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ORIGINAL ARTICLE

Development and validation of the Attention Bias Questionnaire (ABQ)

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Abstract

Objectives: Various psychopathologies are associated with threat-related attention biases, which are typically measured using mechanized behavioral tasks. While useful and objective, behavioral measures do not capture the subjective experience of biased attention in daily-living. To complement extant behavioral measures, we developed and validated a self-report measure of threat-related attention bias – the Attention Bias Questionnaire (ABQ).

Methods: The ABQ consists of nine items reflecting the subjective experience of attention bias towards threats. To enable personalized relevance in threat-content, the general term "threat" was used, and respondents were instructed to refer to specific things that threaten them personally. In a set of five studies, the ABQ was developed and validated. Internal consistency, discriminant validity, test-retest reliability, and convergent validity were tested.

Results: The ABQ emerged as a coherent and stable measure with two sub-scales: Engagement with Threat and Difficulty to Disengage from Threat. ABQ scores were positively correlated with trait anxiety, social anxiety, PTSD, and depression, as well as behaviorally measured attention bias.

Conclusion: Assessing the subjective experience of threat-related attention bias can enrich existing knowledge about the cognitive mechanisms underlying psychopathology and complement extant behavioral bias measures in research and clinical evaluation.

KEYWORDS
anxiety, attention bias, depression, questionnaire, social anxiety

1 | INTRODUCTION

Threat-related attention bias is the tendency to preferentially allocate attention to threatening over benign stimuli in the environment (Bar-Haim et al., 2007; Mathews & MacLeod, 1985; Mogg & Bradley, 1998). Extensive research establishes associations between threat-related attention bias and anxiety (for reviews see: Armstrong & Olatunji, 2012; Bar-Haim et al., 2007; Mogg & Bradley, 1998), posttraumatic stress disorder (e.g., Bryant & Harvey, 1997; Buckley et al., 2000), obsessive compulsive disorder

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(Amir et al., 2009; Muller & Roberts, 2005), and depression (Peckham et al., 2010).

The measurement of threat-related attention relies almost exclusively on mechanized behavioral methods derived from basic cognitive research. Such behavioral assessments of threat-related attention have many merits and are typically considered objective and less vulnerable to conscious and explicit influences. However, these behavioral methods are not designed to measure the subjective and cumulative experience that may accompany this basic cognitive phenomenon of biased attention. Such experience seems to characterize at least some individuals who explicitly report being highly attentive to threats in their day-to-day life (Bar-Haim, 2010), and relate to a conscious experience of being extremely alert and vigilant toward potential threats in one's environment. Currently, there is no standardized measure that captures how individuals subjectively experience their threat-related biases in daily-living. The purpose of the current set of studies was to develop a reliable and valid measure of this experience, under the assumption that this aspect of the attention bias construct may be linked – but not identical – to behaviorally measured threat-related attention biases. Such self-report measure could complement the extant behavioral measures in clinical and experimental research, and allow for a multi-faceted assessment of cognitive biases in relation to psychopathology and treatment outcome.

We developed a self-report measure of threat-related attention bias – the Attention Bias Questionnaire (ABQ), and tested its psychometric properties and associations with behavioral indices of attention bias and with psychopathology symptoms. Importantly, given that threat-related attention bias is a characteristic of patients with various disorders, the ABQ is intended to measure a trans-diagnostic aspect not limited to a single disorder. Here, we provide initial indications for associations between the ABQ and social anxiety, trait anxiety, depression, and PTSD.

2 | STUDY 1: DEVELOPMENT OF THE ABQ

In this study we developed and elucidated the initial items for the ABQ.

2.1 | Methods

2.1.1 | Participants

A sample of 350 participants (232 females, *Mage* = 27.35 years, *SD* = 7.08, range = 18–67) was recruited using online advertisement. Sample size was determined according to best practices guidelines for exploratory factor analysis (EFA) (Worthington & Whittaker, 2006), suggesting a minimum of 300 participants. Ethical approval for all studies was provided by the local Ethics Committee.

2.1.2 | Materials and procedure

A total of 31 items were generated. These items were recommended as reflecting the subjective experience of attention bias towards threats, based on proposals from 12 independent clinical researchers engaged in cognitive bias research in general, and with threat-related attention bias assessment and modification in particular. Removing duplicate items and items with unclear phrasing, 15 items were selected for further testing. To allow personalized relevance in the measured threat content, all items were formulated using the general term "threat(s)". Because attention biases are typically stronger when relating to disorder-congruent relative to general threats (Pergamin-Hight et al., 2015), we instructed participants to "*refer to specific things (objects, people, animals, situations) that threaten them personally or that are stressful for them, whenever the word threat(s) appears in the questionnaire*". Respondents were asked to indicate on a scale how true each item is for them ranging 0 ("not at all") to 4 ("to a great extent"). For full text of the instructions see Supplemental Material 1.

2.1.3 | Data analysis

To select the ABQ items, identify latent constructs, and optimize internal consistency, we conducted an exploratory factor analysis (EFA), applying principal-axis factoring estimation and Promax oblique rotation. Parallel analysis was used to determine the appropriate number of factors. Items that loaded highly on their factor and had Eigenvalues ≥0.40 were retained. This procedure was repeated on the remaining items until a theoretically meaningful factorial structure with adequate goodness of fit was achieved considering the Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) and Root Mean-Square Error of Approximation (RMSEA; Steiger & Lind, 1980). Internal consistency of the retained items was calculated using Cronbach's alpha.

2.2 | Results

Inter-correlations between all items were positive, the Kaiser-Meyer-Olkin measure of sampling adequacy was >0.90, and Bartlett's test of sphericity was significant ($\chi^2(105) = 2363.89$, $p < 0.001$), indicating appropriateness of the sample and data for EFA. Three iterations of EFA and items exclusion were performed, until a stable two-factor solution with nine items (Table 1) emerged. A theoretical inspection of the resulting structure indicated that items grouped under the first factor reflected difficulty to attentionally disengage from threats (Difficulty to Disengage from Threat), whereas items grouped under the second factor reflected enhanced initial attentional engagement with threats (Engagement with Threat). These two factors accounted for 32 and 22% of the variance in item scores, respectively. Goodness of fit measures were adequate (RMSEA = 0.08, TLI = 0.94). Cronbach's alphas were 0.87, 0.79 and

TABLE 1 Exploratory factor analysis (EFA), factor loadings of the 9-item ABQ

Item	Factor 1 (Difficulty to disengage from threat)	Factor 2 (Engagement with threat)
1. It is difficult for me not to look at threatening things	0.51	
2. Sometimes, I notice threats even before I have looked at them directly (e.g., from the corner of my eye)		0.70
3. My attention tends to "get stuck" on threatening things	0.66	
4. I notice threats quickly		0.74
5. I am vigilant and alert towards threats in the surroundings		0.80
6. When I arrive somewhere new, I scan my surroundings and check for threats		0.54
7. If I notice a threat, I will focus on it for a long time	0.83	
8. It is difficult for me to concentrate on other things when I know there is a threat in my surroundings	0.81	
9. When I notice threats, it is difficult for me to stop focusing on them	0.94	

0.87 for the total 9-item ABQ, the Engagement with Threat and the Difficulty to Disengage from Threat factors, respectively. Intercorrelation between the two factors was 0.68.

2.3 | Discussion

Study 1 elucidated a set of self-reported items reflecting the subjective experience of threat-related attention bias. EFA results indicate that the selected items reflect two sub-scales: Engagement with Threat - the experience of being highly vigilant and easy to orient to threats; and Difficulty to Disengage from Threat—the experience of prolonged attention to threats in one's environment and a difficulty to disengage attention from threats once captured. The Engagement with Threat and Difficulty to Disengage from Threat sub-scales show acceptable and good internal consistency, respectively. The two-factor ABQ was supported by an acceptable TLI goodness of fit value (Bentler & Bonett, 1980) and RMSEA value equal to the recommended cutoff for model-data fit (Browne & Cudeck, 1992; Xia & Yang, 2019). The emergent two-factor structure is in line with previous experimental evidence suggesting that enhanced attentional engagement with threat, and reduced attentional disengagement from threat, are two distinct sub-components contributing to the manifestation of threat-related attention bias (Fox et al., 2001; Rudaizky et al., 2014).

3 | STUDY 2: INTERNAL CONSISTENCY, FACTORIAL STRUCTURE, DISCRIMINANT VALIDITY, AND RELATIONS WITH PSYCHOPATHOLOGY

We proceeded to test the ABQ's internal consistency and factorial construct within a new sample and evaluated its discriminant validity against measures of trauma-related hypervigilance and the neuroticism personality trait, two constructs that may overlap with threat-related attention bias. Additionally, because behaviorally measured threat-related attention has been associated with anxiety and depression (Armstrong & Olatunji, 2012; Bar-Haim et al., 2007; Peckham et al., 2010), we tested the associations between ABQ scores and these symptoms.

3.1 | Methods

3.1.1 | Participants

Two hundred and ninety-seven first-year undergraduate Psychology students (240 females, *Mage* = 23.00 years, *SD* = 3.08, range = 18–48), all who agreed to participate out of an available pool, received course credit for participation.

3.1.2 | ABQ

The 9-item ABQ generated in Study 1 was used in Study 2 (see Supplemental Material 1 for the ABQ). A total score was calculated as the mean of all nine items, an Engagement with Threat score was calculated as the mean of items 2, 4, 5, and 6, and a Difficulty to Disengage from Threat score was calculated as the mean of items 1, 3, 7, 8, and 9.

3.1.3 | Measures of discriminant validity

Due to a possible overlap between self-reported experience of attention bias and self-reported trauma-related hypervigilance constructs, we tested the discriminant validity of the ABQ relative to two measures specifically developed in the context of traumatic stress: the Post Traumatic Stress Disorder Checklist 5 (PCL-5; Weathers et al., 2013), and the Brief Hypervigilance Scale (BHS; Bernstein et al., 2015). The PCL-5 evaluates the severity of PTSD symptoms

corresponding to DSM-5 criteria (Bovin et al., 2016; Liu et al., 2014). The hypervigilance sub-scale (E-criterion; American Psychiatric Association, 2013) has the highest overlap potential with the ABQ, and thus the sum score of items of this sub-scale was computed. Cronbach's alphas of the full PCL-5 scale and the hypervigilance sub-scale in the current sample were 0.93 and 0.82, respectively. The BHS consists of five items reflecting behaviors associated with alertness and watchfulness, rated on a 5-point Likert scale. A sum score was used in the current analyses. The BHS has a good reliability and convergent validity, with higher scores associated with enhanced PTSD symptoms (Bernstein et al., 2015). Cronbach's alpha of the BHS items in the current sample was 0.83. Importantly, the PCL-5 hypervigilance sub-scale and the BHS are focused on global aspects of alerted behavior (e.g., "trouble falling or staying asleep"; "I feel that if I don't stay alert and watchful, something bad will happen"), whereas the ABQ is focused on threat-related attention patterns (e.g., "I notice threats quickly"). Finally, Neuroticism was measured using the Big-Five Inventory (BFI; John et al., 1991). The BFI assesses five personality domains, with 44 items, including a neuroticism sub-scale. For completeness, we computed the scores for all the domains assessed by the BFI. In the current sample, Cronbach's alphas of the Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness domains were 0.89, 0.87, 0.69, 0.76 and 0.80, respectively.

3.1.4 | Symptoms measures

Trait anxiety was measured using the State-Trait Anxiety Inventory – Trait Scale (STAI-T; Spielberger et al., 1983). The STAI-T consists of 20 items assessing general anxiety proneness. Cronbach's alpha in the current sample was 0.93. Social anxiety was measured using the self-report version of the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). The LSAS describes 24 socially relevant situations; each situation is rated on two scales indicating the level of fear and level of avoidance provoked by the described situation. The total LSAS score was used in analyses. Cronbach's alpha in the current sample was 0.96. Finally, depression was measured using the depression module from the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001). This 9-item self-report measure represents depressive symptoms per DSM-IV. Cronbach's alpha in the current sample was 0.87.

3.1.5 | Procedure

All participants completed the following questionnaires online: ABQ, PCL-5, BHS, STAI-T, LSAS, and PHQ-9. A sub-sample of 100 participants (83 females, *M*age = 23.13 years, *SD* = 3.28, range = 19–48) also completed the BFI.

3.1.6 | Data analysis

Internal consistency of the ABQ was assessed using Cronbach's alpha. A confirmatory factor analysis (CFA) was used to validate the correlated two-factor model consisting of an Engagement with Threat and a Difficulty to Disengage from Threat factors that emerged in Study 1. We applied structural equation modeling (SEM) with maximum likelihood estimation to compare a two-factor model to an alternative, restricted single-factor model, in which the covariance between the two factors of the unrestricted model was set to 1. A chi-square difference test (CMIN) was used (AMOS 26.0.0; Arbuckle, 2011) to examine loss in model fit from the unrestricted model to the nested, restricted model (Kline, 2005; Worthington & Whittaker, 2006). We also calculated the Comparative Fit Index (CFI; Bentler, 1990) and Standardized Root Mean Square Residual (SRMR; Bentler, 1995) fit measures. Simple correlations were calculated to examine the associations between the ABQ and the hypervigilance and symptoms measures. Finally, Fisher's *r*-to-*Z* transformations were used to compare the magnitude of the correlations between the ABQ scores and the different symptoms measures.

3.2 | Results

Internal consistency of the total ABQ score was high in this replication sample, Cronbach's alpha = 0.90. Cronbach's alphas for the Engagement with Threat and Difficulty to Disengage from Threat factors were 0.85 and 0.87, respectively. See Supplemental Material 1 for descriptive statistics of the ABQ and descriptive statistics of trauma-related hypervigilance, personality traits, and symptoms measures.

CFA supported a two-factor model, with a significant loss in fit when shifting from this model to a restricted one-factor model (CMIN(1) = 10.63, $p < 0.01$). Overall fit measures were adequate, with CFI = 0.89 and SRMR = 0.07. See Supplemental Material 1 for the CFA factor loadings of ABQ items.

The correlations between the ABQ scales and measures of trauma-related hypervigilance, personality traits, and symptoms are presented in Table 2. The ABQ scales were positively correlated with trauma-related hypervigilance, the Neuroticism personality domain, and psychopathology symptoms, with moderate effect sizes. Fisher's transformations indicated that the ABQ's total score correlated more strongly with the LSAS (social anxiety) relative to the PHQ-9 (depression; Fisher's *r*-to-*Z* = 1.81, $p < 0.05$). The ABQ's Difficulty to Disengage from Threat scores correlated more strongly with the LSAS and the STAI-T (anxiety), relative to the PHQ-9 (LSAS: Fisher's *r*-to-*Z* = 2.17, $p = 0.01$; STAI-T: Fisher's *r*-to-*Z* = 1.68, $p < 0.05$). All other differences between the magnitude of the correlations between the ABQ and symptoms measures were non-significant (all *p*s > 0.05).

3.3 | Discussion

The ABQ emerged as a coherent, two-scale inventory with high internal consistency. The ABQ measures a theoretical construct that is significantly related to, but also differed from the trauma-related hypervigilance (PCL-5 and BHS), and from the Neuroticism domain (BFI). The correlations between the ABQ scales and these measures were all <0.53, indicating good discriminant validity (Kaplan, 2008).

TABLE 2 Correlations between ABQ and measures of trauma-related hypervigilance, personality traits and psychopathology symptoms

		ABQ (Total score)	ABQ (Engagement with threat)	ABQ (Difficulty to disengage from threat)
PCL5	General score	0.34**	0.31**	0.32**
	Criterion E	0.33**	0.30**	0.31**
BHS		0.52**	0.50**	0.47**
BFI	Neuroticism	0.35**	0.25*	0.37**
	Extraversion	−0.17	−0.10	−0.19
	Openness to experience	0.00	−0.03	0.03
	Agreeableness	−0.16	−0.12	−0.16
	Conscientiousness	−0.08	0.02	−0.14
STAI-T		0.38**	0.27**	0.40**
LSAS		0.44**	0.39**	0.45**
PHQ-9		0.34**	0.29**	0.33**

Abbreviations: BFI, Big-Five Inventory; BHS, Brief Hypervigilance Scale; LSAS, Liebowitz Social Anxiety Scale; PCL5, Post-Traumatic Stress Disorder Checklist 5; PHQ-9, Patient Health Questionnaire; STAI-T, State-Trait Anxiety Inventory - Trait.

*$p < 0.05$, **$p < 0.01$.

In line with research using behavioral indices of attention bias (Bar-Haim et al., 2007; Gober et al., 2020; Peckham et al., 2010), higher ABQ scores were associated with elevated symptoms of trait anxiety, social anxiety, and depression, supporting cognitive models assigning biased information processing an important role in anxiety and depression (e.g., Beck, 1987; Beck & Clark, 1997; Mathews & Mackintosh, 1998). The magnitude of the correlations between the ABQ and symptoms of anxiety, depression, and PTSD ranged between 0.27 and 0.45, resembling previous findings of correlation between behaviorally measured attention bias and symptoms (for meta-analyses and a review see: Bar-Haim et al., 2007; Gober et al., 2020; Peckham et al., 2010). Of note, the ABQ's total and Difficulty to Disengage from Threat scales appear to be more strongly correlated with anxiety symptoms than with depression symptoms, suggesting that the subjective experience of threat-related attention bias, and particularly difficulty to disengage attention from threats, characterizes anxiety to a greater degree than it does depression (Armstrong & Olatunji, 2012; Peckham et al., 2010).

4 | STUDY 3: TEST-RETEST RELIABILITY

To further establish the stability of the ABQ scales, we examined its test-retest reliability in a new independent sample.

4.1 | Methods

4.1.1 | Participants

Participants were 150 undergraduate students (121 females, *M*age = 23.01 years, *SD* = 1.90, range = 19–37).

4.1.2 | ABQ

The 9-item ABQ used in Study 2 was used in the current Study 3.

4.1.3 | Procedure

Participants completed the ABQ online twice. The interval between the two time-points ranged 4–16 days (*M* = 8.40, *SD* = 3.27).

4.1.4 | Data analysis

Test-retest reliability of the ABQ scales was assessed using simple correlations. To examine the effect of between-measurements interval length on ABQ stability, we computed hierarchical linear regressions, with ABQ scores in Time 2 as the dependent variables, and scale scores in Time 1 (regression step 1) and time interval (regression step 2) as independent variables, testing for F-change significance between the two steps.

4.2 | Results

Cronbach's alphas for the ABQ's total, Engagement with Threat, and Difficulty to Disengage from Threat scores were 0.89, 0.81, and 0.86, respectively, in Time 1 and 0.91, 0.84, and 0.90, respectively, in Time 2. For ABQ scale scores see Supplemental Material 1.

Test-retest reliability for the total, Engagement with Threat, and Difficulty to Disengage from Threat scores were 0.73, 0.74, and 0.70, respectively (all *ps* < 0.001). Length of the time interval between the two measurements did not affect the test-retest reliability of the ABQ's total (*F*-change = 0.60, $p > 0.10$),

Engagement with Threat (*F*-change = 0.23, $p > 0.10$), and Difficulty to Disengage from Threat (*F*-change = 0.83, $p > 0.10$) scores.

4.3 | Discussion

The ABQ scales are stable over time, with test-retest coefficients above or equal to the recommended cutoff of 0.70 (Cronbach, 1949; Terwee et al., 2007).

5 | STUDY 4: RELATIONS BETWEEN THE ABQ AND BEHAVIORAL MEASURES OF ATTENTION BIAS

To further validate the ABQ, we tested its associations with behaviorally measured threat-related attention bias.

5.1 | Methods

5.1.1 | Participants

Participants were 311 males (*Mage* = 18.41 years, *SD* = 0.64, range = 18–22), tested as part of a pilot study of cognitive patterns among young men enlisting for mandatory military service.

5.1.2 | ABQ

The same ABQ as in Studies 2 and 3 was used.

5.1.3 | Attention task

The free-viewing eye-tracking task is an established attention bias measure with good psychometric properties (Lazarov et al., 2016). In each trial, a 4 × 4 matrix of faces (from the Karolinska Directed Emotional Faces database; Lundqvist et al., 1998) was presented. Each actor appeared once in a matrix, each 16-face matrix contained eight male and eight female faces, half of the faces showed an angry expression and half a neutral expression, and the four inner faces were always two angry and two neutral. Each face image extended 238 × 238 pixels. Each matrix extended 950 × 950 pixels. At the beginning of each trial a fixation cross appeared and remained on the screen until a 1,000 ms fixation was identified. Then, a matrix of faces appeared and remained on the screen for 6,000 ms, followed by an inter-trial interval of 2,000 ms (Figure 1). Thirty matrices were presented. Participants were instructed to look at the faces in any way they chose.

Two indices of threat-related attention bias were computed: (1) percent dwell time on threat – the proportion of the dwell time on threat faces relative to the total dwell time on all faces; (2) percent fixations on threat – the proportion of the number of fixations on

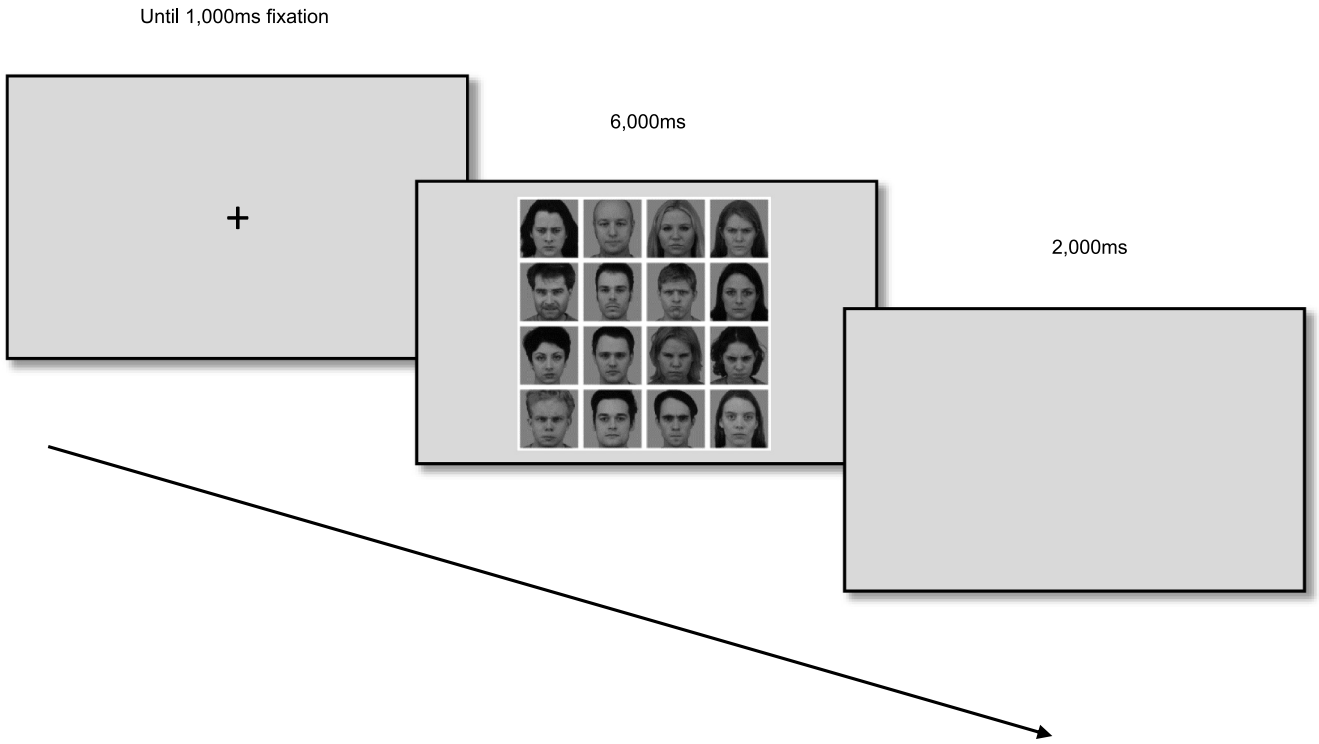

FIGURE 1 A single trial of the free viewing eye-tracking attention task. Following a 1,000 ms fixation on a cross located at the center of the screen, a 16 faces matrix appears for 6,000 ms. The next fixation cross appears after a 2,000 ms inter-trial interval. All faces images were taken from the Karolinska Directed Emotional Faces database (KDEF; Lundqvist et al., 1998)

threat faces relative to the total number of fixations on all faces. Both measures were previously established as consistent and reliable (Lazarov et al., 2016, 2018; Waechter et al., 2014). In the current sample, Cronbach's alphas for percent dwell time on threat and percent fixations on threat were 0.70 and 0.57, respectively.

5.1.4 | Apparatus

Eye-tracking was performed using a remote eye-tracker (Eye-Link Portable Duo, SR Research, Ltd., Ottawa, Ontario, Canada). Sampling rate was 1000 Hz. Participants were sitting 90cm from a 24″ ASUS VG248QE monitor with a screen resolution of 1920 × 1080 pixels.

5.1.5 | Procedure

Participants performed the eye-tracking task and then completed the ABQ.

5.1.6 | Data analysis

To evaluate the associations between self-reported and behaviorally measured threat-related attention biases, we calculated simple correlations between the ABQ scores and the two attention bias indices from the gaze data.

5.2 | Results

Cronbach's alphas for the total, Engagement with Threat, and Difficulty to Disengage from Threat scales were 0.88, 0.83, and 0.84, respectively (see Supplemental Material 1 for the ABQ scale scores).

The ABQ's total and Difficulty to Disengage from Threat scores were significantly correlated with both percent dwell time on threat and percent fixations on threat. The ABQ's Engagement with Threat score was significantly correlated with percent fixations on threat, but not with percent dwell time on threat (Table 3).

5.3 | Discussion

The results of Study 4 indicate that the self-reported ABQ scores, reflecting the subjective experience of threat-related attention bias, are significantly related to objective threat-related attention bias scores measured behaviorally. Although these significant correlations suggest an overlap between the subjective and objective aspects of threat-related attentional deployment, the magnitude of these correlations is small, also indicating that subjective and objective measures of bias are not identical and potentially reflect different aspects of the threat monitoring experience (Shechner & Bar-Haim, 2016). These results provide evidence of convergent validity between the ABQ and an established behavioral assessment of attention bias. Of note, the current study used a male-only sample. Future studies may wish to examine the relations between ABQ and behavioral measures of attention bias in sex-balanced samples.

6 | STUDY 5: THE ENGLISH VERSION OF THE ABQ

The four studies reported above used a Hebrew version of the ABQ and tested Israeli participants. Here we provide reliability and internal consistency data of the ABQ's English version.

6.1 | Methods

6.1.1 | Participants

Participants were 196 undergraduate students from a large research university in the USA (121 females, *M*age = 19.19 years, *SD* = 2.16, range = 17–36). Test-retest data were collected from a sub-sample of 131 participants (85 females, *M*age = 19.31 years, *SD* = 2.51, range = 17–36). Participants received course credit for participation.

6.1.2 | ABQ

The Hebrew version of the ABQ used in Studies 2-4 was translated to English and back-translated to Hebrew. The first and last authors examined the English translation and compared the original and the back-translated Hebrew versions. Words or phrases where the retranslated and the original versions were not fully coherent were discussed until an agreed upon version was formulated. This version was further reviewed for clarity and approved by the second author (see Supplemental Material 1 for the English ABQ).

TABLE 3 Correlations between ABQ scales and eye-tracking indices of threat-related attention bias

	ABQ (Total score)	ABQ (Engagement with threat)	ABQ (Difficulty to disengage from threat)
% dwell time on threat	0.12*	0.08	0.14*
% fixations on threat	0.17**	0.11*	0.19**

*$p < 0.05$, **$p < 0.01$.

6.1.3 | Procedure

Participants were asked to complete the ABQ online twice. The interval between the two time-points ranged 14–21 days ($M = 15.85$, $SD = 1.94$).

6.1.4 | Data analysis

Cronbach's alpha was used to test the internal consistency of the English ABQ. To validate its factorial structure, as in Study 2 we conducted CFA of a correlated two-factor model consisting of the Engagement with Threat and the Difficulty to Disengage from Threat factors. Test-retest reliability of the ABQ scales was tested using simple correlations.

6.2 | Results

Cronbach's alphas for the ABQ's total, Engagement with Threat, and Difficulty to Disengage from Threat scales were 0.87, 0.81, and 0.87, respectively, in time 1 and 0.88, 0.80, and 0.90, respectively, in Time 2. CFA supported a two-factor model, with a significant loss in model fit when shifting from this model to a restricted, one-factor model (CMIN(1) = 13.66, $p < 0.001$). Overall fit measures were adequate, with CFI = 0.91 and SRMR = 0.07. Test-retest reliability for the total, Engagement with Threat, and Difficulty to Disengage from Threat scales were 0.75, 0.72. and 0.78, respectively (all $ps < 0.001$). See Supplemental Material 1 for the ABQ scale scores and for the factor loadings of the Hebrew and English versions of the ABQ.

6.3 | Discussion

Similar to the Hebrew version, the English version of the ABQ was coherent and stable, with high internal consistency and good test-retest reliability. CFA of the English version supported the ABQ's two-factor scale revealed in the Hebrew version. Together, these findings indicate that the ABQ is warranted for use with English speaking populations.

7 | GENERAL DISCUSSION

The aim of the current set of studies was to develop and validate a self-report measure capturing the subjective experience of threat-related attention bias. The ABQ repeatedly emerged as a coherent and stable measure with good internal consistency and test-retest reliability. These properties were found both for the Hebrew and the English versions of the ABQ. EFA indicated that the ABQ consists of two sub-scales reflecting different sub-components of attention bias towards threat (Posner & Cohen, 1984): (1) Engagement with Threat, that is, the experience of initial engagement with or rapid orientation to threats; and (2) Difficulty to Disengage from Threat, that is, the experience of difficulty disengaging attention from threat once captured. This two-factor structure was further confirmed in CFA using new samples.

Higher ABQ scores were related to enhanced self-reported trait anxiety, social anxiety, PTSD, and depression. These results suggest that a subjective experience of being attentionally biased to threats may be associated with elevated symptoms of these forms of psychopathology. It has been suggested that certain transdiagnostic cognitive-affective irregularities may contribute to the high degree of co-morbidity between depression, anxiety, and PTSD (e.g., Harvey et al., 2004; Hertel, 2010). The similarity between depression-related and anxiety-related findings in the current set of studies implies that the ABQ may tap into one such transdiagnostic component. The data further suggest that the experience of threat-related attention bias may be more strongly associated with anxiety than with depression symptoms. Future studies could explore the nature of these associations in clinical samples. Future studies could also examine whether situational stress, which has been reported to lead to adaptive changes in threat-related attentional patterns among healthy individuals (Bar-Haim et al., 2010; Shechner & Bar-Haim, 2016; Shechner, Pelc, et al., 2012), also affect their subjective experience of attention bias as reflected in ABQ scores.

Relations between self-reports and behavioral measures tend to be modest, and such relations are generally challenging to establish (Paulhus & Vazire, 2007). Here too, modest but significant correlations were observed between the ABQ scores and established eye-tracking-based attention bias indices. These findings suggest that the ABQ taps into a construct that is related to the established cognitive-behavioral phenomenon of threat-related attention bias (Bar-Haim et al., 2007; Mathews & MacLeod, 1985; Mogg & Bradley, 1998), but at the same time captures an aspect of threat-related attention that is different from that captured by behavioural attention bias measures. Specifically, whereas lab-based behavioral measurements of attention are designed to capture a distinct manifestation of biased threat-related attention during task performance, the ABQ scores likely reflect a subjective integration of accumulated past experiences in which preferential attention towards threats had consciously emerged. An additional reason for the small magnitude of the correlations between ABQ scores and the behavioral indices of biased attention observed here may relate to the use of a constricted and very specific type of threat stimuli (i.e., images of angry faces), whereas the ABQ instructs a more general and individualized threat content. For example, the angry faces presented in the free viewing task might have been more relevant for participants with enhanced levels of social anxiety and less so for highly depressed but non-anxious participants or for symptom-free participants (Lazarov et al., 2016, 2018; Sanchez et al., 2013). Lastly, the current study used a cognitive task providing a global index of threat-related attention bias that does not allow an examination of potential associations between the ABQ scores and specific sub-components of behaviorally measured attention bias. Future studies may wish to examine the relations between ABQ scores and

behavioral measures of attention bias using cognitive tasks that dissociate the engagement and difficulty-to-disengage components (e.g., Fox et al., 2001).

Given the ABQ's adequate psychometric properties and modest but significant associations with established measures of anxiety, depression, and PTSD, we posit that the ABQ may now serve as a complementary tool in the assessment of the impact of attention biases on psychopathology. Measuring the subjective experience of being highly attentive to threats, which is related but not identical to the phenomenon of behavioral attention bias towards threat, can provide a more comprehensive and multifaceted understanding of the basic cognitive irregularities characterizing anxiety and mood disorders. Future studies could measure both behavioral attention bias and the subjective experience of being highly attentive to threats in the same experimental design to examine the unique contributions of each of these constructs and their interaction in predicting anxiety, PTSD, and depression symptoms. Future studies may also use the ABQ to gauge changes in subjective attention bias experience as a function of therapeutic interventions, and specifically following attention bias modification (ABM; Bar-Haim, 2010; Lazarov & Bar-Haim, 2021; MacLeod & Clarke, 2015). Furthermore, it may be valuable to examine whether baseline levels of self-reported experience of threat-related attention bias predict treatment outcome in general and ABM efficacy in particular. Finally, the ABQ specifically measures two classic sub-components of attention towards threats: enhanced engagement with threat and difficulty to disengage from threat. It has been suggested that certain disorders may be characterized by attentional biases other than the specific biases indexed by the ABQ, for example, a bias away from threats or strong alternations between bias toward and away from threat (e.g., Koster et al., 2006; Mansell et al., 1999; Naim et al., 2015; Shechner, Britton, et al., 2012). Future studies may wish to develop scales measuring the subjective experience related to other types of biased attention.

In conclusion, the current set of studies suggests that there may be a benefit in assessing the subjective experience of being highly attentive to threats. Such an assessment, which can be reliably achieved with the ABQ, may enrich existing knowledge about the cognitive mechanisms underlying anxiety and mood disorders, and specifically about the role of threat-related attention bias in their formation and maintenance.

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CONFLICT OF INTEREST

The authors report no conflict of interest.

DATA AVAILABILITY STATEMENT

All data have been made publicly available at the Open Science Framework (OSF) and can be accessed at https://osf.io/ejhxs/?view_only=3c24d39108db4bdf8c4aea90a4065525.

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