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A study named desire: Local focus increases approach motivation for desserts

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Abstract When we desire something, our approach motivation is high. Recent research shows affective states high in approach motivation cause attentional narrowing (localization) (e.g.; Gable and Harmon-Jones in Psychological Science 19:476–482, 2008; Juergensen and Demaree in Motivation and Emotion 39:580–588, 2015). Does the reciprocal relationship exist? That is, when our attention is narrowed, does our motivation to approach something desirable increase? To test this, we primed participants with either global or local attentional focus before viewing images of desirable items (e.g., desserts) or neutral items (e.g., furniture). Relative to participants primed with global attentional focus, participants primed with local attentional focus demonstrated greater approach motivation to desirable desserts compared to neutral items on an Approach Avoidance Task. Despite greater approach motivation for desserts, participants with localized attention did not subjectively rate desserts as more desirable than participants with global attention. These results suggest that increased approach motivation following local priming is evidenced at an implicit level only: participants appear to be unaware of appetitive images' increased desirability.

Keywords Approach motivation · Global local focus · Desire

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Introduction

For decades, research suggested that positive affective states broaden attention whereas negative affective states narrow attention (e.g., Fredrickson 1998; Gasper and Clore 2002; Isen and Daubman 1984; Weltman et al. 1971). Attentional scope can be broad, to focus on global perceptual information and take in the big picture, i.e. "the forest," or narrow to localize on the details, i.e. "the trees" (Navon 1977). However, more recent research supports the Motivational Dimensional Model of Affect (Gable and Harmon-Jones 2010a), which indicates that affective states with similar valence can differ in attentional scope depending on the intensity of their associated approach or withdrawal motivation. Motivational intensity is the strength of motivation to approach or withdraw, and can range from low to high. For example, positive affect states low in approach motivation like joy, contentment, and post-goal positive affect require no urge or action tendency to approach an object. Therefore, these affective states are lower in approach motivation intensity than positive affect states like enthusiasm or desire that do have an associated urge to move toward an object (Gable and Harmon-Jones 2008). Likewise, negative affect states like sadness are lower in withdrawal motivation than negative affect states like fear or disgust. Fear and disgust are associated with a greater urge to withdraw from a stimulus than sadness and therefore have a higher intensity of withdrawal motivation. According to the motivational dimensional model of affect (Gable and Harmon-Jones 2010a), the intensity of approach or withdrawal motivation has a greater impact on the scope of attention than valence alone.

Researchers who concluded positive affect broadens cognitive processes and attention used manipulations evoking positive affect states low in approach-motivation like

joy or contentment, (e.g., recalling a happy event, Gasper and Clore 2002; receiving a gift; Isen and Daubman 1984; listening to positive music; Rowe et al. 2007; or viewing funny films, Isen et al. 1985; Fredrickson and Branigan 2005). Similarly, researchers concluding negative affect narrows cognition and attention examined high withdrawal-motivated negative affect states like anxiety, fear, stress, and failure (e.g., Derryberry and Tucker 1994; Easterbrook 1959; Gasper and Clore 2002; Tyler and Tucker 1981; Weltman et al. 1971; Williams et al. 1990). These studies examined the role of valence, but confounded the intensity of motivation to approach or withdraw. In contrast, the motivational dimensional model of affect (Gable and Harmon-Jones 2010a) suggests affective states high in motivational intensity, either to approach or withdraw, result in more narrowed attention than affective states lower in motivational intensity. Presumably, attention narrows because affective states high in approach or withdrawal motivation accompany biologically important behaviors. For example, protection from danger and obtainment of mates or food are necessary tasks for survival, therefore organisms block out stimuli and perceptions irrelevant to these goals.

Previous researchers have made similar arguments that narrowed attention in fear states is intuitive from an evolutionary perspective, given that fear has often indicated potentially life-threatening events requiring attention to localize and promote quick action (Fredrickson 1998, 2001). These similar conclusions differ in the mechanism believed to cause attentional narrowing. Fredrickson (1998, 2001) suggests attention narrows as a result of negative affect. However, recent research indicates that though negative affect states high in withdrawal motivation like fear and disgust do narrow attention, negative affect states low in withdrawal motivation like sadness actually broaden attention (Gable and Harmon-Jones 2010b). Therefore, affective states low in approach or withdrawal motivation, regardless of valence direction, result in more broadened attention (Gable and Harmon-Jones 2010b). And with particular interest to this paper, affective states high in approach or withdrawal motivation, regardless of valence, result in more narrowed attention (Gable and Harmon-Jones 2010a). Research suggests the neurophysiological underpinning of this relationship may be increased amplitudes of the late positive potential (LPP), which is an event-related potential reflecting facilitated attention. Specifically, appetitive images induce large LPP amplitudes and predict greater local attentional bias as a result of emotionally arousing stimuli capturing attention (Gable and Harmon-Jones 2010c).

Indeed, several studies, including a registered replication report by Domachowska et al. (2015), indicate that high approach-motivated positive affective states like desire lead to narrowed attention (e.g., Gable and Harmon-Jones 2008; Harmon-Jones and Gable 2009; Hicks et al. 2012; Juergensen and Demaree 2015; Liu et al. 2014; Nittono et al. 2012). To further elucidate the relationship between high approach motivating positive affect and attentional narrowing, we sought to examine whether the inverse relationship exists. There is growing evidence that when an emotional and cognitive process are paired together consistently over time, they become integrated (e.g., Bar 2009; Ghashghaei and Barbas 2002; Matthews 1990; Parrott and Sabini 1989; Phelps 2006; Pessoa 2008; Storbeck and Watson 2014). Simon (1967) suggested that integrated cognitive and emotional processes develop the capability to impact each other bidirectionally. Given the support for high approach motivating positive affect (an emotional process) causing local attentional focus (a cognitive process), we sought to examine whether inducing local attentional focus had the capability to produce high approach motivating positive affect. Specifically, if local focus produces increased approach motivation to desirable objects and greater ratings of desirability, this would suggest high approach motivating positive affect and narrowed attention may be integrated.

To assess this, the present study examines whether priming global versus local attentional focus differentially impacts approach motivation for desirable desserts. We randomly assigned participants to either local or global focus attention priming. All participants then completed an Approach Avoidance Task (AAT), which measured automatic action tendencies to approach or withdraw from images of neutral everyday objects and desirable desserts. After completing this implicit measure, participants provided explicit ratings for how desirable they found the neutral and dessert items pictured. We hypothesized that the local focus prime would increase approach motivating positive affect as evidenced by: (1) faster pull times on the AAT for dessert items and (2) higher subjective ratings of desirability for the dessert images.

Methods

Participants

Ninety-nine participants (46 females) enrolled in undergraduate Introduction to Psychology courses participated for partial course credit. Participants ranged in age from 18 to 25 years old ($M = 19.36$, $SD = 1.29$). This sample was a sample of convenience collected during the course of one semester. Given that this is the first study of its kind, there was not ample information that could be used to predetermine a sample size necessary to identify an effect. The Institutional Review Board approved the protocol.

Materials and procedures

Participants were first instructed about the procedures of the experiment and provided written consent. Participants then completed the following questionnaires and tasks in the order listed unless otherwise noted:

Background questionnaire

Participants provided basic demographic information including age, gender, native language, race, and ethnicity. Participants also indicated the extent they tried to control their weight through diet (1 = *not at all*, 9 = *extremely*), how often they considered caloric or nutritional information when deciding what to eat (1 = *never*, 9 = *always*), and how long it had been since their last meal or moderately sized snack.

Satiety-labeled intensity magnitude (SLIM)

Next, participants indicated their current level of hunger or satiety by making one horizontal slash mark on a vertical line with 11 descriptions ranging from "Greatest Imaginable Hunger" to "Greatest Imaginable Fullness" on the SLIM (Cardello et al. 2005). The SLIM has excellent sensitivity and an average reliability coefficient of 0.90 (Cardello et al. 2005). The SLIM was included to rule out individual differences in hunger and satiety that could affect motivation for food items.

Eating attitudes test (EAT-26)

Participants then completed the EAT-26, a 26-item questionnaire with excellent test–retest reliability that is frequently used as a screening tool to identify those at risk for eating disorders (Garner et al. 1982). Participants indicated the frequency of their feelings on a 6-point Likert scale (1 = *never*, 6 = *always*) in three categories: Dieting (13 questions), Food Preoccupation (6 questions), and Oral Control (7 questions). Scoring instructions specify a summed score of 20 or higher and certain responses to five behavioral questions suggest a potential eating disorder (Garner et al. 1982). Individuals with eating disorders have altered motivation for food and unique brain activation in response to food images (Schienle et al. 2009). Additionally, research indicates dieters demonstrate an automatic tendency to avoid tempting foods and approach diet goals as evidenced by pushing high-calorie food stimuli away and pulling diet and exercise stimuli towards them faster on an AAT than non-dieters (Fishbach and Shah 2006). Given that individuals with disordered eating can exhibit unique patterns of behaviors related to food including extreme dieting or fluctuations between strict intake control and binging, the EAT-26 was used to exclude participants meeting scoring criteria for a potential eating disorder as their responses on the AAT would likely reflect these atypical characteristics. Previous research has used the EAT-26 to exclude participants with potential eating disorders from studies involving food (e.g., May et al. 2016).

Positive and negative affect schedule (PANAS)

Participants then completed the PANAS (Watson et al. 1988) wherein they were presented with 20 affective terms, 10 positive and 10 negative. Participants indicated the extent they felt each at the time of assessment, using a rating scale of 1 to 5, (1 = v*ery slightly or not at all*, and 5 = *extremely*). The Chronbach alpha coefficients reported by Watson et al. (1988) were 0.86–0.90 for positive affect and 0.84–0.87 for negative affect. Because some researchers argue general positive affect could be a source of increased approach motivation, we wanted to ensure any increases in approach motivation were not associated with changes in general positive or negative affect occurring during the experiment. As such, participants completed the PANAS twice during the study: once at the beginning of the experiment and again after all other tasks to monitor any changes in mood.

BIS/BAS

Participants responded to 20 items assessing individual differences in sensitivity to punishments (BIS; 7 questions) and rewards (BAS; 13 questions) using a four-point Likert scale (1 = *strongly agree*, 4 = *strongly disagree*). Carver and White (1994) reported the following coefficients: BIS $\alpha = 0.74$, BAS Reward Responsiveness $\alpha = 0.73$, BAS Drive $\alpha = 0.76$, and BAS Fun Seeking $\alpha = 0.66$. The BIS/BAS scales were used to consider individual differences in sensitivity to punishment (BIS) or to reward (BAS) impacting attentional focus and approach motivation.

Attentional focus prime

All participants completed an adapted version of Navon's (1977) letter identification task modeled after Macrae and Lewis (2002) using E-Prime 2.0 Professional (Schneider et al. 2002). Priming to manipulate attentional breadth has been used in a variety of research (e.g. Fujita and Han 2009; Dale and Arnell 2014). Participants completed 5 blocks with 24 unique images of large global letters measuring 2.5 inches tall and wide, made of small, 1/6-inch letters in Courier New font. Each vertical and horizontal line was composed of eight smaller letters. Stimuli were presented on a 17″ computer monitor roughly 18″ from the participant for 120 total trials. Participants in both

conditions were shown large letters comprised of smaller mismatched letters and told to press the number 1 key if they saw an H on the screen and press the number 0 key if they saw an S on the screen. Participants were randomly assigned between the global and local focus priming via a random number generator. Participants primed for global focus attention always saw a large H or a large S made of smaller incongruent letters (e.g., a large H made of small Rs, a large S made of small Ns). Participants primed for local focus attention always saw a large incongruent letter comprised of smaller Hs or Ss (e.g., a large R made up of Hs, a large N made up of Ss). Therefore, participants primed for global focus always identified the larger, global letter, and participants primed for local focus always identified the smaller, local letters.

Dessert approach avoidance task (D-AAT)

Using E-Prime 2.0 Professional (Schneider et al. 2002) participants completed the D-AAT, an adapted Approach Avoidance Task (AAT) modeled after a previously used paradigm (Fleming and Bartholow 2014). Participants began with 10 practice trials that taught them to quickly and accurately pull or push a joystick in response to a gray box's tilt direction. Roughly half of participants were instructed to pull the joystick towards them when an image was tilted 3° to the left, and push the joystick away from them when an image was tilted 3° to the right. The other half of participants were instructed to push the joystick away when the image was tilted 3° to the left, and pull towards them when it was tilted 3° to the right. During practice trials, pulling the joystick resulted in the gray box increasing in size, appearing to come closer to the participant, and ultimately filling the screen. Pushing the joystick resulted in the gray box decreasing in size before disappearing off the screen. A random number generator was used to counterbalance the mapping between left / right picture orientation and push/pull responses. Trials were separated by a 1 s inter-stimulus interval. Correct trials were followed by the next trial. Incorrect trials were followed by a red 'X' indicating the participant had moved the joystick in the incorrect direction. Participants immediately repeated incorrect trials. Data from error trials (3.7%), and the repeated trial following the error, were excluded from analyses.

Past research by Caccioppo et al. (1993) showed humans have biased reflexes to flexor, approach movements for desirable items and extensor, withdrawal motions to negative stimuli. As such, the AAT employs a joystick to reveal automatic action tendencies to approach or withdraw from neutral and emotion eliciting stimuli by measuring participants' response times to pull stimuli towards them or push stimuli away. Images were initially presented at a medium size on the screen (333 × 256 pixels). To further emphasize pulling motions as approach movements, pulling the joystick increased the image's size making the item appear to move closer to the participant. A complete pull motion on the joystick resulted in the image filling the screen at 555 × 427 pixels. Similarly, to reinforce pushing movements as withdrawal movements, pushing the joystick decreased the size of the image making the item appear to move farther away from the participant. A complete push motion on the joystick resulted in the image decreasing to 111 × 85 pixels before disappearing off the screen. Response Time (RT) was calculated in E-Prime 2.0 (Schneider et al. 2002), as the number of milliseconds between onset of stimulus presentation and completion of a full pull motion (occurring when the image filled the screen) or a full push motion (when the image disappeared off the screen). Automatic approach bias was indicated by faster RT to pull versus push movements in response to appetitive relative to neutral images.

The D-AAT consisted of 40 neutral images selected from the International Affective Picture System (IAPS) previously rated by participants at the Center for the Study of Emotion and Attention (1999) on the Self-Assessment Manikin as neutral in valence ($M = 4.97$, $SD = 0.25$; 1 = *extremely negative*, 9 = *extremely positive*) and low in arousal ($M = 2.91$, $SD = 0.59$; 1 = *extremely unarousing*, 9 = *extremely arousing*)[1] and 40 dessert images borrowed from Gable and Harmon-Jones (2008)[2]. Participants in Gable and Harmon-Jones (2008) rated the dessert images as significantly more desirable ($M = 4.12$; 1 = *really desired*, 9 = *did not* desire) than images of rocks ($M = 7.15$). The neutral and dessert images were presented randomly without replacement with each image shown tilted in both directions, thereby ensuring participants pushed away and pulled toward them each image equally often during the experiment. Again, pulling the joystick resulted in the image increasing in size until it filled the screen, appearing to come closer to the participant. Pushing the joystick resulted in the image decreasing in size before disappearing off the screen, appearing to move farther away from the participant. Participants pushed or pulled the joystick based on the images' tilt direction, thus picture content, either a neutral item or desirable dessert, was task-irrelevant.

Consistent with previous research using the AAT (e.g. Wiers et al. 2010), individual participant data were summarized using median performances. Medians are

[1] International Affective Picture System images included in the D-AAT: 7000, 7001, 7002, 7003, 7006, 7009, 7010, 7012, 7014, 7016, 7017, 7018, 7020, 7021, 7025, 7026, 7030, 7031, 7034, 7040, 7041, 7045, 7050, 7052, 7053, 7056, 7059, 7061, 7062, 7090, 7100, 7160, 7161, 7170, 7175, 7185, 7186, 7190, 7211, and 7235.

[2] Gable and Harmon-Jones generously provided the images from their 2008 study to the co-author for use in the D-AAT.

Table 1 Participant characteristics by condition

Characteristic	Global condition $n=45$		Local condition $n=35$	
	Mean	Std. deviation	Mean	Std. deviation
Gender (%F)	48.9		40	
Age (years)	19.40	1.37	19.31	1.16
BIS	17.78	4.17	18.37	3.65
BAS total	33.60	8.46	34.06	8.77
BAS drive	9.93	3.17	10.34	2.84
BAS reward	12.91	4.83	13.60	5.05
BAS fun seek	10.76	2.56	10.11	2.56
SLIM (0–10)	4.83	1.68	5.01	1.80
Last meal (Min)	269.29	321.03	276.60	335.82
Dieting (1–9)	3.91	2.28	3.94	2.21
Count calories (1–9)	5.40	1.91	5.26	2.09

less influenced by outliers than means and eliminate the need for arbitrary cut off points to identify outliers. To quantify approach bias to desserts relative to neutral stimuli, Approach Bias was calculated as: Approach Bias = (Dessert Push RT − Dessert Pull RT) − (Neutral Push RT − Neutral Pull RT). The Approach Bias variable was calculated using both approach speed to desserts relative to neutral stimuli and withdrawal speed to desserts relative to neutral stimuli. Higher Approach Bias scores indicated greater approach bias to dessert images relative to neutral images. If Local attentional focus increases approach motivation to desserts, as predicted, then this would be reflected in significantly faster approach (pull) responses to desserts as compared to participants with global focus. This may also be accompanied by slower withdrawal (push) responses to desserts as participants with narrowed attentional focus may experience difficulty when instructed to avoid desserts. Our hypotheses are that participants with local focus will have greater approach motivating positive affect than participants with global focus as evidenced by: (1) faster pull times on the AAT for dessert items and (2) higher subjective ratings of desirability for the dessert images.

Desirability ratings

Participants then viewed pictures of the desserts and neutral items presented in the D-AAT and rated how desirable they found each image using a 9-point rating scale modeled after Gable and Harmon-Jones (2008; 1 = *really desire*, 9 = *do not desire*).

Results

Participants

Of the original 99 participants, one participant was excluded due to use of a cell phone during the D-AAT, and 18 participants were excluded for indicating potential eating disorders according to EAT-26 criteria. The remaining 80 participants (age $M=19.36$, $SD=1.28$) included 36 females and 44 males. Thirty-eight participants identified themselves as White (47.5%), 30 as Asian (37.5%), 4 as Black/African American (5%), and 8 as Other (10%).

Randomization check

Participants were randomly assigned between Global ($N=45$) or Local ($N=35$) focus conditions. A Chi square test indicated the focus condition groups did not significantly differ in terms of gender, (χ^2 [1] = 0.63, $p=.43$). Independent samples t tests were performed for continuous variables and revealed no significant group differences in age, or any of the subscale or total scores on the background questionnaire, SLIM, EAT-26, PANAS Time 1, or BIS/ BAS scales, all $ps > 0.05$ (please see Table 1).

D-AAT

Analysis of approach (pull) and avoidance (push) latencies

To assess whether speed of reaction time significantly differed between the global focus and local focus groups and whether these differences depended upon the type of image presented and/or direction of arm movement required, a three-factor ANOVA with a between subjects variable of Condition and within-subjects variables of Target and Direction was performed. The 2 (Condition: global, local) X 2 (Target: dessert, neutral) X 2 (Direction: push, pull) repeated measures ANOVA yielded a significant three-way interaction, $F(1, 78)=7.40$, $p<.01$, partial $\eta^2=0.087$. To better understand this 3-way interaction, 2-way interactions and main effects were analyzed. The 3 2-way interactions were all non-significant: Target by Condition, $F(1, 78)=0.32$, $p=.58$, partial $\eta^2=0.004$, Direction by Condition, $F(1, 78)=0.68$, $p=.41$, partial $\eta^2=0.009$, and Target by Direction, $F(1, 78)=1.14$, $p=.29$, partial $\eta^2=0.014$. However, significant main effects of Target $F(1, 78)=6.49$, $p=.013$, partial $\eta^2=0.077$, and Direction $F(1, 78)=5.70$, $p=.019$, partial $\eta^2=0.068$, were revealed. Independent samples t-tests revealed participants in the Local focus condition were significantly faster to pull (approach) dessert images ($M=753.64$, $SD=149.34$) than participants in the global focus condition ($M=818.69$, $SD=136.94$), $t(78)=2.03$, $p=.046$, $d=0.46$. The global and local focus

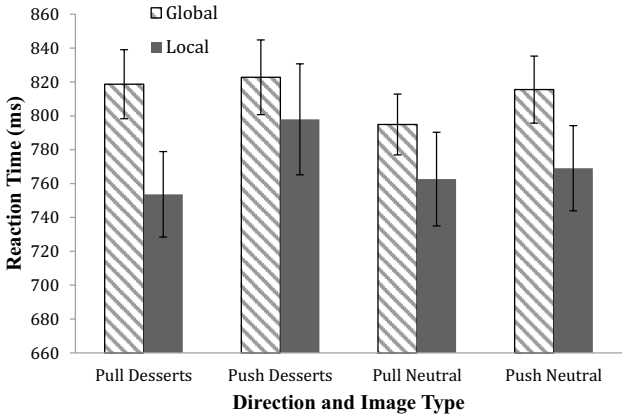

Fig. 1 Reaction time data (±1 SEM) for approach (pull) and withdrawal (push) responses to dessert and neutral stimuli by condition

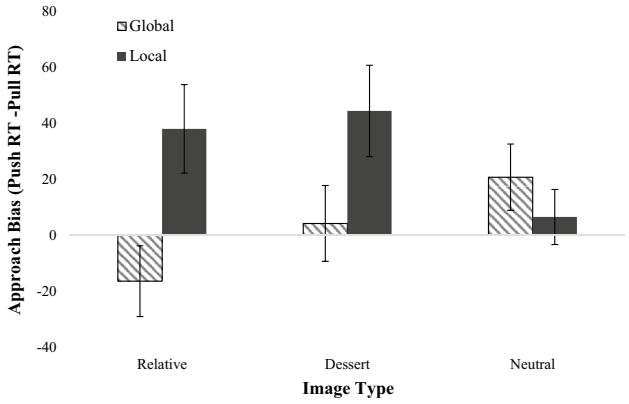

Fig. 2 Approach bias (±1 SEM) to stimuli by condition

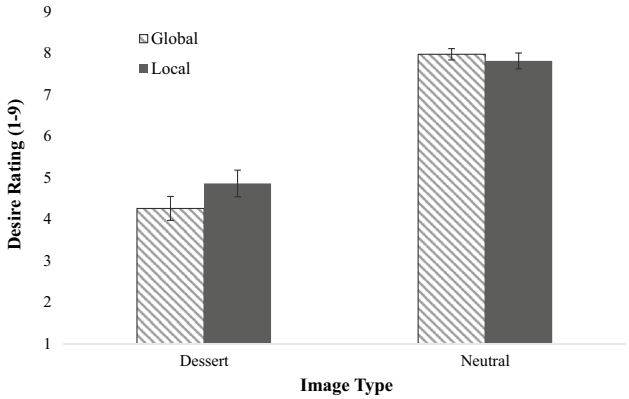

Fig. 3 Desire ratings (±1 SEM) for neutral and dessert images by condition

groups did not significantly differ in mean response times to push (withdraw from) dessert images, $t(78)=0.65$, $p=.52$, $d=0.15$. (Global: $M=822.79$, $SD=148.02$; Local: $M=797.91$, $SD=193.91$), pull (approach) neutral images, $t(78)=1.01$, $p=.31$, $d=0.23$. (Global: $M=794.89$, $SD=120.39$; Local: $M=762.64$, $SD=163.74$), or push (withdraw from) neutral images, $t(78)=1.47$, $p=.15$, $d=0.33$. (Global: $M=815.50$, $SD=132.72$; Local: $M=769.06$, $SD=148.94$). Please see Fig. 1. The main effect of Condition was not significant, $F(1, 78)=1.76$, $p=.19$, partial $\eta^2=0.022$.

Differences in approach bias: desserts relative to neutral stimuli

As a reminder, higher Approach Bias scores indicate greater approach bias to dessert images relative to neutral images. To assess differences in Approach Bias between the global and local focus conditions, an independent-samples t-test was conducted. Consistent with predictions, as compared to those primed with global focus, participants primed with local focus exhibited significantly greater Approach Bias to desserts relative to neutral items, $t(78)=-2.72$, $p<.01$, $d=0.61$. When including eating disordered participants, this relationship was no longer significant, $p=.06$, $d=0.43$. Participants' Approach Bias did not correlate with reported BIS or BAS, $r(78)=0.03$, $p=.77$ and $r(78)=0.14$, $p=.22$ respectively. (See Fig. 2).

Differences in approach motivation: dessert and neutral stimuli separately

To assess if group differences in relative Approach Bias were due primarily to differences in approach motivation for dessert images or for neutral images, we also evaluated group differences in Dessert Approach Bias (calculated as Dessert Push RT − Dessert Pull RT) and Neutral Approach Bias (calculated as Neutral Push RT − Neutral Pull RT). Higher scores indicated greater bias to approach, rather than withdraw from, the respective stimuli. Neither Dessert Approach Bias, $t(78)=-1.91$, $p=.06$, $d=0.43$ nor Neutral Approach Bias, $t(78)=0.89$, $p=.38$, $d=0.20$, differed by focus condition. (See Fig. 2).

Desirability ratings

Contrary to predictions, desire ratings for the dessert images did not differ between the global and local focus conditions, $t(78)=-1.40$, $p=.17$ (Global: $M=4.27$, $SD=1.93$; Local: $M=4.87$, $SD=1.89$). Participants in the global and local focus condition were also equally likely to rate the neutral items as relatively non-desirable, $t(78)=0.05$, $p=.96$ (Global: $M=7.98$, $SD=0.92$; Local: $M=7.82$, $SD=1.12$; Please see Fig. 3).

Table 2 PANAS responses by condition

	Global condition n = 45		Local condition n = 35	
	Mean	Std. deviation	Mean	Std. deviation
PA Time 1	25.87	7.66	25.06	6.34
PA Time 2	24.91	8.19	24.37	7.11
NA Time 1	15.60	5.94	15.00	5.49
NA Time 2	14.51	4.85	14.51	6.12

PANAS

Because affect impacts motivation, the PANAS was included to ensure results on the D-AAT were not the result of changes in affect. To test whether greater approach motivation was due to changes in affect, we examined PANAS Positive Affect (PA) and Negative Affect (NA) scores both at the beginning (Time 1) and at the end of the study (Time 2). Change in PA was analyzed using a mixed-design ANOVA with a between-subjects factor of Condition (2: global, local) and a within-subjects factor of Time (2: Time 1, Time 2). There was no significant effect of Condition, $F(1, 78) = 0.18$, $p = .68$, Time, $F(1, 78) = 3.15$, $p = .08$, nor a significant Condition × Time interaction $F(1, 78) = 0.09$, $p = .77$. Positive affect did not significantly change for either group during the experiment.

Change in NA was also analyzed using a mixed-design ANOVA with a between-subjects factor of Condition (2: global, local) and a within-subjects factor of Time (2: Time 1, Time 2). There was no significant effect of Condition, $F(1, 78) = 0.06$, $p = .80$. There was a significant main effect of Time, $F(1, 78) = 5.14$, $p = .03$. The Condition × Time interaction was not significant, $F(1, 78) = 0.76$, $p = .39$; both groups' negative affect scores decreased to a similar extent from the beginning to the end of the experiment. PA and NA scores did not significantly differ between the global or local focus groups during the experiment. Similarities between the global and local focus groups on the PANAS at the beginning and the end of the experiment indicate changes in approach motivation were not due to changes in positive or negative affect. (See Table 2).

Discussion

The present study is the first to examine whether the relationship between high approach motivating positive affect and local focus is reciprocal. We found that participants with a local focus of attention exhibited faster automatic approach motivation for desserts than participants with a global focus. In conjunction with the numerous studies showing high approach-motivated positive affective states narrow attention, this finding supports the notion that local focus and positive affect approach motivation are integrated and possess the capability to impact each other bi-directionally. Importantly, participants with a local focus were faster to pull dessert images than neutral images on the D-AAT, indicating that local focus resulted in greater approach motivation to desirable desserts, rather than general approach motivation such that people were drawn to neutral objects. Both positive and negative emotions high in motivational intensity are associated with localized attention. Therefore, inducing a local processing bias could result in greater approach tendencies or greater withdrawal tendencies, depending on the affective valence of the presented object. Though for many years researchers believed valence was the operating force behind attentional scope broadening or narrowing, our findings suggest the importance of both motivational intensity and valence in determining the specific effect of a local processing bias. Reciprocally, this contributes to a growing body of evidence that the interaction between valence and motivational intensity determines attentional scope, rather than one dimension alone.

Interestingly, though participants with local focus had faster automatic approach tendencies for desserts than participants with global focus on an implicit measure (the D-AAT), they did not explicitly rate the desserts as more desirable. Two interpretations of this finding are possible. First, it is possible that participants in the local condition were unable to recognize or quantify differences in how desirable they found the desserts. Research suggests that similar emotions that vary in motivational intensity have different physiological and behavioral characteristics. For example, desire for desserts in general differs from the desire for desserts when people expect they may have an opportunity to consume the desserts (Gable and Harmon-Jones 2008). However, due to their similar subjective experience, participants may be unable to detect or report differences in physiological and behavioral characteristics (e.g., Berridge 2007). A second interpretation is that global/local focus of attention directly impacts motoric behavior without altering subjective evaluations. In their research using the AAT as a means of retraining automatic action tendencies to approach alcohol in hazardous drinkers, Wiers et al. (2010) successfully altered behavior associated alcohol without impacting participants' subjective feelings of craving or liking. Similarly, it is possible that global/local focus has a direct effect on automatic action tendencies but does not change subjective evaluations.

The present study had some notable limitations. The first limitation is the discrepancy between implicit and explicit measures. Disagreement between implicit and explicit measures has been noted in food preferences (e.g., Richetin et al. 2016), memory (e.g., Nguyen-Louie et al. 2016), racial attitudes (e.g., Peterson et al. 2016), and relationship

satisfaction (e.g., Hicks et al. 2016). Like most explicit measures, the subjective evaluations in the current study required top-down processing. In contrast, the implicit measure of the D-AAT tapped into more primal instincts to approach high calorie, high fat, energy-dense foods. Disagreement between automatic responses on the D-AAT and self-reported desirability likely resulted from incongruence between bottom-up approach motivation and top-down cognitive interpretations of the desirability ratings task. To provide an intermediate level of approach-avoidance tendencies, future studies might implement an AAT in which picture content determines joystick movement direction. This more explicit AAT would negotiate differences in top down and bottom up processing between automatic reactions to task-irrelevant features and explicit desirability ratings. However, it is also possible this discrepancy was due to the explicit measure occurring near the end of the experiment when the influence of the global/ local focus priming may have worn off, whereas the implicit measure took place immediately after the attentional focus priming. In the future, the order of implicit and explicit measures may be modified to account for this possibility.

A second limitation of the study is that there was not a manipulation check to measure global/ local bias after the priming task. A measure of bias after the priming, for example using traditional Navon's (1977) letters to compare RTs to local and global targets between the priming groups would have indicated definitively that the manipulation had successfully altered attentional breadth. However, such a manipulation check was not included due to concerns that doing so may have diminished the robustness of the priming effect. Consistent with other studies using similarly modified Navon's (1977) letters to prime attentional bias (e.g., Borst and Kosslyn 2010; Dale and Arnell 2014; Lewis et al. 2009; Macrae and Lewis 2002), we considered it necessary for the prime to occur immediately before the task without interference of a manipulation check.

A third limitation is that all participants in the present study were college-aged students, most of whom identified as either White or Asian, thus limiting the generalizability of the findings. These characteristics presented an additional limitation of high susceptibility to potential eating disorders. Roughly 18% of participants were excluded due to potential eating disorders, consistent with reported increasing rates of eating disordered behavior among undergraduate females (32%) and undergraduate males (25%; White et al. 2011). Furthermore, prevalence rates for eating disorders are similar for White and Asian students, but lower for Black students (Eisenberg et al. 2011). Given that most participants in the present study identified as White or Asian, this further emphasizes the unique problem of disordered eating in this sample and limited generalizability of the findings. Despite this limitation, a significant effect of local focus on approach motivation was still evident. Future studies should replicate this finding in a more diverse sample and incorporate non-food stimuli. For example, highly arousing positive words could be used instead of food images to reduce the potential interference of atypical views toward food resulting from eating disorders.

A fourth limitation is that the D-AAT lacks some nuances of real-world approach behavior. For example, most real-life approach behavior using the arm involves both extensor and flexor movements. For example, one must first extend one's arm (a withdrawal motion) to reach for an item before flexing the arm to pull the item towards the body. A meta-analysis on the facilitation of arm flexion and extension as a function of approach and avoidance behaviors found more support for faster flexor movements with approaching a desirable item as a result of evaluative coding than as a result of specific muscle activation (Laham et al. 2015). Specifically, this means there is greater evidence of faster flexor motions in response to appetitive stimuli when these flexor motions are framed as approach movements than simply flexor motions in response to appetitive items in general. Humans possess faster reflexes to perform the behavior that enables them to obtain a desired item quickly, especially when they believe this action will get them the desired object.

A final limitation of the present study is that the visual focus prime may have allowed participants with local focus to identify minor details of the images better than those in the global focus condition. Focusing on details could have impacted the way participants in the local condition viewed the dessert images, for example focusing on the chocolate chips in a cookie rather than the cookie as a whole. Perhaps the visual details of a dessert are more approach motivating than the dessert image as a whole. Future studies should incorporate priming from other perceptual modalities and use desirable stimuli that are not susceptible to this limitation. For example, replication of the present finding using an auditory global versus local focus priming as opposed to the visual focus priming in the present experiment would address whether a reciprocal relationship exists between perceptual attention and approach motivation, or simply between visual attention and approach motivation. Likewise, replication using approach-motivating positive words to replace food images would reduce the limitations associated with visual stimuli. If the present findings are replicated with words, then local attentional focus does not increase approach motivation simply by compelling a person to focus on the visual details of a desirable image. Together these findings would suggest a true effect of perceptual global local focus on approach motivation.

The present research has potential for both theoretical contribution and real-world application. From a theoretical

perspective, continued research on this topic improves understanding of the relationship between perceptual attention and approach motivated positive affect: contributing to a more comprehensive theory. In terms of real-world relevance, the present findings suggest the potential to use attentional pathways to modify behavior in marketing or clinical treatment. In marketing, a local prime could 1 day be used to increase approach motivation to purchase desirable items. In clinical treatment, a local prime might be beneficial to help patients approach desirable activities. For example, with a patient who wants to—but struggles to—approach a partner, locally focused attention might prove helpful. Our findings suggest implicit approach motivation could be altered using a local focus priming without impacting explicit evaluations of desirability.

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