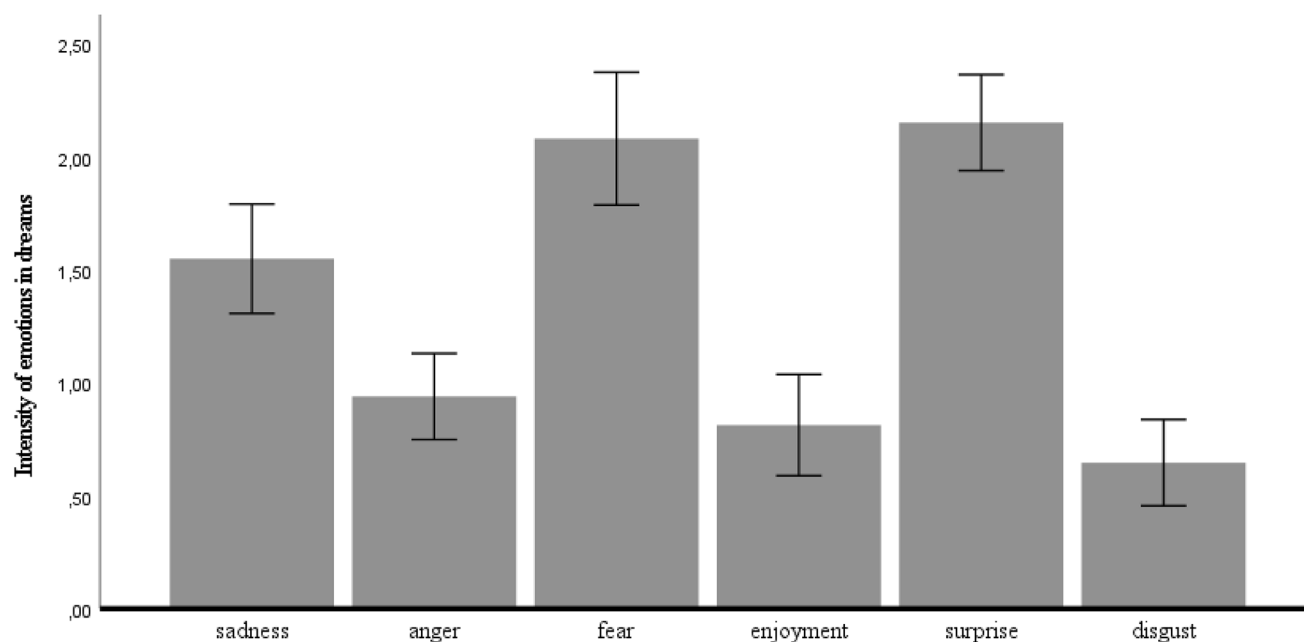
Fig. 1 Marginal estimated means for intensity of emotions

Table 2 U Mann-Whitney Test Results for emotions and affects for participants with clinical and non-clinical levels of anxiety and depression

		HADS_ANX					HADS_DEP				
	Group	N	Mean rank	U	z	p	N	Mean rank	U	z	p
1. Sadness	non-clinical	36	40.35	786.50	-1.53	0.13	56	41.90	750.00	-1.68	0.09†
	clinical	54	48.94				34	51.43			
2. Anger	non-clinical	36	42.40	86,050	-0.92	0.36	56	46.44	899.50	-0.44	0.66
	clinical	54	47.49				34	43.96			
3. Fear	non-clinical	36	42.51	864.50	-0.89	0.38	56	45.72	939.50	-0.10	0.91
	clinical	54	47.49				34	45.13			
4. Enjoyment	non-clinical	36	45.01	954.50	-0.15	0.88	56	44.96	922.00	-0.26	0.80
	clinical	54	45.82				34	46.38			
5. Surprise	non-clinical	36	51.33	762.00	-1.73	0.08†	56	47.26	853.50	-0.82	0.41
	clinical	54	41.61				34	42.60			
6. Disgust	non-clinical	36	41.79	835.50	-1.13	0.26	56	44.79	912.00	-0.34	0.73
	clinical	54	47.97				34	46.68			
7. Positive affect	non-clinical	36	45.79	961.55	-0.09	0.93	56	45.65	943.50	-0.07	0.94
	clinical	54	45.31				34	45.25			
8. Negative affect	non-clinical	36	41.67	834.00	-1.14	0.25	56	44.38	889.00	-0.53	0.60
	clinical	54	48.06				34	47.35			

† $p \leq .10$, * $p \leq .05$, ** $p \leq .01$

the dreams of participants with clinically elevated anxiety levels as compared to those with lower anxiety level. Moreover, in the dreams of participants with clinically elevated depression levels more sadness appears as compared to those with lower depression levels.

As the difference in sadness in dreams of clinically depressed and non-depressed participants is consistent with clinical knowledge, we focused on the explanation of differences in surprise between participants with clinically elevated anxiety and healthy controls. We conducted

a thematic analysis to answer the question why dreams of participants with clinically elevated anxiety levels evoked less surprise than dreams of non-clinical group did.

Thematic analysis

All coders were blinded to the presented groups. Overall, the most frequently evoked emotions in dreams were surprise and fear. However, the clinical group (with high anxiety levels) exhibited significantly less surprise compared to

the non-clinical group. Therefore, we conducted an investigation into the content and main themes of dreams in both groups.

Interestingly, both the clinical and healthy control groups' dreams revealed the same general themes, which include Threat (with subcategories such as Danger, War/Battle/Fight, or Obstacle), People (with subcategories of Close or Dangerous Strangers), Oddity, Helplessness, Escape, and Taking Action. However, the frequency and characteristics of these themes varied between the groups.

In the clinical group, the main theme subcategories within Threat, such as War and Battle, were predominant and vivid (examples of dreams are presented in Appendix I, Example 1). These subcategories were not identified in the healthy control group. The source of threat in the clinical group often came from people, both directly and indirectly (e.g., a close or well-known person turning out to be someone unexpected). The subcategory of Dangerous Strangers drew more attention in the clinical group compared to the almost non-existent presence in the comparison group (Appendix I, Example 2). The threat in the clinical group was relatively more unrealistic and bizarre, with the Oddity theme manifesting more frequently than in the healthy control group (Appendix I, Example 3).

Protagonists in the clinical group often displayed either perseverance in uncomfortable conditions without attempting to change the situation or a feeling of impotence and helplessness. The themes of threat and helplessness frequently coexisted in the same dreams (Appendix I, Example 4). Alternatively, although escape was a coping strategy observed in some cases in the clinical group, the attempts were usually unsuccessful. Active resistance to danger or destructive forces was not representative of this group, unlike the healthy control group (Appendix I, Example 5).

In the non-clinical group, the threat manifested as more realistic obstacles or negative events, without direct references to war or battle. The events and characters in these dreams were less bizarre (though often surprising) and definitely more realistic than in the clinical group. References to magic or fiction were less frequent (Appendix I, Example 6).

Furthermore, dreams in the non-clinical group often continued beyond the description of the threat itself, either with a sudden turning point (redemption sequence) or with the protagonist's attempt to deal with the situation. Therefore, an obstacle did not necessarily lead to feelings of impotence or helplessness. Coping strategies identified in this group included negotiations, calling for help, and taking action (Appendix I, Example 7). Escape was more frequently successful in the non-clinical group, and there were indications of relief or even positive events or emotions without any threat at all (Appendix I, Example 8).

Discussion

The current project had two main aims: (1) to identify the prevailing emotions in the dreams of Poles during the war outbreak in the neighbouring country, and (2) to explore the intensity and content of emotions in the dreams of individuals with low versus high levels of anxiety and depression. The study found that the most prevalent emotions conveyed through dreams were surprise, fear, and sadness. Interestingly, anxiety was found to be related to the intensity of surprise in dreams, with participants with higher levels of anxiety experiencing less surprise compared to the comparison group. Additionally, the degree of depressive symptoms was related to the level of sadness, with dreams of individuals with higher depression scores conveying more sadness than the comparison group.

The prevalence of negative emotions in dreams can be interpreted using theoretical frameworks. According to the continuity hypothesis (Domhoff, 1999), emotions experienced when awake are transferred to dreams. In the context of war, the increase in fear, sadness, and surprise in participants' waking life may have led to the appearance of these emotions in their dreams. Another explanation can be provided by the protoconsciousness theory (Hobson, 2009), which suggests that waking and dreaming states are interconnected and serve to prepare the brain for coping with real-world challenges. In this case, the emotional content of dreams during war serves as preparation for difficult situations and adaptation to negative emotions. Each observed emotion has a specific regulatory function that can be associated with reactions to war, such as surprise indicating the need for adaptation and fear prompting alertness and preparedness for escape.

In addition to the general findings on the prevalence of negative emotions in the overall sample, individual differences were found to relate to the emotional content of dreams. The intensity of depressive symptoms was associated with a more vivid presence of sadness in dreams, consistent with the central role of sadness in clinical depression. Dreams of anxious individuals, on the other hand, exhibited less surprise, which may be attributed to their tendency to expect the worst-case scenario due to defensive pessimism. This finding is especially interesting because, in general, we found that one of the most prevalent emotion conveyed through dreams was, for instance, surprise. However, in cases of higher anxiety levels, the relationship was the opposite. These results can be attributed to the impact of anxiety, both as a trait and as a state, on emotion recognition (Fox, 2002; Attwood et al., 2017). This influence, in turn, can lead to varying interpretations of social events. State anxiety appears to result in a global impairment in emotion recognition rather than being specific to particular emotions.

Additionally, there is evidence of heightened interpretational biases during states of anxiety, characterized by an increased tendency to perceive anger and a decreased inclination to perceive happiness in ambiguous facial expressions that blend both emotions (Attwood et al., 2017). The preference for anger perception over happiness perception in highly anxious individuals may suggest that they tend to view the world through a more negative lens in general, and they are less surprised when current events, such as conflicts like war, align with this perspective. However, it's important to note that this is a hypothesis and requires further analysis and additional studies.

Moreover, the thematic analysis of dreams from participants with clinically elevated anxiety, compared to the non-clinical group, partially supported the interpretations mentioned above. Dreams of anxious individuals predominantly included subcategories such as 'War' and 'Battle,' which reflected their tendency toward worst-case scenario expectations. In contrast, dreams of non-anxious individuals contained more action and twists, resulting in a blend of threat and surprise. It is also possible that non-anxious individuals perceive more ambiguity in their dreams (containing elements of threat and surprise cues), which does not necessarily imply a clear negative judgment of an event but rather makes their dreams more surprising.

Limitations and future research directions

Considering that our interpretation of the results is partially speculative, it brings to light several limitations that should be taken into account. Firstly, the study adopted a cross-sectional design, which limits our ability to establish causal relationships. Secondly, the recruitment method via social media introduced self-selection bias, as it attracted individuals who remembered their dreams and were willing to share them, with the majority of participants being women. In future studies, it would be beneficial to assess the intensity of basic emotions experienced by participants to explore the alignment between their daily emotional experiences and the emotional content of their dreams.

Further research is needed to deepen our understanding of the relationship between dreams, reality, and personality. It would be valuable to incorporate other qualitative methods, which could provide insights into both conscious and unconscious aspects of dreams. One option is Online Photovoice (OPV), developed by Tanhan and Strack (2020), which utilizes photos to delve deeper into the meaning of the topics being studied, e.g. dreams. When paired with Interpretative Phenomenological Analysis (IPA), such methods could assist researchers in making sense of participants' attempts to understand their experiences, such as in dreams (Eatough, V., & Smith, J. A., 2017). These methods are also highly engaging for participants, potentially allowing for a wider range of individuals to be included in the study (Tanhan & Strack, 2020; Doyumğaç et al., 2021).

Conclusions

Despite these limitations, the study provides interesting findings, showing the role of the prevalence of negative emotions in participants' dreams during times of war. Additionally, it highlights the connection between individual variations in depressive symptoms and anxiety and the emotional content of dreams. In conclusion, this study revealed that the most common emotions conveyed through dreams were surprise, fear, and sadness. Furthermore, the research unveiled connections between levels of depression and anxiety and their relation to dream content. Specifically, higher levels of anxiety were associated with decreased levels of surprise in dreams. These findings underscore the complex relationship between emotional well-being and the emotional content of our dreams, shedding light on the potential psychological significance of dream experiences.

These results also hold practical implications, especially for professionals working with traumatized groups. It is crucial to identify risk factors that may predict psychosocial consequences. Paradoxically, based on our study, it could be speculated that individuals who generally exhibit lower levels of anxiety when faced with life-threatening events might develop more psychological problems. Such events, like war, may contradict their view of the world, as evidenced by their increased experience of surprise. These ideas could benefit from future longitudinal studies that focus on the development of anxiety and depressive symptoms following traumatic life events.

Declarations

Conflict of interest The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data deposition The data for this study can be found on the Open Science Foundation: https://osf.io/ph7xn/.

Ethical Statement The project was approved by the Academic Human Research Ethics Committee.

Informed consent Interested volunteers were informed about the nature and purpose of the study and offered the opportunity to participate.

When they chose to participate, they were informed that they could discontinue at any time and their responses would be confidential and not revealed to anyone.

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