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Approach-motivated positive affect reduces breadth of attention: Registered replication report of Gable and Harmon-Jones (2008)☆

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ABSTRACT

This is an independent replication of a study conducted by Gable and Harmon-Jones [Gable, P. A., & Harmon-Jones, E. (2008). Approach-Motivated Positive Affect Reduces Breadth of Attention. *Psychological Science*, *19*(*5*), 476–482]. In this influential paper, the authors demonstrated positive affect high in approach motivation to reduce the breadth of attention. The present replication study includes a direct replication of Experiment 2 from the original paper, comparing positive affect high in approach motivation with neutral affect, as well as a conceptual replication, using different affective and control stimuli and comparing positive affect high in approach motivation, positive affect low in approach motivation and neutral affect within one experiment. In both the direct and conceptual replication, we observed positive stimuli that were associated with high approach motivation to reduce attentional breadth in a Navon task when compared to control stimuli, thus replicating the effect reported by Gable and Harmon-Jones (2008). These results increase confidence in the generalizability of the original findings across cultures, as well as across different stimuli.

1. Introduction

Emotions and moods not only influence the contents of cognitive processes (e.g., which stimuli we attend to), but they also modulate *how* information is processed (e.g., how narrow or wide the focus of attention is, for review see Bolte & Goschke, 2010; Goschke & Bolte, 2014). More specifically, there is evidence that positive affect is associated with a broadened focus of attention and a bias towards global or holistic aspects of stimuli, whereas negative affect is associated with a constricted focus of attention and promotes the processing of local details (see Fredrickson, 2013; Friedman & Förster, 2010, for reviews). For instance, positive affect has been shown to increase cognitive flexibility in a range of tasks, as indicated by activation of remote associates (Bolte, Goschke, & Kuhl, 2003; Rowe, Hirsh, & Anderson, 2007; Topolinski & Deutsch, 2013), creative problem-solving and decision-making (Fredrickson, 2013; Isen, 2007; Isen, Dalgleish, & Power, 1999), improved execution of non-dominant responses in the face of competing automatic responses (Kuhl & Kazén, 1999), and greater global than local visual processing (Gasper & Clore, 2002). Conversely, positive affect impaired performance in tasks requiring focused attention and filtering out of distracting information (Bolte & Goschke, 2010; Goschke & Bolte, 2014; Zwosta, Hommel, Goschke, & Fischer, 2013). These findings have been generally interpreted as evidence for the idea that positive mood is associated with increased cognitive flexibility and a broadened focus of attention, which promotes the activation of an extended network of thoughts and memories and the exploration of new ideas.

However, in an impactful paper, Gable and Harmon-Jones (2008) argued that broadening effects of positive mood on attention in earlier studies resulted from the low motivational intensity of the affective manipulations in these studies, rather than the positive valence. According to their *motivational dimensional model of affect* (Gable & Harmon-Jones, 2010b), positive vs. negative valence and intensity of approach vs. avoidance motivation are two orthogonal dimensions characterizing emotions. More specifically, positive affect low in approach motivational intensity (in the following called *positive-low*) (e.g., joy) is assumed to signal that goal pursuit runs smoothly or that the goal was obtained and that there is no need for effortful control, thus promoting an explorative processing mode and a broadened focus of attention. In contrast, positive affect high in approach motivational intensity (in the following called *positive-high*) (as elicited, for instance, by pictures of tasty food, which induce an appetitive motivational state related to the pursuit of the goal to attain food) is assumed to have the opposite effect and constrict rather than expand the focus of attention (presumably to filter out irrelevant stimuli during goal pursuit). The motivational dimensional

☆ The current research was conducted according to a preregistered protocol available at: https://osf.io/c2bt8.

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model thus predicts that affective stimuli high in motivational intensity (e.g., eliciting enthusiasm or disgust) induce a narrowed focus of attention irrespective of whether their affective valence is positive or negative, whereas both positive and negative affective stimuli low in motivational intensity (e.g., eliciting joy or sadness) induce a broadening of the focus of attention.

According to Gable and Harmon-Jones (2008), previous studies investigating effects of emotions on the focus of attention had used affect induction manipulations (e.g., watching funny movies, recalling pleasant memories, receiving a small gift) likely creating positive mood that is low in approach motivation and unrelated to goal pursuit (e.g., amusement or happiness), thus confounding positive emotional valence with low motivational intensity. Consequently, previous studies left open the possibility that the broadening effects of positive mood on attention may have been due to low motivational intensity rather than positive valence per se.

To address this confound, Gable and Harmon-Jones (2008) compared the effect of positive-high affect on the focus of attention with the effect of positive-low affect (Experiment 1) or with a neutral control condition (Experiment 2). In Experiment 1, positive-low affect was induced with films depicting cats in humorous situations, whereas positive-high affect was induced with pictures of delicious desserts. After viewing the emotional stimuli, participants performed a visual global–local shape task (Kimchi & Palmer, 1982), in which they had to judge which of two figures resembled a reference figure more. One of the comparison figures matched the reference figure with respect to the local elements out of which the figures were composed and the other comparison figure matched the reference figure with respect to its global shape. In Experiment 2, positive-high versus neutral affect were induced by presenting either a dessert or a rock picture, respectively. To assess the focus of attention, participants performed a global–local letter task (Navon, 1977), in which they were presented with large letters composed of smaller letters and had to indicate as fast as possible which of two target letters the display contained. Targets could be instantiated either by the large letter or by the small letters out of which the large letter was composed. As predicted, in both tasks, positive-high affect narrowed the focus of attention as indicated by a relatively stronger bias to judge the similarity of figures based on local rather than global features (Experiment 1) or as indicated by slower response times (RTs) to global targets after dessert pictures than after rock pictures, and faster RTs to local targets after dessert pictures than after rock pictures (Experiment 2).

These initial findings were later extended in various ways. For instance, it has been shown that attention-narrowing effects of appetitive stimuli are accompanied by relatively higher left frontal EEG activity as a neural indicator of approach motivation (Harmon-Jones & Gable, 2009). Moreover, Gable and Harmon-Jones (2010a) showed that, compared to a neutral control condition, negative affect low in motivational intensity (induced by sad pictures) caused attentional broadening, whereas negative affect high in motivational intensity (disgust) narrowed the focus of attention in the Navon letter task. Further converging evidence for the moderating role of motivational intensity in the influence of positive affect on attentional flexibility was reported by Liu and Wang (2014) who observed that positive-low affect increased cognitive flexibility at the cost of higher distractibility in an attentional set-switching task (Dreisbach & Goschke, 2004), whereas positive-high affect reduced distractibility but increased perseverance.

The motivational dimensional model of affect proposed by Gable and Harmon-Jones (2010b) has deservedly been met with great interest and was highly influential in recent research on emotion and attention (see Harmon-Jones, Gable, & Price, 2012, for a review). However, there are also several inconsistencies in the current record of empirical findings. For instance, Friedman and Förster (2000), using a direct manipulation of approach and avoidance tendencies (embodied manipulation of arm flexion vs. extension), reported that priming approach motivation (by instructing participants to flex their arm) broadened the focus of attention, while avoidance motivation narrowed it. In another experiment, Friedman and Förster (2001) manipulated approach and avoidance motivation by instructing participants to lead a mouse out of a maze to either find a piece of cheese (approach condition) or escape a hovering owl (avoidance condition). Results demonstrated a broadened focus of attention in the Navon task (Navon, 1977) after approach priming and a narrowed focus of attention after avoidance priming. As it is improbable that in the studies by Friedman and Förster (2000, 2001) motivational intensity was higher in these avoidance conditions than in the approach conditions, the motivational dimensional model does not predict these effects.

Other studies reported that the effects of positive affect depended on whether participants had a predominant preference for a global or a local processing mode (Baumann & Kuhl, 2005) or that positive mood only strengthened whatever processing mode was currently dominant without modulating it (Huntsinger, 2012). Finally, there are studies that completely failed to replicate the effects of positive mood on the focus of attention (Bruyneel et al., 2013).

In light of these conflicting findings and the fact that most close replications of the original findings by Gable and Harmon-Jones (2008) stem from their own research group, and given the high impact and theoretical relevance of the motivational dimensional model of affect, we believe that a direct replication by an independent research group is critical in order to evaluate the robustness of the obtained effects. In the present replication study, we attempted to emulate as closely as possible the original settings of Experiment 2 by Gable and Harmon-Jones (2008), and, whenever possible, use the original materials obtained from the authors. However, the affective and motivational nature of the stimuli might be affected by cultural factors. Therefore, the fact that the original study was conducted in Texas, USA might undermine the validity of the original research materials in the German research environment where the replication data were sampled (i.e., the city of Dresden). Therefore, in addition to using the original stimuli, we also conducted a conceptual replication experiment in which we used stimuli for which normative data were generated in German-speaking countries (Blechert, Meule, Busch, & Ohla, 2014). We hypothesized that using a priori rated stimuli would help to establish potential boundary conditions as well as to test the generalizability of the original findings. Finally, in the original paper the authors compared positive-high affect with positive-low affect (Experiment 1) and positive-high affect with neutral affect (Experiment 2). We propose that a direct comparison of these three conditions within one experiment provides a stronger test of the critical hypothesis that positive-high affect reduces the breadth of attention compared to positive-low and neutral affect. Therefore, in our conceptual replication experiment, we included stimuli evoking positive-high affect, stimuli evoking positive-low affect, as well as a neutral affect control condition.

2. General method

As described by Simonsohn (2015), in order to have sufficient statistical power, we aimed at a sample that is 2.5 times the original sample size (32 participants), which is 80 participants. Although originally we planned to conduct the direct and conceptual replication experiments one after the other (compare the preregistered replication plan), running both experiments in succession would have resulted in a total duration of 2.5 h and we feared that the long duration would undermine the quality of the data sampled in the second half of the experiment. Therefore, we decided to run both experiments separately but in parallel, with 80 participants in each experiment. Participants were randomly assigned to one of the two experiments: either the direct replication or the conceptual replication. The general procedure was the same for both experiments.

3. Direct replication

3.1. Method

For the direct replication, we kept the design and the procedure as close as possible to the original study. We contacted the authors of the original paper and obtained from them the materials used in the Navon letter task. The main difference was the language of instructions - as our study was conducted at a German university, all instructions were in German (see Appendix A.1 in supplemental materials for the translation). We also included a German version (Krohne, Egloff, Kohlmann, & Tausch, 1996) of a short mood questionnaire (PANAS; Watson, Clark, & Tellegen, 1988) at the beginning of the experiment to control for possibly confounding effects of the initial mood.

3.1.1. Participants and design

Eighty students were recruited on the campus of the Technische Universität (*TU*) Dresden. The a priori exclusion criteria were color blindness and being a senior psychology student (senior psychology students at the TU Dresden are already familiar with the concept of affective modulation). One participant did not meet these inclusion criteria, therefore the data were discarded and an additional participant was recruited. In addition, one participant was excluded because his error data revealed that he did not respond according to instructions, resulting in a sample of 79 participants ($M_{age} = 24.86$, $SD = 4.67$[2]; 55 females). Participants were blind to the hypothesis; the study description used for recruiting described it generally as a study on cognitive processes. The experiment had a 2 (focus: local vs. global) × 2 (affective condition: positive-high vs. neutral) within-subjects design.

3.1.2. Materials

3.1.2.1. Affect induction and attentional breadth. To assess attentional breadth we used the Navon letter task (Navon, 1977). In this task, participants are shown large letters that are composed of smaller letters (e.g., a large *H* made up of small *F*s) and are asked to indicate whether the display contains the letter *T* or *H* by pressing the left or the right control key, respectively. A global (broad) attention focus was indicated by faster response to global targets (a large *T* or *H* made up of small *F*s or *L*s), a local (narrow) attention focus was indicated by faster responses to local targets (a large *F* or *L* made up of small *T*s or *H*s). Each trial was preceded by a picture. We used the same stimuli, i.e., pictures of desserts (positive-high affect) and rocks (neutral stimuli) and the same DMDX software script (Forster & Forster, 2003) as Gable and Harmon-Jones (2008).

3.1.2.2. Manipulation check. Each picture[3] used in the affect induction was presented again for 3 s after which participants rated how pleasing (from *very pleasing* to *very unpleasing*) and arousing (from *exciting* to *calm*) it was using 9-point Self-Assessment Manikin scales (Backs, da Silva, & Han, 2005; Bradley & Lang, 1994). Desire for each pictured object was measured (1 = *really desired*, 9 = *did not desire*) on a numeric scale. The instructions and the scales were presented in German (see Appendix A.2 in supplemental materials). The scales were presented with E-prime software, Version 2.0 [Psychology Software Tools].

3.1.3. Procedure

Data collection was conducted in a laboratory by student assistants who were blind to the hypothesis, but not to the condition (due to differing lengths of both conditions). Upon arriving in the laboratory, participants were greeted by an assistant, signed the informed consent and were seated in separate cubicles with computers (PC with a 19″ TFT monitor, 1280 × 1024 pixels). After filling out the mood questionnaire at the computer, participants did the Navon letter task with the affective induction. The procedure and timing of the Navon task were the same as in the original experiment, i.e., after 6 practice trials with neutral pictures, participants viewed 64 experimental trials. Every trial began with a fixation cross (500 ms), followed by a picture (6000 ms), another fixation cross (500 ms), and a letter from the Navon task (until response or 5000 ms when no response was given). The intertrial interval was 18,000 ms to 20,000 ms long. After the Navon task, the pictures were presented again to be rated regarding pleasantness, evoked arousal, and desirability. At the end of the task, participants were asked to indicate how long it had been since they had last eaten (in hours). After completing the experiment, participants were thanked, debriefed, and compensated with either money or study credits.

Table 1
Individual stimulus ratings as a function of affective condition.

Rating	Affective condition					
	Positive-high		Positive-low		Neutral	
	M	*SD*	*M*	*SD*	*M*	*SD*
Direct replication						
Valence	6.77_a	1.26			5.44_b	1.08
Arousal	4.78_a	1.76			3.54_b	1.38
Desire	5.89_a	1.78			3.02_b	1.33
Conceptual replication						
Valence	7.01_a	0.98	6.69_b	1.10	4.71_c	0.85
Arousal	4.04_a	1.71	4.02_a	1.52	3.29_b	1.35
Desire	6.03_a	1.46	4.43_b	1.47	2.50_c	1.01

Note. Higher scores indicate higher ratings. Different subscripts between columns indicate that means differ at $p < .05$.

3.2. Results

3.2.1. Mood check

We initially planned to assess the participants' baseline mood with the PANAS, but due to a programming error the data were not adequately logged and could not be interpreted. Note that this was not an essential issue in the original article because Gable and Harmon-Jones (2008) did not report mood checks.

3.2.2. Manipulation check

One participant got assigned to the wrong manipulation check condition so that the pictures he saw in the Navon task and the pictures he rated in the manipulation check were not the same. Hence, his data were excluded from this analysis (but not from the main analysis), resulting in a sample of 78 participants. A 3 (ratings: valence vs. arousal vs. desire) × 2 (affective condition: positive-high [desserts] vs. neutral [rocks]) repeated-measures analysis of variance (ANOVA) with participants' ratings of the pictures as the dependent variable revealed a significant interaction,[4] $F(1.74,134.13) = 59.24$, $p < .001$, $\eta_p^2 = .44$. Participants rated the dessert pictures as significantly more pleasing, arousing, and desirable than the rock pictures, all *p*s < .001 (see Table 1).

3.2.3. Attentional breadth

As in the original experiment, RTs were logarithmically transformed. Practice trials, incorrect trials (3.20% of the sample), and trials with RTs more than 3 standard deviations above the mean for that Navon stimulus (1.16% of the sample) were excluded from the analysis (Fazio, 1990; after Gable & Harmon-Jones, 2008). Replicating the interaction effect observed by Gable and Harmon-Jones (2008) (see Fig. 1a), a 2 (focus: local vs. global) × 2 (affective condition: positive-high vs. neutral) repeated-measures ANOVA revealed a significant interaction, $F(1, 78) = 25.19$, $p < .001$, $\eta_p^2 = .24$, (see Fig. 1b).

[2] Stating the age was optional, therefore the age statistics are based on $N = 72$.

[3] Erroneously, one picture from the positive-high condition was omitted from the ratings (a strawberry dipped in chocolate), but was included in the main task.

[4] Greenhouse–Geisser-corrected values are presented due to violation of sphericity.

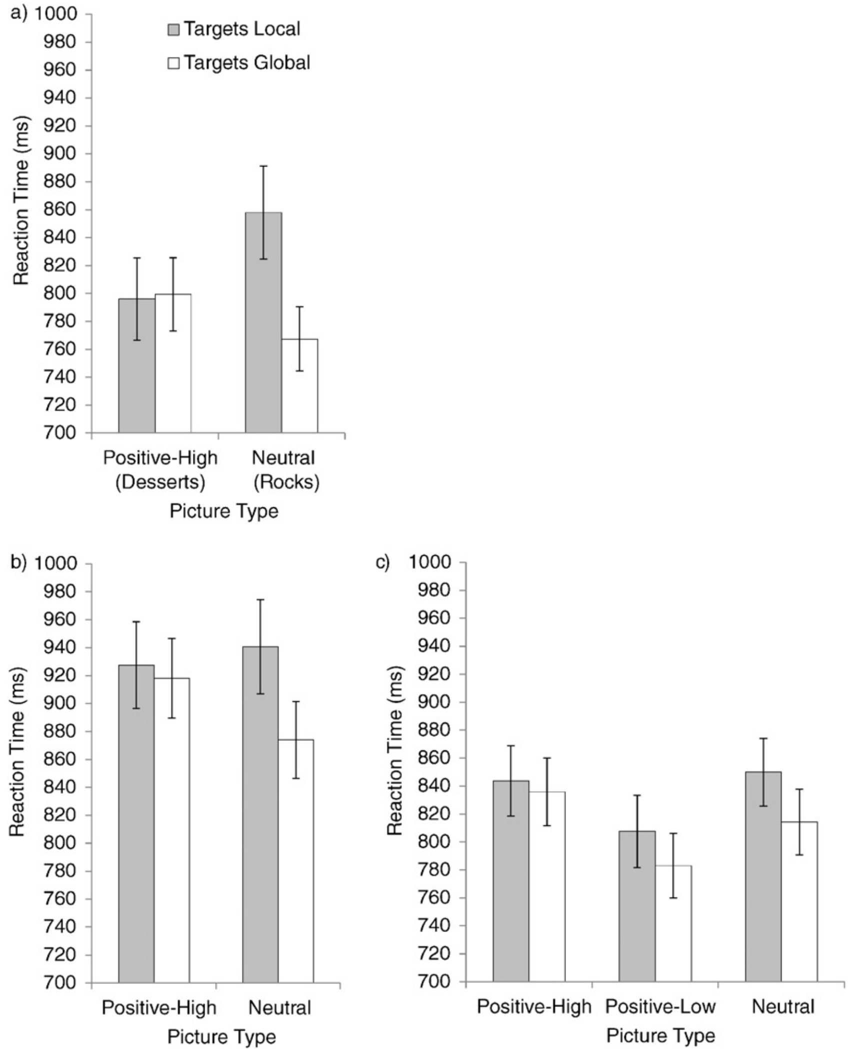

Fig. 1. Reaction times for local and global targets as a function of affective condition. Results from (a) the original study (adapted from Gable & Harmon-Jones, 2008; Experiment 2), (b) the direct replication, (c) the conceptual replication. Error bars represent ± 1SEM.

Responses to global targets were significantly slower after dessert pictures (M = 918.13, SD = 253.09) than after rock pictures, (M = 873.93, SD = 244.76), p < .001. However, even though responses to local targets were slightly faster after dessert pictures (M = 927.50, SD = 276.32) than after rock pictures (M = 940.65, SD = 298.88), this contrast did not reach statistical significance, p = .144. In the neutral condition (rock pictures), responses to global targets were significantly faster than to local targets, p < .001, which is consistent with the global precedence effect (Navon, 1977) and was also reported by Gable and Harmon-Jones (2008). In the dessert condition, RTs to global and local targets did not differ, p = .957, which also mirrors the finding by Gable and Harmon-Jones (2008).

3.2.4. Time last eaten

There was no significant correlation between the time last eaten and attentional breadth in the dessert condition, $r = -.20$, $p = .084$, nor did time last eaten correlate with valence (r = .07), arousal (r = .13) or desire (r = .18) ratings of the dessert pictures, all ps > .106.

In summary, our direct replication yielded the same pattern of results as Experiment 2 of the original study (Gable & Harmon-Jones, 2008). The German sample rated the pictures similarly as the American sample on pleasure, arousal, and desire, and showed a comparable reduction of attentional breadth after dessert pictures inducing positive-high affect compared to neutral pictures of rocks. Notably, this effect was driven exclusively by differences in responses to global targets.

4. Conceptual replication

4.1. Method

The same procedure, software, and self-report measures to assess initial mood were used as in the direct replication. The main difference was that we used a different set of pictures that were pretested in a German population. Additionally, in order to directly compare positive-high affect with positive-low affect and a neutral condition, we changed the design into a 3 (positive-high affect vs. positive-low affect vs. neutral affect) × 2 (local vs. global targets) within-subjects design.

4.1.1. Participants

Eighty students (M_{age} = 24.30, SD = 4.95[5]; 48 females) were recruited at the same time as the direct replication and according to the same criteria and procedure.

[5] Stating the age was optional, therefore the age statistics are based on N = 77.

4.1.2. Materials

4.1.2.1. Affect induction and attentional breadth. We used the same Navon letter task (Navon, 1977) as in the direct replication, but used a different set of pictures that had been pre-tested on a German-speaking population. The dataset ("Food-pics"; Blechert et al., 2014) contains pictures of objects and food items. All pictures were rated on valence (1 = *very negative*, 100 = *very positive*) and pictures presenting food items were additionally rated on desire to eat/craving (1 = *not at all*, 100 = *extremely*) and palatability (1 = *not at all*, 100 = *extremely*). In our choice of pictures, we followed the logic described in the original paper, i.e., for positive-high stimuli we chose mouth-watering food pictures with high (one standard deviation above the mean) positive valence ($M = 69.55$, $SD = 3.98$), high craving ($M = 50.14$, $SD = 7.56$) and high palatability ($M = 76.20$, $SD = 4.16$) ratings. For positive-low stimuli we chose pictures of animals and flowers with high positive valence ($M = 67.31$, $SD = 3.74$). There was no significant difference, $t(62) = 1.70$, $p = .094$ in valence ratings between positive-low and positive-high stimuli. For neutral stimuli we chose pictures of objects with lower valence ($M = 32.07$, $SD = 2.34$). The list of the stimuli and their respective ratings can be found in the supplemental materials (Appendix A.3).

4.1.2.2. Manipulation check. We used the same ratings as in the direct replication, but with the new pictures.[6]

4.1.3. Procedure

The procedure was the same as in the direct replication. Due to the additional condition with positive-low affect, the Navon task consisted of 6 neutral practice trials and 96 experimental trials.

4.2. Results

4.2.1. Manipulation check

Two participants received a manipulation check that did not match the stimuli in the Navon task so that their data were excluded from the analysis of the manipulation check (but not the main analysis), resulting in a sample of 78 participants. A 3 (ratings: valence vs. arousal vs. desire) × 3 (affective condition: positive-high vs. positive-low vs. neutral) repeated-measures ANOVA with participants' ratings of the pictures as the dependent variable revealed a significant interaction effect,[7] $F(2.81, 216.28) = 94.32$, $p < .001$, $\eta_p^2 = .55$. Positive-high pictures differed significantly from neutral pictures in valence, arousal, and desire (see Table 1). Desire ratings were highest for positive-high pictures, intermediate for positive-low pictures and lowest for neutral stimuli, all $ps < .001$. Importantly, arousal ratings of positive-low and positive-high pictures did not differ, $p = .912$. Note that although the valence ratings of positive-low and positive-high pictures did not differ significantly in the pre-test, they differed significantly in this sample, $p < .001$.

4.2.2. Attentional Breadth

RTs in the Navon letter task were logarithmically transformed. Practice trials, incorrect responses (2.83% of the sample), and trials with RTs more than 3 SDs above the mean for that Navon stimulus (0.6% of the sample) were excluded from analyses. The 2 (focus: local vs. global) × 3 (affective condition: positive-high vs. positive-low vs. neutral) repeated-measures ANOVA revealed a significant interaction, $F(2,158) = 4.14$, $p = .018$, $\eta_p^2 = .05$ (see Fig. 1c). In order to better understand the interaction with regard to our hypotheses, we conducted two additional analyses: The first one only compared positive-high affect to neutral affect (comparable to Experiment 2 by Gable and Harmon-Jones (2008) and our direct replication); the second one compared only positive-high affect to positive-low affect (comparable to Experiment 1 by Gable and Harmon-Jones (2008)).

In the first additional analysis, the 2 (focus: local vs. global) × 2 (affective condition: positive-high vs. neutral) repeated-measures ANOVA revealed a significant interaction effect, $F(1,79) = 6.91$, $p = .010$, $\eta_p^2 = .08$. This narrowing effect replicates the effect of the original study with another stimulus set. RTs to global targets were significantly slower after positive-high pictures ($M = 835.84$, $SD = 216.05$) than after neutral pictures ($M = 814.26$, $SD = 211.26$), $p = .009$, whereas responses to local targets were only slightly, but not significantly faster after positive-high pictures ($M = 843.62$, $SD = 225.43$) than after neutral pictures ($M = 849.91$, $SD = 216.45$), $p = .182$.

In the second additional analysis, the 2 (focus: local vs. global) × 2 (affective condition: positive-high vs. positive-low) repeated-measures ANOVA revealed no significant interaction, $F(1,79) = 2.10$, $p = .152$, $\eta_p^2 = .03$. Responses after positive-low pictures were faster to both local ($M = 807.61$, $SD = 231.84$) and global targets ($M = 783.03$, $SD = 207.13$), $p < .001$ than after positive-high pictures, which is in contrast to the results of Experiment 1 by Gable and Harmon-Jones (2008).

The manipulation check revealed that positive pictures conceptualized as low in motivational intensity received desire ratings that suggested that motivational intensity of these pictures was actually in between neutral pictures and positive-high pictures. To test whether the narrowing of attentional breadth follows this linear trend of increasing motivational intensity, we conducted a one-way repeated-measures ANOVA to compare the effect of affective condition (positive-high vs. positive-low vs. neutral) on attentional breadth indicated by a globality score (RTs for local targets–RTs for global targets). The main effect of affective condition was significant, $F(2,158) = 4.14$, $p = .018$, $\eta_p^2 = .05$. As can be seen in Fig. 2, there was a significant linear trend, $F(1,79) = 6.91$, $p = .010$, $\eta_p^2 = .08$, indicating that with increased motivational intensity, attentional breadth decreased proportionally. However, there was no significant correlation between desire ratings and the globality score, $r = .05$, $p = .670$ (see Appendix A.4 in supplemental materials).

4.2.3. Time last eaten

There was no significant correlation between the time last eaten and attentional breadth in the positive-high condition, $r = -.03$, $p = .770$, nor with valence ($r = .06$), arousal ($r = .07$) or desire ($r = -.02$) ratings of the positive-high pictures, all $ps > .545$.

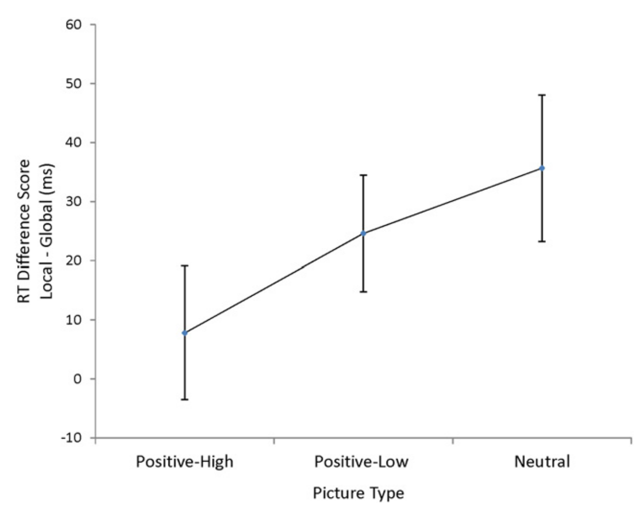

Fig. 2. Results from the conceptual replication: reaction times for difference score as a function of affective condition. Error bars represent ±1SEM.

[6] Erroneously, one picture from the positive-low condition was omitted from the ratings (picture number 1529), but was included in the main task.

[7] Greenhouse–Geisser-corrected values are presented due to violation of sphericity.

5. Discussion

In the current replication project we tested and confirmed the hypothesis proposed by Gable and Harmon-Jones (2008) that positive-high affect narrows the breadth of attention compared to neutral affect. In both a direct (using the original stimuli) and a conceptual (using new stimuli) replication, we observed that appetitive stimuli (pictures of desserts or fruit) that were rated as more desirable, more positive, and more arousing than neutral stimuli, reduced the attentional breadth as indicated by increased RTs to global targets in a Navon task. These results increase confidence about the generalizability of the original findings across cultures, as well as across different stimuli.

One of the aims of the conceptual replication was to compare the effects of positive-high, positive-low, and neutral affect within one experiment. Even though we found a significant reduction in attentional breadth when comparing positive-high affect with neutral affect, we did not find a significant effect in the comparison with positive-low affect, as reported by Gable and Harmon-Jones (2008) in Experiment 1. The analysis of the stimulus ratings revealed that positive stimuli conceptualized as having low motivational intensity, i.e., animals and flowers, were seen as moderately, rather than low, desirable. Possibly, by having three affective conditions within one experiment, we created a context, in which the positive-low condition was contrasted against the neutral and the positive-high condition. The contrast effect might have thus been not as strong as when comparing only two conditions, i.e., positive-low stimuli might be judged as not very desirable when compared only with positive-high stimuli, but moderately desirable when contrasted with both neutral and positive-high stimuli, which is exactly what we found. This contrast effect could have not only influenced the desire ratings, but also the attentional breadth, explaining the lack of a significant difference between the positive-low and the positive-high condition.

Another reason might be the fact that Gable and Harmon-Jones (2008) used stimuli with low motivational intensity that were rated low in desire, but high in amusement (a film depicting cats in humorous situations), whereas our stimuli were rated as pleasant, but were probably not amusing. Additionally, we used pictures depicting animals (e.g., butterflies, a cat, and a horse), as well as flowers and leaves and we assume that our stimuli were less cute than the films depicting kittens in Experiment 1 by Gable and Harmon-Jones (2008). As we did not measure amusement nor 'the cuteness' of the stimuli, we can only speculate about the role of these factors in the broadening effects of positive affect. This is a trade-off of using natural stimuli that evoke a broader spectrum of emotions.

A limitation of the current study is the fact that even though the positive-high and positive-low stimuli were chosen so that there was no significant difference in valence, the post-experimental ratings revealed a small, but significant difference. However, we assume that this could not have led to the lack of a significant difference between the positive-low and positive-high affect condition, as we found a difference between positive-high and neutral affect condition that also differed in valence.

Contrary to the original findings, in both the direct and conceptual replication the effect of pictures on attentional breadth was mainly driven by responses to global targets and not by responses to local targets. However, we observed attentional breadth to decrease from positive-high stimuli, to positive-low stimuli (representing intermediate desirability, according to our manipulation check), to neutral stimuli (representing low desirability). Therefore, the results of the conceptual replication could be rather interpreted in light of the observations in Experiment 4 of Gable and Harmon-Jones (2008), which suggest attentional breadth to decrease with increasing motivational intensity.

While the comparison between experimental groups suggests a linear relation between the attentional breadth and desirability of stimuli (and, by inference, motivational intensity), an additional analysis of our data failed to provide further support for this notion. More specifically, in addition to the group-wise effect of the different classes of stimuli (positive-high, positive-low, neutral), we computed a correlation between subjective desire ratings (as a proxy for motivational intensity) and attentional breadth across participants, which proved to be non-significant (see Appendix A.4 in the supplemental materials). Hence, although the three types of stimuli differed in their desirability, subjective desirability does not seem to statistically mediate the effect on attentional breadth. Neither did we see effects of the time passed since the last meal on desirability or attentional breadth. As participants stated the time last eaten in hours, it might have been a too coarse-grained measure to detect more nuanced influences. It is also possible that participants were not able to accurately monitor the true desirability of the stimuli (cf. Nisbett & Wilson, 1977) or that other stimulus features than desirability are responsible for the variation in attentional breadth.

This notion seems plausible in the light of recent research and theory on approach-avoidance motivation, which points at the possibility that desirability is only one of several features of importance for basic motivational tendencies (see Deutsch, Smith, Kordts-Freudinger, & Reichardt, 2015; Krieglmeyer, De Houwer, & Deutsch, 2013, for discussions). Besides varying degrees of motivational intensity, approach and avoidance may go along with tendencies to increase vs. decrease the distance towards an object, to consume or to eliminate an object. Possibly, one or several of these facets are confounded with desirability in the present set-up and may be a mediator of effects on attentional breadth instead of or in concert with valence or motivational intensity. Drawing on natural stimuli to manipulate valence, motivational intensity, or other facets of motivation will always come with the risk that the observed effects are caused by correlated, albeit conceptually different unidentified stimulus features. From this perspective, future research should aim at further clarifying the inner affective and motivational conditions that modulate attentional breadth, preferably by manipulating these conditions in a more direct manner than by presenting natural stimuli.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jesp.2015.09.003.

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