

Optimizing Attention Bias Modification Training: The Role of Engagement and Anxiety

Qin Lin¹, Samantha Denefrio², Tracy A. Dennis-Tiway^{1,2}

¹Hunter College, The City University of New York, ²The Graduate Center, The City University of New York

INTRODUCTION

- Anxiety disorders, the most prevalent class of mental disorders, have been associated with threat bias (TB), or hypervigilant attention towards threat in the absence of immediate danger (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van Ijzendoorn, 2007).
- Attention Bias Modification Training (ABMT), a novel treatment for anxiety, uses a modified version of the reaction time (RT) based dot probe task to train attention away from threat (Dennis, Egan, Babkirk, & Denefrio, 2016).
- Recent inconsistencies and null findings have highlighted the importance of individual factors, such as task engagement, or interest in and motivation to complete a specific task (Matthews et al., 2002).

HYPOTHESES

- Lower levels of anxiety would be associated with greater task engagement.
- Greater task engagement would be associated with better ABMT efficacy, such that increased engagement will correspond to a reduction in threat bias, measured across three domains (attention bias, vigilance, and disengagement).

METHODS

Participants

- 109 undergraduate students (69 females) aged 18-37 ($M = 20.30$, $SD = 3.39$) participated in this study.

Self-Reported Anxiety Measures

Baseline (Table 1)

- The State Trait Anxiety Inventory (STAI; Spielberger, 1983) assessed levels of trait and state anxiety. Possible scores range from 20 to 80.
- The Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988) assessed participants' positive and negative affect in (1) General and (2) Today [day of the study]. Possible scores range from 10 to 50.

Table 1. Descriptive Statistics

	Min	Max	M (SD)
STAI Trait	22	74	42.50 (10.78)
STAI State	20	61	36.25 (9.20)
PANAS General PA	10	50	30.63 (8.13)
PANAS General NA	11	37	18.35 (5.41)
PANAS Today PA	10	49	27.31 (9.04)
PANAS Today NA	10	28	15.49 (4.16)

Threat Bias Assessment

Threat Bias (TB) was assessed using the reaction-timed (RT) dot probe task (MacLeod & Mathew, 1988) following parameters of the Tel-Aviv University/National Institute of Mental Health protocol (Figure 1).

- Three threat bias scores were generated.
 - Attention Bias** was calculated as average RT for neutral probes minus average RT for threat probes. Positive scores indicate an attention bias towards threat.
 - Vigilance** was calculated as average RT for neutral probes following neutral-neutral pairs minus average RT for threat probes following threat-neutral pairs. Positive scores indicate vigilance toward threat.
 - Disengagement** was calculated as average RT for neutral probes following threat-neutral pairs minus average RT for neutral probes following neutral-neutral pairs. Positive scores indicate difficulty disengaging from threat.

Engagement Questionnaire (EQ)

- The Engagement Questionnaire (EQ) is a measure of task engagement. It consists of three questions (How engaged were you with this task?, How interested were you in this task?, and How motivated were you to complete this task?); participants indicated their response on a 7-point scale ranging from not engaged at all (1) to extremely engaged (7). Task engagement was assessed at three timepoints: following pre- and post-training dot probe, and following ABMT.

Attention Bias Modification Training (ABMT)

- Participants underwent 160 trials of ABMT away from threat, where the probe is always cued by non-threat on threat/non-threat paired trials (Figure 2).

Timeline

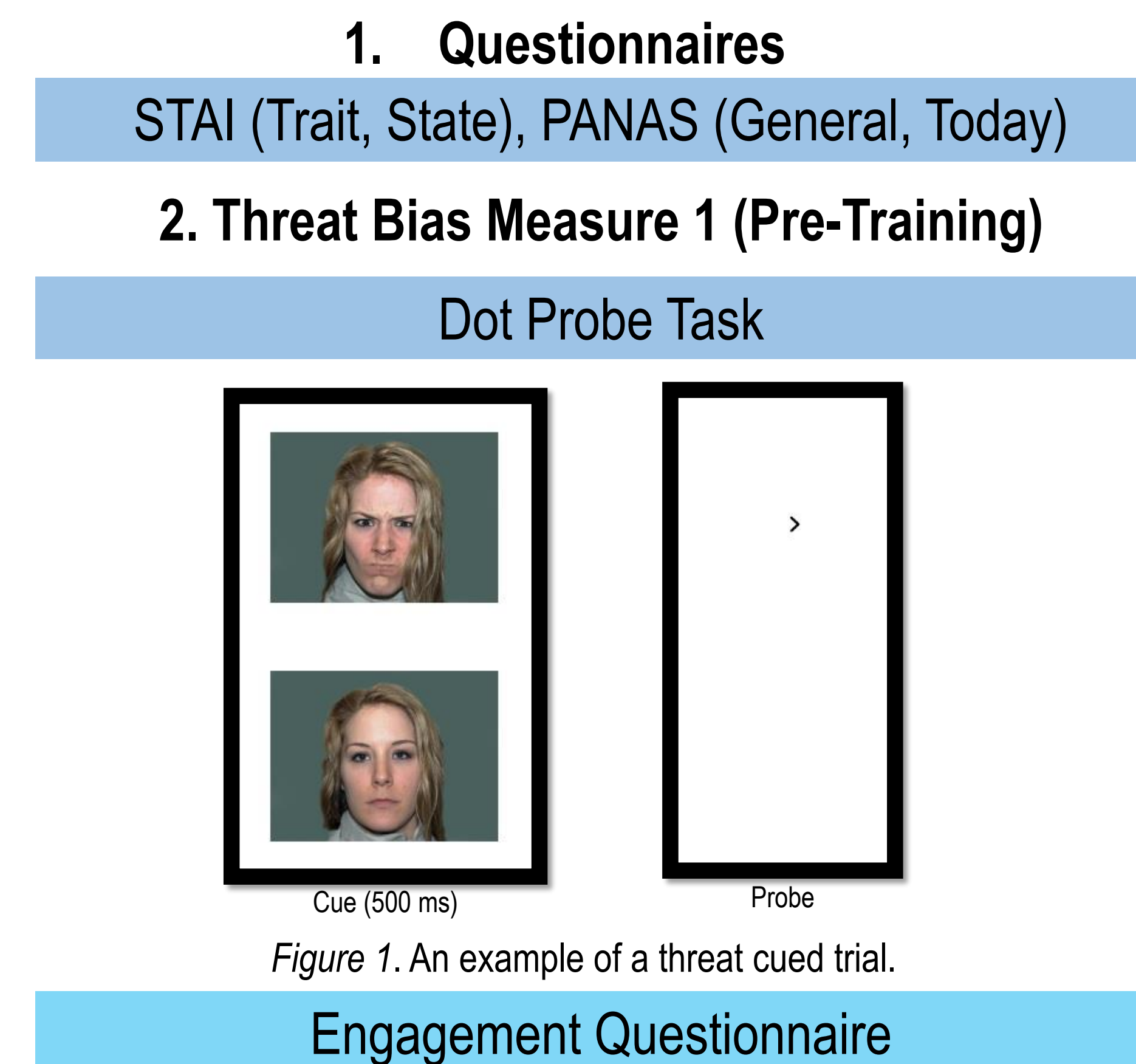


Figure 1. An example of a threat cued trial.

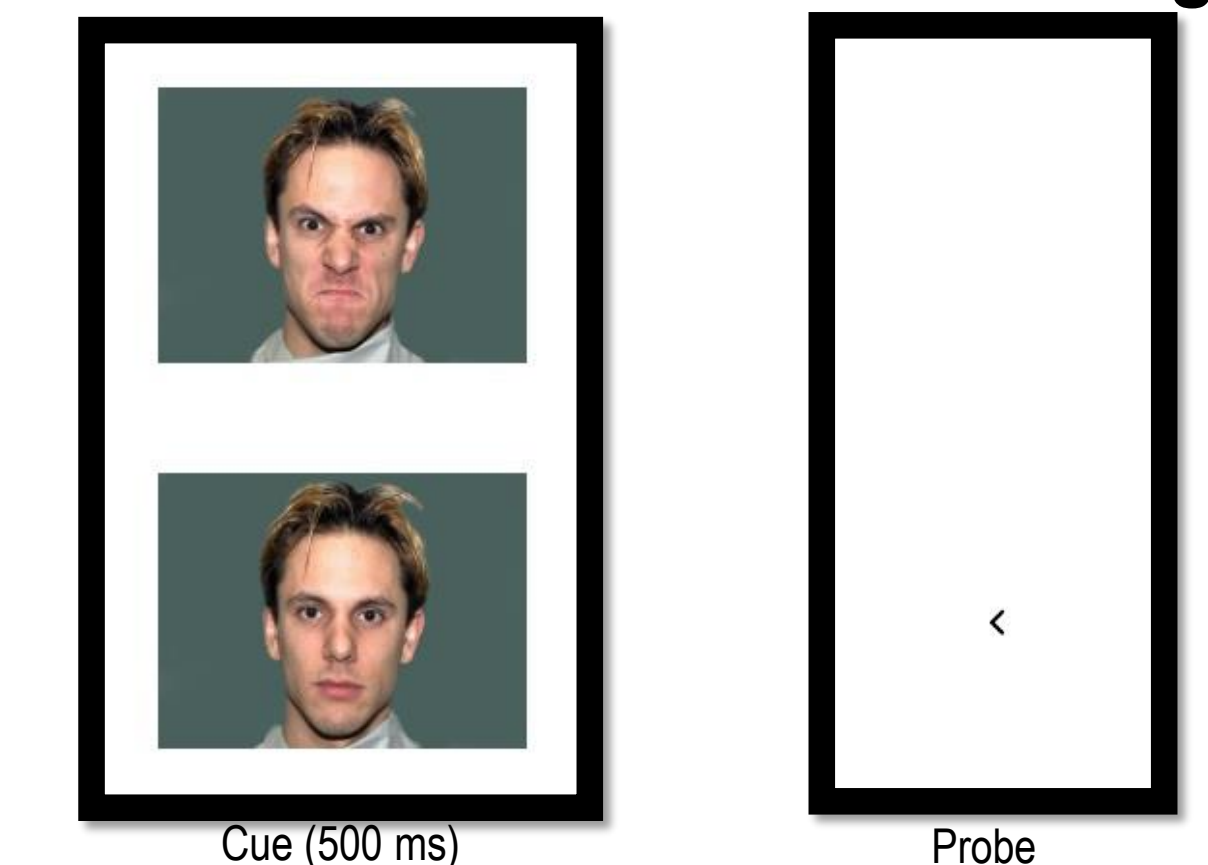
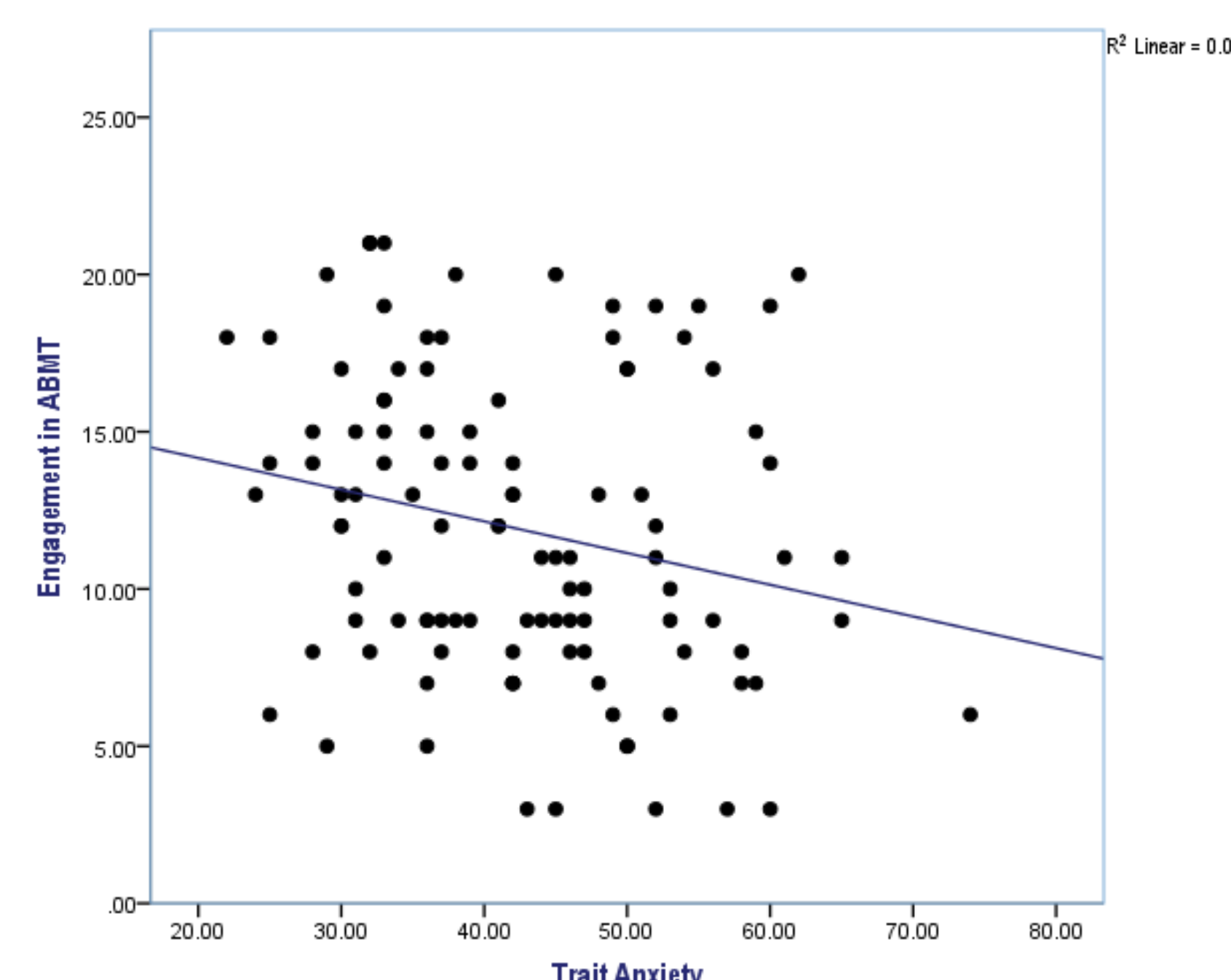


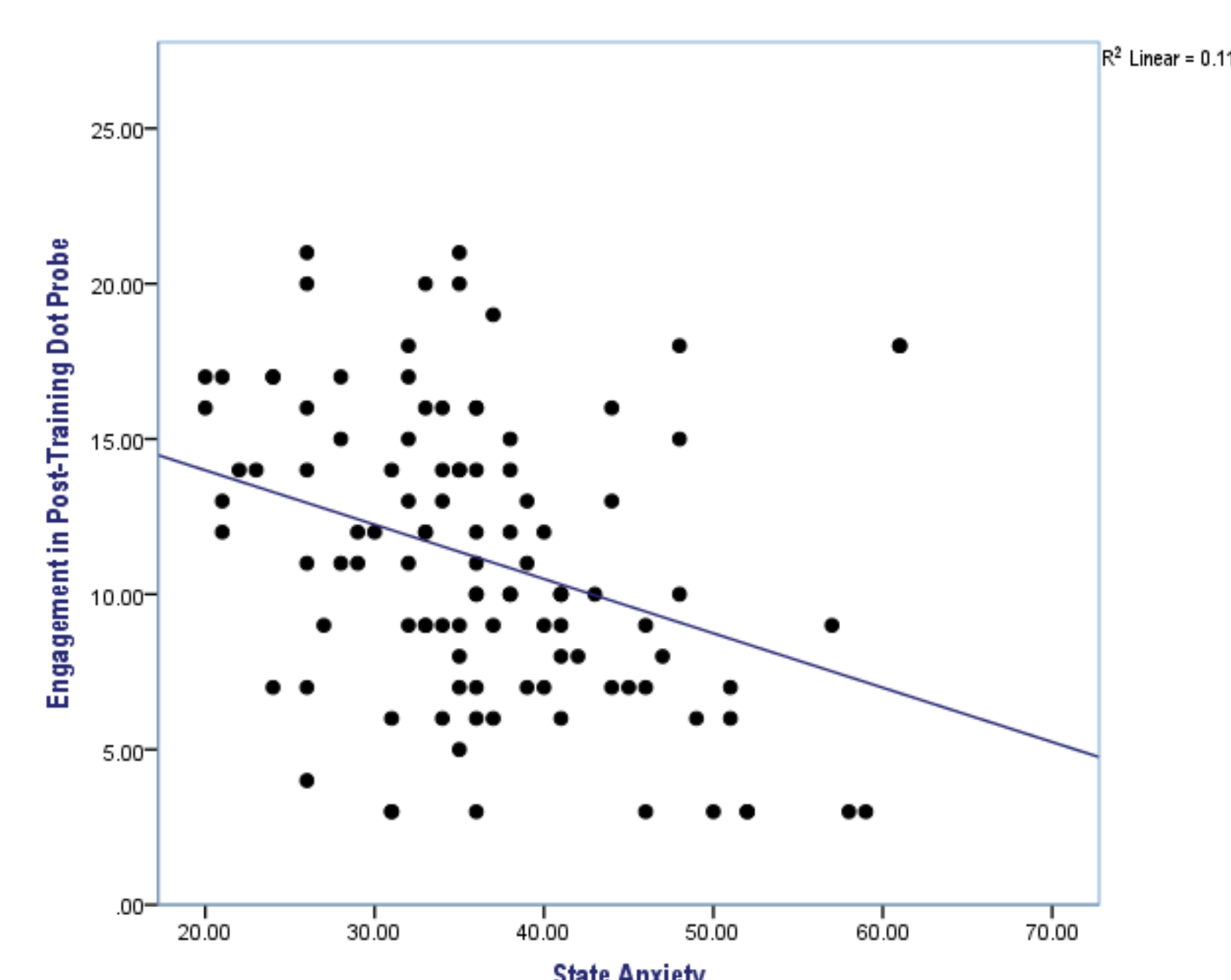
Figure 2. An example of a non-threat cued trial.

RESULTS

Anxiety was Associated with Decreased Engagement

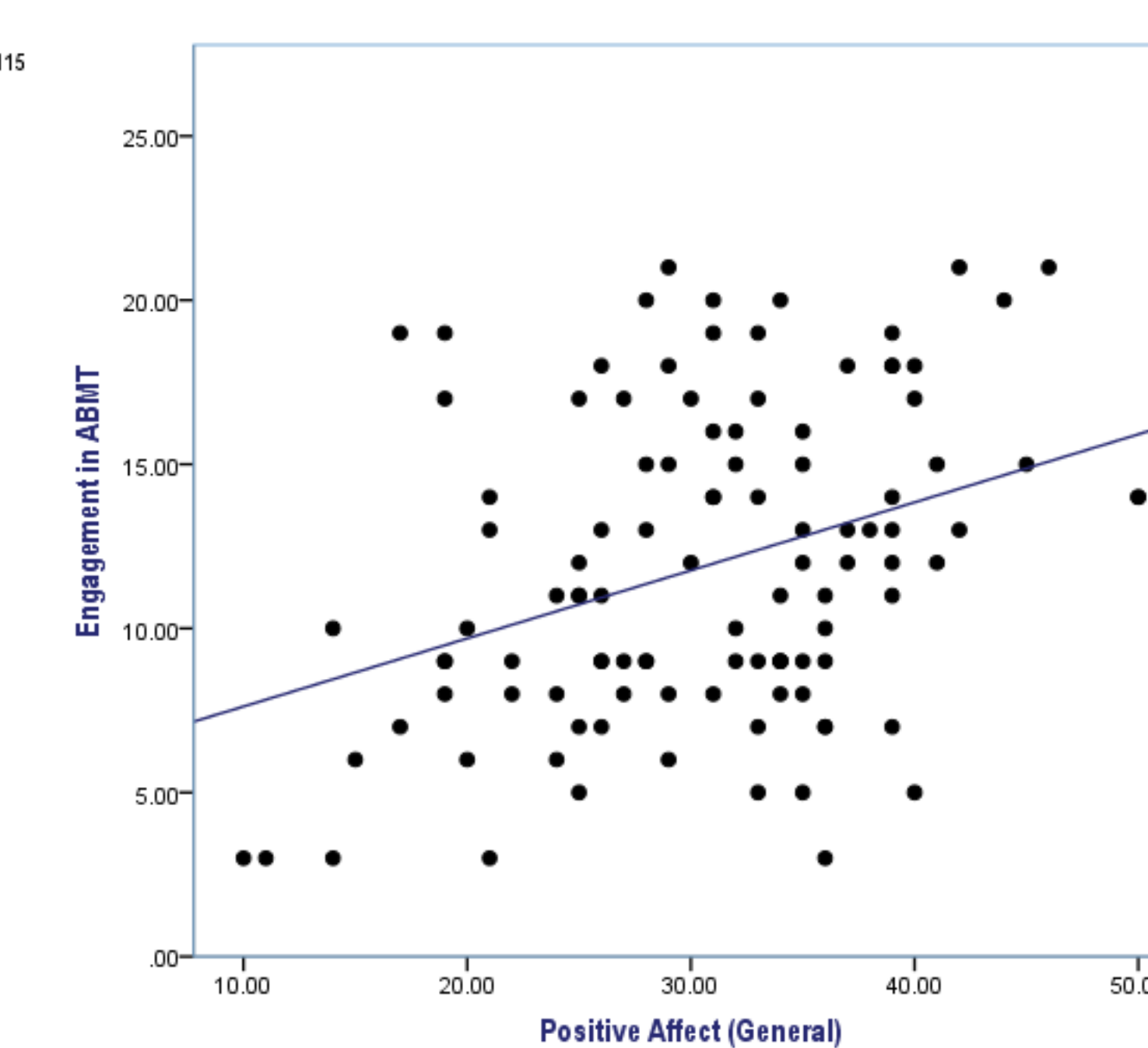


- Higher ratings of trait anxiety ($M = 42.50$, $SD = 10.78$) were associated with decreased engagement in all tasks, p 's < .02.

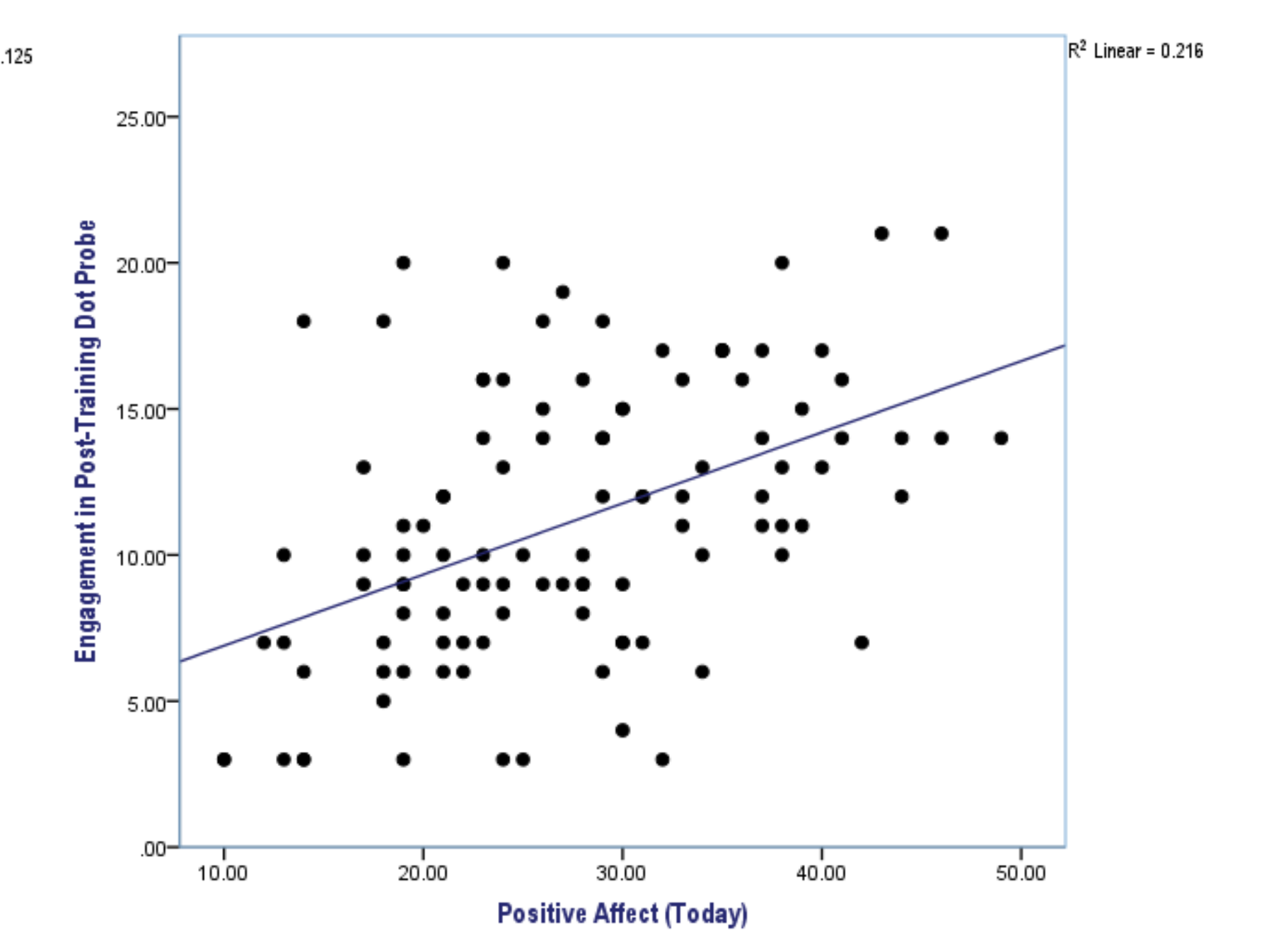


- Higher ratings of state anxiety ($M = 36.25$, $SD = 9.20$) were associated with decreased engagement in all tasks, p 's < .002.

Positive Affect was Associated with Increased Engagement

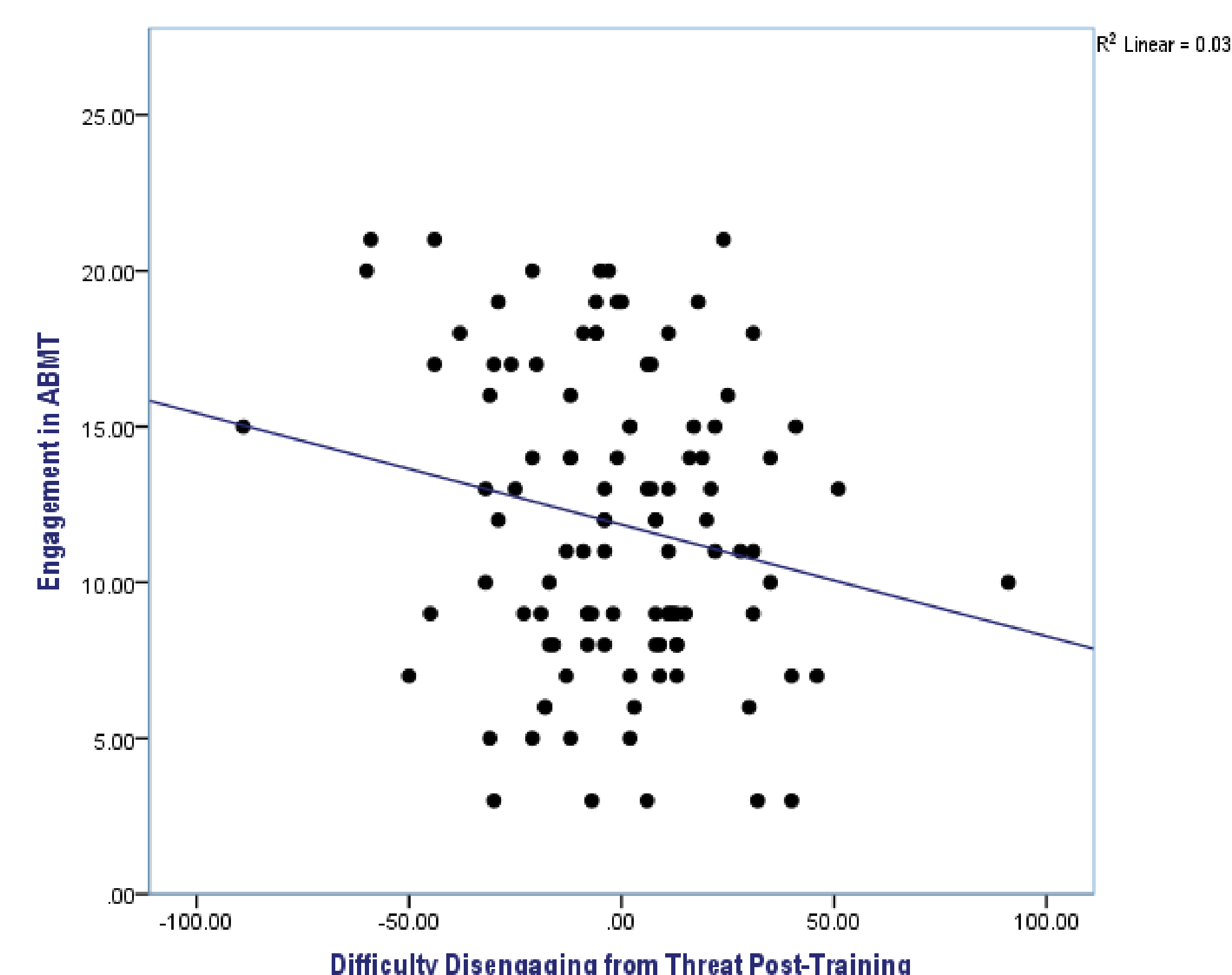


- Higher ratings of general positive affect ($M = 30.63$, $SD = 8.13$) were associated with increased engagement in all tasks, p 's < .001.



- Higher ratings of positive affect on the day of the study ($M = 27.31$, $SD = 9.04$) were associated with increased engagement in all tasks, p 's < .001.

Higher Engagement was Associated with Post-Training Reductions in Threat Bias



- Higher levels of engagement in ABMT ($M = 11.89$, $SD = 4.79$) were associated with decreased difficulty disengaging from threat post-training ($M = -.69$, $SD = 26.00$), $r(108) = -.194$, $p = .045$.

DISCUSSION

- This study was among the first to systematically examine the impact of task engagement on ABMT efficacy in a large group of non-clinically anxious adults.
- The results implicate the importance of boosting engagement to optimize ABMT efficacy.
- Future research should focus on developing methods aimed at improving task engagement.

REFERENCES

- Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin*, 133(1), 1.
- Dennis, T. A., & O'Toole, L. J. (2014). Mental health on the go: Effects of a gamified attention-bias modification mobile application in trait-anxious adults. *Clinical Psychological Science*, 2167702614522228.
- Matthews, G., Campbell, S. E., Falconer, S., Joyner, L. A., Huggins, J., Gilliland, K., ... & Warm, J. S. (2002). Fundamental dimensions of subjective state in performance settings: Task engagement, distress, and worry. *Emotion*, 2(4), 315.
- Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory (form Y1)* ("self-evaluation questionnaire").
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063.