Power in numbers: The association of attentional bias and symptom severity in two large online samples

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Background

- Cognitive models of depression suggest that attention to negative stimuli plays a role in the susceptibility to, and maintenance of, the disorder.
- While studies of between group differences often find significant biases towards negative information in depressed populations compared to healthy controls, the relationship between attentional biases and symptom severity is less clear.
- We sought to address this question using two large online studies to ensure adequate power to detect even small associations between attentional biases and symptom severity.

Methods

Participants

Participants were adults between the ages of 18 and 45 years. The Reddit sample included 293 participants recruited from several different sub-reddits with a focus on mental health topics, such as, r/depression and r/anxiety. The Mechanical Turk sample included 902 participants recruited from Amazon Mechanical Turk. Participants completed the following:

- Demographics and self reported symptom questionnaires measuring depression, anxiety, and general distress (MASQ).
- A dot probe task designed to measure negative attention bias (Figure 1).

Data Analysis

As opposed to using the traditional mean bias score to quantify attentional bias, we used trial level bias score metrics, based upon Zvelli et al. (2015), to capture temporal variability in attention bias.

In the Reddit sample, 48% of participants were dropped, and in the Mechanical Turk sample, 4% of participants were dropped due to invalid responses and low accuracy, such as, responses faster than 250ms, longer than 1500ms, or were 3 standard deviations beyond individual's mean.

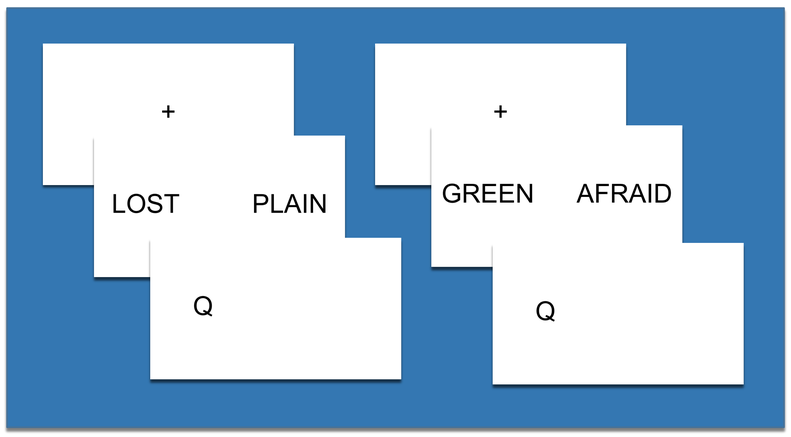

Figure 1. A congruent trial (left) and an incongruent trial (right) of the dot probe task. After a fixation cross, one negative and one neutral word appear on the screen, followed by a cue (either an "O" or "Q") in the same location as one of the words. Words were taken from the ANEW database (Bradley & Lang, 1999) and matched for arousal and length.

Reddit Sample Correlations

Variable	*M*	*SD*	1	2	3	4	5	6
1. Mean bias	-0.73	19.15						
2. Toward$_{TLBS}$	97.38	30.82	.22** [.11, .32]					
3. Away$_{TLBS}$	97.57	30.91	-.23** [-.33, -.12]	.79** [.74, .83]				
4. Variability$_{TLBS}$	94.14	27.55	.01 [-.10, .13]	.90** [.88, .92]	.88** [.85, .90]			
5. MASQ – GD	23.10	11.29	.00 [-.12, .12]	-.22** [-.31, -.11]	-.18** [-.29, -.08]	-.20** [-.31, -.09]		
6. MASQ – AD	36.60	8.01	.01 [-.10, .12]	-.09 [-.21, .02]	-.03 [-.14, .08]	-.05 [-.17, .07]	.15* [.02, .27]	
7. MASQ – AA	18.42	7.68	-.03 [-.15, .10]	.02 [-.10, .13]	.03 [-.07, .16]	.04 [-.08, .16]	.73** [.67, .79]	-.16** [-.28, -.06]

Table 1: Means, standard deviations, and correlations with 95% confidence intervals for negative attention bias metrics and depression symptom severity in the Reddit sample. * indicates p < .05; ** indicates p <.01. GD- general distress; AD= anhedonic depression; AA= anxious arousal.

Mechanical Turk Sample Correlations

Variable	*M*	*SD*	1	2	3	4	5	6
1. Mean bias	-1.21	17.67						
2. Toward$_{TLBS}$	89.12	26.82	.31** [.25, .37]					
3. Away$_{TLBS}$	89.28	24.73	-.24** [-.30, -.17]	.72** [.69, .75]				
4. Variability$_{TLBS}$	87.15	23.36	.05 [-.01, .12]	.87** [.85, .88]	.87** [.85, .88]			
5. MASQ – GD	21.78	9.55	-.04 [-.10, .03]	-.00 [-.07, .07]	-.02 [-.08, .05]	-.02 [-.08, .05]		
6. MASQ – AD	30.50	9.07	-.02 [-.09, .05]	-.01 [-.08, .05]	-.01 [-.07, .05]	-.04 [-.11, .03]	.35* [.29, .42]	
7. MASQ – AA	17.41	7.40	-.04 [-.11, .02]	.04 [-.03, .11]	.03 [-.07, .16]	.04 [-.02, .11]	.73** [.70, .77]	.13** [.07, .20]

Table 2: Means, standard deviations, and correlations with 95% confidence intervals for negative attention bias metrics and depression symptom severity in the Mechanical Turk sample. * indicates p < .05; ** indicates p <.01. GD- general distress; AD= anhedonic depression; AA= anxious arousal.

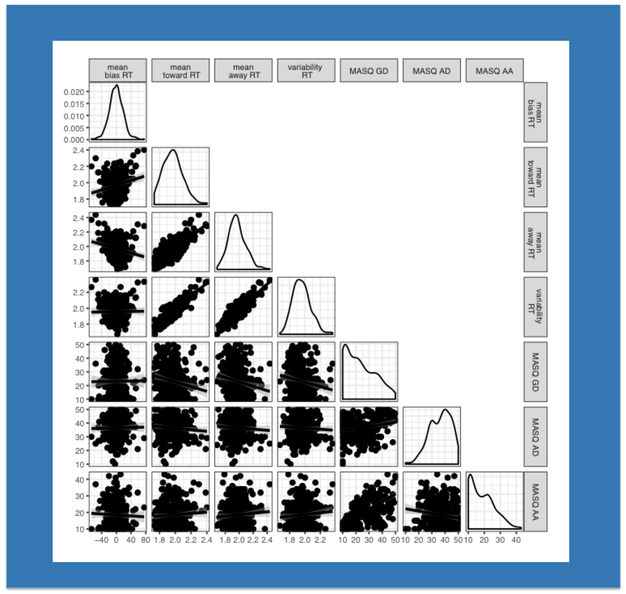

Figure 2: Scatter and density plots for the depression, anxiety, and attention bias for the Reddit sample.

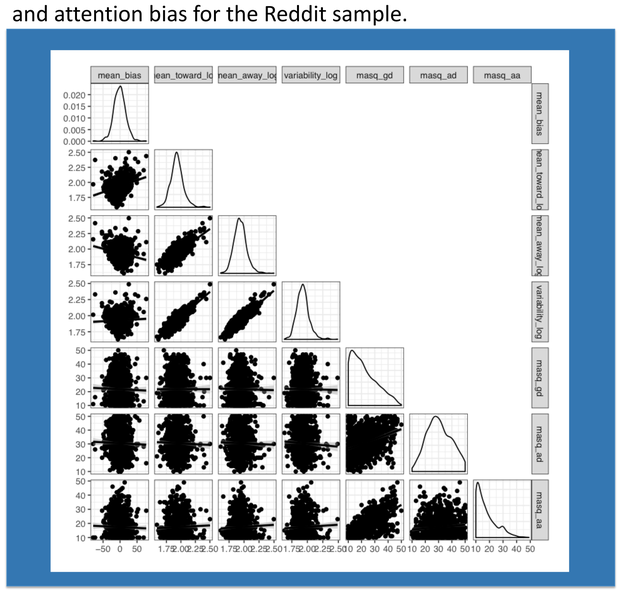

Figure 3: Scatter and density plots for the depression, anxiety, and attention bias for the Mechanical Turk sample.

Results

Trial level score metrics in the Reddit sample revealed a negative association between attention bias metrics and general distress symptoms. As increasing general distress severity was associated with decreased biases toward and away from negative stimuli.

There were no significant associations between negative attention bias and the symptom dimension of anhedonic depression and anxious arousal.

The Mechanical Turk sample demonstrated weak, non-significant associations between symptom severity and attention bias or away from negative stimuli.

Conclusions

Findings indicate a small association between negative attention bias and symptom severity. Our results suggest that while there may be moderate group differences in attentional bias, these biases are not clearly associated with depression symptom severity in these samples.

Recruiting from web services like Mechanical Turk, instead of online forums like Reddit, may result in more accurate responses. Future directions for research include using negative or neutral pictures (as opposed to words) to assess attentional bias to negative stimuli.

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