The pulling power of chocolate: Effects of approach–avoidance training on approach bias and consumption

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ABSTRACT

Previous research has shown that action tendencies to approach alcohol may be modified using computerized Approach–Avoidance Task (AAT), and that this impacted on subsequent consumption. A recent paper in this journal (Becker, Jostman, Wiers, & Holland, 2015) failed to show significant training effects for food in three studies: Nor did it find effects on subsequent consumption. However, avoidance training to high calorie foods was tested against a control rather than Approach training. The present study used a more comparable paradigm to the alcohol studies. It randomly assigned 90 participants to 'approach' or 'avoid' chocolate images on the AAT, and then asked them to taste and rate chocolates. A significant interaction of condition and time showed that training to avoid chocolate resulted in faster avoidance responses to chocolate images, compared with training to approach it. Consistent with Becker et al.'s Study 3, no effect was found on amounts of chocolate consumed, although a newly published study in this journal (Schumacher, Kemps, & Tiggemann, 2016) did do so. The collective evidence does not as yet provide solid basis for the application of AAT training to reduction of problematic food consumption, although clinical trials have yet to be conducted.

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1. Introduction

Current psychological strategies to address excessive weight have limited effects (Hartmann-Boyce et al., 2014; Michie, Abraham, Whittington, McAteer, & Gupta, 2009), especially over a medium-term follow-up (Barte et al., 2010). A different approach may be required.

A focus of some recent laboratory research has been on the use of cognitive tasks to modify attention or analogue responses to food stimuli. Some have focused on changing attentional bias on a dot-probe task (Kakoschke, Kemps, & Tiggemann, 2014; Kemps, Tiggemann, Orr, & Grear, 2014). Others have modified associations of chocolate with words related to approach or avoidance (Kemps, Tiggemann, Martin, & Elliott, 2013). Training go-no go responses to images can not only reduce immediately subsequent consumption of chocolate and other high-calorie foods (Houben & Jansen, 2015; Veling, Aarts, & Stroebe, 2013), but there is emerging evidence that it may improve weight loss (Veiling, van Koningsbruggen, Aarts, & Stroebe, 2014).

Even more direct training of behavioural tendencies may be obtained by using the Approach Avoidance Task (AAT; Rinck & Becker, 2007), which typically involves pulling a joystick to make a picture larger (simulating approach) or pushing it away to make it smaller (simulating avoidance). These responses have high face validity as analogues of pulling or pushing away a target such as a bar of chocolate in the natural environment. Action tendencies to approach alcohol are positively associated with both previous consumption of alcohol (Barkby, Dickson, Roper, & Field, 2012; Peeters et al., 2012), and with alcohol consumption measured on subsequent laboratory-based 'taste tests' (e.g. Wiers, Rinck, Kordts, Houben, & Strack, 2010). Changes in approach biases can be elicited by training approach or avoidance of a particular target category (e.g. alcohol vs. soft drinks; Wiers et al., 2010). When repeated trials on the AAT are configured so participants more consistently pull in response to alcohol pictures and push in response to soft drink, this increases approach biases for alcohol, while the reverse contingency decreases them. When heavy drinkers are successfully trained to approach or avoid alcohol pictures, this also affects the

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amount they consume in a subsequent taste test (Wiers et al., 2010). Importantly, two randomized controlled trials have also demonstrated that multiple AAT sessions increase rates of abstinence in alcohol-dependent patients receiving cognitive-behavioural therapy (Eberl et al., 2013; Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011).

A recent paper by Becker, Jostmann, Wiers and Holland (2015), published in this journal, described three studies applying the AAT to foods. Unlike the original study on alcohol, avoidance training was compared with sham training, which involved a 50% association of approach and avoidance to both high- and low-calorie foods. In Study 1 there was a trend ($p = .058$) towards greater avoidance in the experimental condition, but this was not seen in the other two studies. No effects on post-session consumption were seen in Studies 1 and 2, and in Study 3, participants trained to avoid chocolate images actually ate more chocolate in a taste test.

The current study was undertaken independently of the ones by Becker et al. (2015). A key difference in the protocol was that it compared approach versus avoidance training on the AAT, consistent with the initial demonstration study on alcohol by Wiers et al. (2010). Like Becker et al.'s Study 3, we had an undergraduate sample, focused on chocolate, and used a 'taste test' of chocolate during the session to examine chocolate consumption. However, in contrast to that study, we did not select participants who intended to reduce chocolate consumption, and we did not elicit chocolate craving before the AAT. We predicted that our AAT procedure would result in differential training effects from avoiding vs. approaching chocolate, and that consumption of chocolate in the taste test would then be greater in the approach than in the avoidance condition. We also examined whether the training altered subjective craving for chocolate, while noting that previous research has sometimes found a disjunction between approach/avoidance training and craving effects (Wiers et al., 2011).

2. Methods

2.1. Participants

Ninety undergraduate students at Queensland University of Technology were recruited through flyers on university notice boards and from first-year Psychology classes in 2012 (in the latter case, for course credit). Marketing for the study (headed "Do you like chocolate?") indicated that its purpose was "to examine the effect of computer-based cognitive tasks on chocolate preferences." Prospective participants were screened to ensure they were not diabetic, and were not currently dieting.

2.2. Materials and measures

2.2.1. Craving experience questionnaire

The Craving Experience Questionnaire (CEQ; May et al., 2014) assesses craving for a variety of targets including chocolate. The current study reports data from the 11-item Strength form of the measure as applied to chocolate (CEQ-SC), focusing on the maximum desire for chocolate during the previous 10 min. Each item is rated from 0 (not at all) to 10 (extremely), giving a total score from 0 to 110. The total CEQ-S is highly internally consistent (alpha = .91 in May et al., 2014; .95 in the current study). While its internal structure consistently comprises Intensity (e.g. 'How strongly did you want it?'), Imagery (e.g. 'How vividly did you picture it?') and Intrusiveness factors (e.g. 'How intrusive were the thoughts?'), only results on total scores are fully reported below.

2.2.2. Stimulus images

In Study 3 of Becker et al. (2015), the AAT used 15 pictures of chocolate and 15 of stationery objects. Our study used 20 pictures of chocolate, and 20 of alternative snacks. The chocolate images included photos of milk, dark, and white chocolate blocks, and of chocolate-covered snacks, biscuits and raisins. Alternative snack images included photos of watermelon, pineapple, and apple pieces, almonds, carrots, and muesli bars. The food was positioned on a white, circular plate. All images were taken from above the food with a digital camera at a distance of approximately 50 cm. Each image was created in both a landscape and a portrait format.

2.2.3. Approach–avoidance task (AAT)

The AAT in the current study was highly consistent with the one used in Wiers et al. (2010). It was presented on a 22″ computer monitor and used a Logitech "Attack 3" joystick to manipulate images that were presented centrally. Participants pushed or pulled a joystick, depending on the portrait or landscape orientation of the presented stimulus. Pushing the joystick was intended to simulate avoidance of the food: it triggered a continuous reduction in the size of the picture on the screen, giving an impression of greater progressive distance. Pulling the joystick gave a progressive enlargement of the image, giving an impression of greater proximity. Each participant was required to consistently make a push response to images of one orientation and a pull response to images of the other orientation. Whether a push vs pull response was required to the portrait vs landscape image format was counterbalanced across participants. If the joystick was moved in the wrong direction, an error message appeared, and 3 s elapsed before the next image. In each phase of the AAT, images were presented in a random order, with half the images appearing in each orientation. Examples of a chocolate and an alternative image in portrait presentation are in Fig. 1.

A practice version of the AAT task, comprising 20 trials displaying images of office supplies (staplers, computer disks, etc.) was initially given, so that participants learned the correct joystick response to the picture orientation. Participants then undertook 80 Baseline assessment trials, across which the 20 chocolate images and 20 alternative snacks images were displayed equally in push-format and in pull-format.

Immediately following this Baseline assessment, without alerting participants, a training contingency was introduced. For participants in the Approach-Chocolate condition, 90% of the chocolate images were presented in pull-format, and 90% of the alternative snack images were presented in push-format, with the intention of inducing a relative increase in approach action tendency for chocolate. In the Avoid-Chocolate condition, these contingencies were reversed, with the intention of inducing a relative reduction in approach action tendency for chocolate. Consistent with the Wiers et al. (2010) AAT study, the training phase of the present AAT delivered a total of 440 trials. This compares with 320 training trials in Becker et al. (2015) Study 3. Half of the chocolate and alternate snack images from the assessment phases were employed in the training phase (i.e. 10 of each), with the half of the stimulus set assigned to training being counterbalanced across participants.

After the training phase, and again without alerting the participant, the training contingency was removed, to restore the AAT to its assessment form. The Post-Training assessment was identical to the Baseline assessment, presenting all 20 chocolate images and all 20 alternative snack images. These images were each shown twice in the 80 assessment trials. The inclusion within the assessment phases of images that were not employed within the training phase was intended to permit determination of whether any observed training-induced changes in action tendencies generalize beyond the training stimuli.

The Baseline assessment, training, and Post-Training assessment phases ran consecutively without a break, and took approximately