



City Research Online

City St George's, University of London

Citation: Madan, R. & Martinelli, C. (2026). Food-related attentional biases in restrained eaters: A meta-analysis. *International Journal of Eating Disorders*, eat.70090. doi: 10.1002/eat.70090

This is the accepted version of the paper.

This version of the publication may differ from the final published version. To cite this item please consult the publisher's version.

Permanent repository link: <https://openaccess.city.ac.uk/id/eprint/37067/>

Link to published version: <https://doi.org/10.1002/eat.70090>

Copyright and Reuse: Copyright and Moral Rights remain with the author(s) and/or copyright holders. Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge, unless otherwise indicated, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way. For full details of reuse please refer to [City Research Online policy](#).

Food-related attentional biases in restrained eaters: A meta-analysis

¹Rio Madan (ORCID: <https://orcid.org/0009-0008-6619-8546>) and ^{1,2}Cristina Martinelli (ORCID: <https://orcid.org/0000-0002-4686-572>)

¹City St George's, University of London

²Kingston University

Declaration of competing interest: *We declare no conflicts of interest.*

Role of funding sources: *We declare that no funding was received for this research.*

Data Availability: *Data and materials will be made available on request by the corresponding author.*

Use of Artificial Intelligence (AI): *Use of AI was not involved in any component of preparation of this manuscript.*

Persons with lived experiences: *Due to the nature of the work, persons with lived experiences were not involved in the study design or execution, or in the preparation of this manuscript.*

Author Contributions:

Rio Madan: *Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review and editing.*

Cristina Martinelli: *Supervision, Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review and editing.*

Keywords: *meta-analysis; attentional biases; dietary restraint; food stimuli; response task; eye-tracking; eating disorders; disordered eating*

Rio Madan (Corresponding Author)

City St George's, University of London

24 Northampton Square, London, EC1V 0HB

25 Rio.Madan@citystgeorges.ac.uk

26

27 Cristina Martinelli

28 Cristina.Martinelli@citystgeorges.ac.uk

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

Abstract

Objective: Dietary restraint may contribute to the development and maintenance of eating disorders (EDs), with food-related attentional biases (ABs) as a key underlying mechanism. We examined associations between dietary restraint and ABs and explored how several methodological factors (i.e. AB mechanism, mode of AB investigation, response task type, stimulus task relevance, type of food stimulus) might influence these associations.

Method: Database searches followed the guidelines set by the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA; Page et al, 2021). We included empirical studies that measured both dietary restraint and ABs, excluding studies involving participants with clinical diagnoses or below 16 years of age. Fifty-one eligible articles were identified, of which 29 unique samples were included in the final analyses. The protocol for this meta-analysis was preregistered at: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=532562

Results: We first examined associations between dietary restraint and attentional maintenance and orienting, separately. This was followed by subgroup analyses to examine whether these associations varied based on the chosen methodological factors. Our findings revealed significant associations between dietary restraint and attentional maintenance in studies that used response tasks (other than the dot probe task), and where the food stimuli were relevant to the task instructions.

Discussion: Collectively, these findings suggest that dietary restrainers activated strategic top-down processing of foods cues, rather than the reflexive orienting linked to ED-driven saliency processing. Overall, this may be interpreted as more purposeful monitoring to facilitate restraint when food is relevant to the goals and actions of dietary restrainers.

70 **Key Points**

- 71 • Dietary restraint may contribute to the development and maintenance of eating disorders,
72 with food-related attentional biases as a key underlying mechanism.
- 73 • Current literature on food-related attentional biases and dietary restraint is contradictory.
- 74 • Different methodological approaches used to capture attentional biases may account for
75 some of this divergence.
- 76 • Our meta-analysis revealed that associations between dietary restraint and attentional
77 biases varied based on the specific attentional bias investigated, the mode of AB
78 investigation, the response task type and the relevance of food stimuli to the task.

79

80

81

82

83

84

85

86

87

88

89

90

91

Introduction

Dietary restraint involves exercising cognitive control to override physiological and environmental cues that signal food intake (Polivy and Herman, 2020). With the abundance of ultra-processed and high energy dense food promoting overeating and hedonic eating styles (Calcaterra et al, 2023; LaFata et al, 2024) dietary restraint is now a prevalent tool for weight loss or maintenance across cultures (Olea Lopez and Johnson, 2016; Alqahtani, and Alhazmi, 2025; Yong et al, 2021).

However, Restraint Theory argues that repeatedly exercising cognitive control over food intake can have a rebound effect, leading to increased preoccupation with food and greater susceptibility to external food cues (Herman and Polivy, 1975). This can result in lapses in dietary control, which may trigger counterregulatory eating (Walilko et al, 2021) and other maladaptive eating tendencies (Meule et al, 2012), thereby contributing to disordered eating. Consistent with this, dietary restrainers are more likely to be overweight (Ramirez-Contreras et al, 2021), experience more episodes of disinhibited eating (Walilko et al, 2021) and binge eating (Linardon et al, 2020), have negative thinking patterns around food (Walilko et al, 2021) and report more body dissatisfaction (Kong et al, 2013), than their unrestrained counterparts. Furthermore, dietary restraint has been shown to be a robust predictor and risk factor for clinical eating disorders (EDs; Racine et al, 2011; Yamamiya and Stice, 2024).

Mechanisms thought to underlie food preoccupation and susceptibility to overeating in dietary restrainers relate to the cognitive processing of food-related cues. Particularly, attentional biases (ABs) – defined as the selective allocation of attention toward specific stimuli whilst ignoring others – toward food have been observed in dietary restrainers (e.g., Hepworth et al, 2010; Veenstra et al, 2010; Dondzilo et al, 2022; Chen et al, 2023). It has been proposed that such ABs could drive the rebounding effect of dietary restraint and contribute to maladaptive eating behaviours (Polivy and Herman, 2020). Consistent with this, food-related ABs have been linked to higher cravings (Hardman et al, 2021), greater food intake (Hardman et al, 2021; Werthmann et al, 2014), higher

117 BMI (Brand et al, 2024), and increased disinhibited (Seage and Lee, 2017) and external eating
118 (Hou et al, 2011).

119 In clinical ED groups, increased attention to food cues has been linked to binge-eating disorder
120 (Schmidt et al, 2016; Deluchi et al, 2017; Stott et al, 2021), bulimia nervosa (Stott et al, 2021;
121 Albery et al, 2016) and food addiction (Liu et al, 2025). In anorexia nervosa, where refusal to eat
122 an adequate intake is the hallmark of the illness, ABs are characterised by an initial attentional
123 orienting towards food cues – reflecting heightened threat detection (Neimeijer et al, 2017) –
124 followed by attentional avoidance of food cues (Meregalli et al, 2023) – thought to reflect top-
125 down goal-driven processing that maintains severe energy restriction.

126 However, the current evidence for food-related ABs in dietary restrainers is equivocal, and the link
127 to disordered eating remains largely unexplored. This gap is important to address as ABs toward
128 food stimuli are known to contribute to EDs in clinical populations (Mercado et al, 2020; Flynn
129 2023; Werle et al, 2024) and may also play a role in maladaptive eating among dietary restrainers.
130 (Walilko et al, 2021). Thus, it remains unclear whether food-related ABs exist and contribute to ED
131 risk in non-clinical yet vulnerable groups such as dietary restrainers. To date, only one study has
132 attempted a systematic review of the literature. Watson and Le Pelley (2021) examined
133 associations between dietary restraint and several cognitive biases but reported inconclusive
134 results regarding the relationship between dietary restraint and ABs. Furthermore, the review did
135 not investigate links between dietary restraint and disordered eating.

136 We here propose that the inconsistent findings in the literature on associations between ABs and
137 dietary restraint may be attributable, at least in part, to heterogenous methodological approaches.
138 One major source of this heterogeneity lies in the different types of ABs that have been examined.
139 The literature typically distinguishes between attentional maintenance (van Ens et al, 2019),
140 attentional orienting (van Ens et al, 2019), distraction (Neimeijer et al, 2013), interference
141 (Neimeijer et al, 2013), switching (Dondzilo et al, 2022) and disengagement (Veenstra et al, 2010)

142 processes, each assessed using varying methodological approaches. A second source of
143 heterogeneity relates to the measurement of ABs. Studies have employed both reaction time (RT)
144 based tasks (Ahern et al, 2010; Meule et al, 2012) and eye-tracking methods, with the latter further
145 subdivided into instructed (Liu et al, 2021; Werthmann et al, 2013) and free-viewing paradigms
146 (Hummel et al, 2018; Graham et al, 2011). Additionally, tasks vary in the food-related stimuli used
147 (Dondzilo et al, 2022; Brignell et al, 2009), and in whether these stimuli are relevant to task
148 instructions (Donofry et al, 2019; Jiang et al, 2024).

149 To address these issues, we conducted a series of meta-analyses examining how these
150 methodological factors influence the relationship between food-related ABs and dietary restraint.
151 Our work builds on the review by Watson and Le Pelley (2021) by 1) focussing exclusively on ABs,
152 rather than a broader range of cognitive biases, 2) including eye-tracking data, which were largely
153 overlooked in their work, 3) isolating distinct AB mechanisms that were not differentiated in their
154 analyses, 4) investigating specific methodological factors not previously considered, and 5)
155 exploring associations between ABs and ED symptoms. In addition, we further reduced
156 heterogeneity present in their investigation by restricting inclusion to studies using pictorial stimuli
157 only (rather than combining pictorial and linguistic stimuli), by excluding studies where main
158 findings were based on experimental manipulations of mood or hunger which may have biased
159 results, and controlling (where possible) for whether studies screened out clinical EDs. This led to
160 the inclusion of 8 samples from Watson and Le Pelley's (2021) review and 21 new samples they
161 did not include. Overall, our goal was to determine whether dietary associations between dietary
162 restraint and ABs are tied to specific methodological factors, and whether such associations are
163 also related to disordered eating in undiagnosed, yet ED-vulnerable populations, such as dietary
164 restrainers.

167 **Research Questions**

168 1) Does the relationship between ABs and dietary restraint vary as a function of attentional
169 mechanisms (i.e., orienting vs maintenance), modes of AB investigation (i.e., eye-tracking vs
170 response tasks; free-viewing vs instructed-viewing eye-tracking tasks), the response task used
171 (i.e., dot probe vs other tasks), the relevance of food stimuli to task instructions (i.e., task relevant
172 vs task irrelevant), and type of food stimuli (i.e., high calorie [HC] vs mixed foods)?

173 2) Is the association between dietary restraint and ABs linked to disordered eating?

174 Research question 1 focuses on potential sources of heterogeneity in the association between
175 dietary restraint and ABs. Given the methodological diversity of AB paradigms and evidence that
176 different tasks and attentional indices capture distinct cognitive processes, it is important to
177 examine whether observed associations vary systematically across attentional mechanisms, task
178 characteristics, and stimulus properties. On the basis of the literature we hypothesised that
179 stronger associations between restraint and ABs would be found for i) eye-tracking versus
180 response tasks, as gaze indices have been found to be more reliable in inferring attentional
181 allocation (Waechter et al, 2014); ii) irrelevant versus relevant task stimuli, as irrelevant stimuli
182 have been shown to carry more bottom-up saliency (Neimeijer et al, 2017) and to easily elicit ABs
183 in clinical populations (Sablotny et al, 2025; Neimeijer et al, 2017; Meregalli et al, 2023) – we
184 predicted dietary restrainers to behave similarly; iii) HC versus mixed foods, as HC cues may carry
185 more reward- or threat-related saliency for dietary restrainers (Wang et al, 2016); iv) dot-probe
186 tasks versus alternative tasks, given the task homogeneity of the dot-probe group.

Method

Search strategy

Literature searches were guided by the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA; Page et al, 2021). Our search was conducted on April 2024 (updated on October 2024, July 2025 and December 2025) on Web of Science, PsycINFO, PubMed, CINAHL Plus and Medline. In addition, we searched the references of all selected articles and relevant published reviews. Grey literature and unpublished articles were searched via ProQuest Dissertations, SocArXiv Papers, Web of Science and Medline. These were included to account for potential publication bias (Hopewell et al, 2007). The search terms for each database consulted can be found in the *Supplementary Materials*. For each concept, relevant search terms were chosen, guided by the literature, as well as the index terms and synonyms in database thesauri. The protocol for this meta-analysis was preregistered at: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=532562. Note that contrary to what was reported in the protocol, we were unable to examine dietary restraint in relation to approach versus avoidance biases due to insufficient studies measuring such biases. We were also unable to proceed with secondary study aims due to insufficient studies measuring any one type of experimental manipulation and insufficient studies measuring ED symptoms in the high dietary restraint group. Instead, we conducted an exploratory analysis of ED symptoms and AB associations unstratified by restraint. Finally, we conducted a univariate rather than a multivariate meta-analysis due to the high degree of heterogeneity across studies and the risk that aggregating multiple correlated outcomes into composite effect sizes could mask distinct effects (Borenstein et al, 2021; please see *Supplementary Materials*).

Eligibility Criteria

To be included, studies had to i) be empirical in nature, ii) use a validated measure of dietary restraint (self-reported or interviewed), and iii) assess ABs to pictorial or video food stimuli. We

216 included food stimuli of unspecified caloric value as well as food stimuli from a specific caloric
217 category (high or low). Linguistic stimuli were excluded because they may be less ecologically
218 valid for food-specific investigations (Freijy et al, 2014), and their inclusion would have increased
219 heterogeneity, as ABs are known to differ across stimulus modalities (Freijy et al, 2014; Stormark
220 and Torkildson, 2004). To capture ABs in dietary restrainers, a population known to be at risk for
221 EDs, we excluded studies involving clinical samples. We also excluded samples below 16 years of
222 age, as feeding practices are largely shaped by parental influence in childhood and early
223 adolescence (van Strien and Bazelier, 2007), and dieting behaviours typically emerge in middle to
224 late adolescence (Field et al, 2003). Reviews, meta-analyses, qualitative studies and study
225 protocols were omitted. We excluded articles which assessed ABs after any experimental
226 induction but included control group data if this was collected prior to manipulation. We also
227 excluded data from any collapsed experimental and control conditions, to avoid food related ABs
228 being confounded by specific manipulations such as those linked to negative mood (Hepworth et
229 al, 2010) and hunger (Forestell et al, 2012). It was agreed to exclude studies using inhibitory
230 control tasks due to a lack of consensus on whether these tasks can isolate ABs (Kakoschke et al,
231 2015). We also excluded tasks measuring any other type of cognitive bias, such as memory bias
232 or impulsivity. Our primary outcome data were statistical associations between dietary restraint
233 and ABs.

234 **Data selection and extraction**

235 The study inclusion process is shown in the PRISMA Flow Diagram (Page et al, 2021) in *Figure 1*.
236 Searches were conducted by one researcher. All retrieved studies were uploaded to Rayyan and
237 duplicate studies were removed, leaving 9682 studies for screening. Two researchers
238 independently screened studies, first by title and abstract and then by full text. Disagreements
239 were resolved upon discussion. The results of a Cohen's Kappa test revealed good inclusion
240 agreement between researchers ($k=0.720$, $P<0.001$; Landis and Koch, 1977). This database
241 search resulted in 36 eligible articles. The screening of 24 reviews on attentional and cognitive

242 biases, and eye-tracking research, in general and ED populations, yielded another 12 eligible
243 studies. An additional 3 studies were identified by searching the references of all studies included.
244 A final citation search of these three studies was carried out with no eligible studies identified.

245 Of the 51 total studies, 27 provided the quantitative data needed for the meta-analyses, for some
246 or all reported outcomes. Of these 27 studies, eleven authors provided this data via email
247 correspondence (Nannt et al, 2025; Xu et al, 2023; Meule et al, 2012; Sambal et al, 2021; Chen et
248 al, 2023; Werthmann et al, 2013, 2014; Garcia-Burgos et al, 2017; Wilson and Wallis, 2013; Kim et
249 al, 2014; Hummel et al, 2018; Donofry et al, 2019). Of the 51 total studies, 24 had missing data
250 required for the meta-analyses (i.e., did not report stats on the association between AB and dietary
251 restraint) that could not be retrieved from email correspondence - authors were contacted up to
252 four times over a five-month period (Soetens et al, 2008; Burmester et al, 2022; Jonker et al, 2019;
253 Kochs et al, 2022; Loeber et al, 2013; 2012; Stamataki et al, 2020; Valenzuela, 2019; Seo and
254 Lee, 2021; Seage and Lee, 2017; Hardman et al, 2014; Broadley et al, 2019; Baldofski et al, 2018;
255 Hege et al, 2017; Geyskens et al, 2010; Smeets et al, 2009; Hou et al, 2011; Leppanen et al,
256 2017; Gearhardt et al, 2012; Higgs et al, 2012; Frayn et al, 2016; Sperling et al, 2017; Bongers et
257 al, 2015; Hummel et al, 2017). As Wilson and Wallis (2013) contributed three separate samples,
258 this resulted in a total of 29 included samples across 27 articles.

259 We extracted the following study and sample characteristics: year of publication, sample size,
260 recruitment setting and country, ethnicity, socioeconomic status, gender, mean age, mean BMI,
261 dietary restraint scale used, ED measures and whether participants were screened for EDs. Task-
262 related information was also extracted, including food type (e.g., HC food), comparator stimuli,
263 stimuli relevance to task instructions, mode of AB investigation (response task vs eye-tracking),
264 task type used, and, for eye-tracking studies, whether paradigms involved free- or instructed-
265 viewing. We also extracted information on the AB mechanism investigated, the type of index used,
266 and the relevant computation method. Extracted statistical data included F-values or correlations
267 between dietary restraint and ABs, means and standard deviations of the AB outcomes (separately

268 for high restraint and low/no restraint in group comparison studies), mean ED scores and
269 correlations between ABs and ED symptoms. Data collection took place between 2024 and 2025.

270 **Figure 1. PRISMA Flow Diagram of study inclusion** (*insert Figure 1. here*).

Effect Size Selection Criteria

We used the following criteria to select one effect size per study (see *Supplementary Materials* for selected effect sizes):

- When studies examined HC and low calorie (LC) food stimuli separately, HC outcomes were prioritised being the most common stimuli among our studies. If studies compared HC food stimuli to both LC and non-food stimuli, we prioritised LC comparator outcomes, as these capture a more nuanced effect of energy density, which is relevant to dietary restraint.
- If multiple modes of AB investigation were used, we used the following order of selection: free-viewing gaze indices, instructed-viewing gaze indices, and response task indices. This order reflects evidence that gaze patterns more directly index attentional allocation and demonstrate greater internal reliability compared to response tasks (Duc et al, 2008), and that free-viewing paradigms provide greater ecological validity than instructed viewing tasks (Puttevils et al, 2023; Pasqualette and Kulke, 2024).

Maintenance Criteria – Primary Analysis

- Outcomes from trials of 500ms or more; shifts in attention can occur as early as 500ms (Field and Cox, 2008). If more than one trial presentation time at 500ms or more was investigated, the longer trial outcome was chosen, as these are deemed to be more reliable in capturing maintained attention (Skinner et al, 2018).
- Eye-tracking indices reflecting maintenance: total dwell time or total fixation duration. If both indices were investigated, we prioritised total dwell time, being the most common in our studies. No current evidence suggests one is more reliable than the other.

Orienting Criteria – Exploratory Analysis

- Outcomes from trials of 200ms or less, as this timeframe is thought to capture initial orienting (Field and Cox, 2008).
- Eye-tracking indices typically used to measure orienting: gaze direction bias or first fixation location. If both indices were investigated, we prioritised first fixation location with previous evidence supporting good reliability (Soleymani et al, 2022) versus gaze direction bias (Van Ens et al, 2019).

ED Symptoms Criteria – Exploratory Analysis

- We prioritised attentional maintenance being the most common outcome investigated in relation to ED symptoms.
- If more than one ED outcome measure was used, we prioritised general over specific symptom measures, being the most common in included studies.

Coding of data

We coded the data so that positive effect sizes reflected a stronger AB towards food stimuli (versus comparator stimuli) as dietary restraint increased or in the high dietary restraint group. Negative effect sizes reflected a stronger AB towards food stimuli (versus comparator stimuli) as dietary restraint decreased or in the low dietary restraint group. When there was no inclusion of a comparator stimulus, we included associations between restraint and response task data or gaze data for the food stimuli only (Jiang et al, 2024; Husted et al, 2016). For one study (Donofry et al., 2019), we recoded the AB score of food minus instrument trials so that a positive AB score reflected a stronger bias towards food versus non-food.

316 **Risk of Bias**

317 The risk-of-bias assessment was carried out by two independent assessors. The Newcastle-Ottawa
318 quality assessment scale (NOS; Wells et al, 2000) was adapted to encompass factors relevant to our
319 study, such as sample representativeness, the exclusion of conditions affecting eating behaviours,
320 validity of the restraint outcome measure, sample size justification, the control of confounding
321 variables, paradigm conditions, practice effects and randomisation, and statistical analysis and
322 reporting of results (see *Supplementary Materials*). Studies could score in the following categories:
323 unsatisfactory (0-6 points), satisfactory (7-9 points), good (10-12 points) or very good (13-14 points).
324 Discrepancies between scores in each of these domains were addressed by a third independent
325 assessor.

326 **Data Analysis**

327 To account for smaller sample sizes, we selected Hedge's G as our standardised effect size (Taylor
328 and Alanazi, 2023). We first explored ROB using meta-regression to determine whether to include
329 high ROB studies in our analyses. ROB was added as an independent variable and associations
330 between dietary restraint and ABs were the dependent variable. If no significant association was
331 found, we included all studies in our analyses (Page et al, 2021).

332 We conducted univariate analyses to explore each of our research questions. Mode of AB
333 investigation was explored in two ways: 1) with two subgroups, comparing response tasks to all
334 viewing paradigms (instructed and free-viewing) and 2) with three subgroups, comparing response
335 tasks, instructed-viewing and free-viewing. Type of response task had two subgroups comparing the
336 dot probe task to all other tasks collectively, due to the low study number in each alternative task.
337 Free-viewing paradigms were excluded from this analysis as no specific task is used. Stimuli task
338 relevance also had two subgroups: task relevant and task irrelevant stimuli, and again we excluded

339 free-viewing paradigms from this analysis as they do not include specific task instructions. Type of
340 stimuli included two subgroups: mixed food and HC food. Finally, associations between ABs and ED
341 symptoms were explored both collectively and across three subgroups of outcome measure used:
342 Eating Disorder Examination Questionnaire (EDE-Q), Eating Disorder Inventory (EDI-2) and all other
343 outcome measures collectively. For all subgroup analyses, we used meta-regression models to adjust
344 for potential confounders. These were whether clinical EDs were screened out, and the type of
345 restraint scale used. We did not run meta-regression analyses if heterogeneity within subgroups was
346 high, as this level of variability among studies can obscure true effects and lead to incorrect
347 conclusions (Zhou and Shen, 2022). We chose random effects models for all analyses, to account for
348 unexplained heterogeneity among effect sizes, and we used the following control variables in meta-
349 regression models: 1) whether clinical EDs were screened out; and 2) the type of restraint scale used.
350 In line with Cochrane guidelines, we did not include control variables in meta-regressions if
351 heterogeneity was already low in the unadjusted models (Chandler et al, 2019). We used the I-
352 squared statistic and the following cut-offs to assess heterogeneity; Low: 25%, Moderate: 50% and
353 High: 75% (Higgins et al, 2003).

354 Attentional maintenance outcomes were examined in the primary analysis, as this was the most
355 frequently reported AB in the included studies. Attentional orienting outcomes were examined in a
356 secondary exploratory analysis, as this was the second most commonly reported AB. There were
357 insufficient studies reporting on other types of ABs to warrant further meta-analyses.

Results

The 29 included samples had a total of 1727 participants, who were mainly adult females, mostly recruited via UK and European based universities. Their mean age range was 19-34 years, and most reported a healthy BMI. *Table 1* shows the information extracted from all studies included in the meta-analysis and our ROB final score.

Table 1. Study Characteristics

(Insert Table 1. here)

Primary Analysis: Maintenance

General associations between dietary restraint and attentional maintenance

ROB did not influence associations between dietary restraint and maintenance ($B=0.084$ [-0.271 0.439] $Q=0.21$) $P=0.644$; $K=25$), so all studies were kept in our meta-analysis. This revealed no significant associations between restraint and attentional maintenance ($HG = 0.100$ [-0.054 , 0.254] $P=0.201$; Heterogeneity: $Q=47.65$ $P=0.003$ $I^2=49.6\%$) – see *Supplementary Materials* for forest plot (*Fig. 1*).

Mode of AB investigation

Eye-tracking vs Response Tasks

We compared all response tasks to all eye-tracking paradigms (i.e., instructed and free-viewing) and found that response tasks demonstrated positive associations between restraint and attentional maintenance, shown in *Figure 2* ($HG = 0.253$ [0.078 , 0.428] $P = 0.005$), but eye-tracking paradigms did not ($HG = -0.129$ [-0.370 , 0.112] $P=0.295$; $K=10$; *Supplementary Material Fig. 2*). Furthermore, the comparison test for associations between restraint and maintenance across each group was

384 significant ($Q= 6.306, P=0.012$), and heterogeneity was low-moderate for response task studies ($Q=$
385 $20.714 P=0.109 I^2 =32.4\%$) and moderate for eye-tracking paradigms ($Q= 18.262 P=0.032 I^2$
386 $=50.7\%$).

387 **Figure 2. Meta-analysis of associations between attentional maintenance and dietary restraint**
388 **in studies using response tasks (K=15)**

389 *(insert Figure 2 here)*

390 In the unadjusted meta-regression, the mode of AB investigation coefficient was significant ($B= 0.377$
391 $[0.087, 0.668], R^2=0.28$) and the model explained a significant amount of the variance ($Q=6.47$
392 $P=0.011$). Heterogeneity reduced from 49.6% (null model) to 41.0%. Adjusting for clinical ED
393 screening and type of restraint scale improved the precision of the coefficient and heterogeneity ($B=$
394 $0.494 [0.195, 0.793] P=0.001; R^2=0.51; Q=13.36 P=0.010 I^2=31.9\%$).

395 Overall, response tasks elicited stronger associations between eating restraint and attentional
396 maintenance compared to all eye-tracking paradigms, with stronger effects when the variance from
397 type of restraint scale and clinical ED screening were accounted for.

398 Instructed Viewing vs Free-viewing

399 We sub-grouped eye-tracking studies into instructed viewing and free-viewing to explore differences
400 between all three experimental paradigms. We found no significant associations between restraint
401 and attentional maintenance among free-viewing studies ($HG = -0.162 [-0.733, 0.409] P=0.578;$
402 $Q=16.733 P=0.001 I^2=82.1\%; K=4; \textit{Supplementary Material Fig. 3}$) nor among instructed viewing
403 studies ($HG = -0.116 [-0.352, 0.120] P=0.544; Q=1.308 P=0.934 I^2=0\%; K=6; \textit{Supplementary Material}
404 *Fig. 4*). Given the high heterogeneity in the free-viewing paradigms, we did not run any further
405 analyses using this subgroup.$

406 Instructed Viewing vs Response Tasks

407 As we previously found a significant association between dietary restraint and ABs in the response
408 task groups, we compared effect sizes between the response task subgroup and instructed viewing
409 subgroup. This comparison showed a significant difference (Q=6.046, P=0.014). In the unadjusted
410 meta-regression, the mode of AB investigation coefficient was significant (B= 0.368 [0.069, 0.667],
411 R²=0.63) and the model explained a significant amount of the variance (Q=5.82, P=0.016).

412 Heterogeneity reduced from 30.0% (null model) to 13.7%.

413 Overall, no associations between restraint and attentional maintenance were found for instructed
414 viewing or free-viewing paradigms. However, when comparing instructed viewing to response tasks,
415 response tasks elicited stronger associations between eating restraint and attentional maintenance.

416 **Response Task Type**

417 We explored whether the response task type could account for differential associations between
418 restraint and attentional maintenance. We found no associations between restraint and attentional
419 maintenance among dot probe studies (HG=0.001 [-0.141, 0.143] P=0.991; K=15; *Supplementary*
420 *Material Fig. 5*) but significant associations among the other tasks group, shown in *Figure 3* (HG =
421 0.545 [0.312, 0.777] P=0.000), with the difference between these effect sizes also significant
422 (Q=15.301, P=0.000). Heterogeneity was low in both the dot probe (Q=9.105, P=0.824 I²=0%) and
423 alternative tasks group (Q=4.168 P=0.526 I²=0%).

424 **Figure 3. Meta-analysis of associations between attentional maintenance and dietary restraint**
425 **in studies using alternative tasks to the dot probe task (K=6)**

426 *(Insert Figure 3 here)*

427 In the unadjusted meta-regression, the task type coefficient was significant (B=0.544 [0.271, 0.816];
428 $R^2=1.00$) and the model explained a significant amount of the variance (Q=15.30 P=0.000)
429 Heterogeneity was 0% (30.0% in the null model).

430 Collectively, the alternative tasks were able to capture significant positive associations between
431 restraint and attentional maintenance compared to the dot probe task.

432 ***Food Stimuli Relevance***

433 We investigated whether the relevancy of food stimuli to the response task could influence
434 associations between restraint and attentional maintenance. The irrelevant stimuli group included the
435 same studies as in the dot probe subgroup, with the addition of one study (Veenstra et al, 2010). The
436 relevant stimuli group included the same studies as the other tasks subgroup minus Veenstra et al
437 (2010). We found no associations between restraint and attentional maintenance among irrelevant
438 studies (HG=0.009 [-0.131, 0.148] P=0.904; K=16 *Supplementary Material Fig. 6*) and significant
439 associations among the relevant group, shown in *Figure 4* (HG = 0.576 [0.332, 0.820] P=0.000), with
440 the differences between these effect sizes also significant (Q=15.644, P=0.000). Heterogeneity was
441 low in the irrelevant group (Q=9.452 P=0.853 $I^2=0\%$) and low in the relevant group (Q=3.478 P=0.481
442 $I^2=0\%$).

443 **Figure 4. Meta-analysis of associations between attentional maintenance and dietary restraint** 444 **in studies using relevant food stimuli (K=5)**

445 *(Insert Figure 4 here)*

446 In the unadjusted meta-regression, the stimuli relevancy coefficient was significant (B=0.567 [0.286,
447 0.848]; $R^2=1.00$) and the model explained a significant amount of the variance (Q=15.64, P=0.000).
448 Heterogeneity was 0% (30.0% in the null model).

449 Overall, task-relevant food stimuli elicited stronger associations between restraint and attentional
450 maintenance compared to irrelevant food stimuli.

451 ***Type of Food Stimuli***

452 We investigated whether the type of food stimuli could influence associations between restraint and
453 attentional maintenance. We found no significant associations among HC studies (0.086 [-0.107,
454 0.278] P=0.382; K=19; *Supplementary Material Fig. 7*) nor among mixed food studies (HG = 0.136 [-
455 0.092, 0.364] P=0.243; K=6; *Supplementary Material Fig. 8*). The difference between these effect
456 sizes was also non-significant (Q=0.108, P=0.743). Heterogeneity was moderate-high in HC group
457 (Q=43.087, P=0.001 I²=58.2%) and low in the mixed food group (Q=4.455 P=0.486 I²=0%).

458 The stimuli type coefficient was non-significant in the unadjusted meta-regression (B=-0.056 [-0.424,
459 0.312] R²=-0.09; Q=0.09 P=0.766 I²= 51.6%; I²=49.6% in null model). We adjusted for clinical ED
460 screening only, given the smaller study number in the mixed food group, with no change in
461 significance (B=-0.032 [-0.148, 0.512] P=0.865, R²=-0.10; Q=1.26 P=0.532 I²=51.8%).

462

463 **Exploratory Analyses**

464 ***General associations between dietary restraint and attentional orienting***

465 We assessed ROB using a meta-regression model and included ROB as the independent variable.
466 ROB was not associated with dataset (B=0.058 [-0.421 0.536], Q=0.06, P=0.813) so we included all
467 studies in analyses (K=18). The meta-analysis of the whole dataset revealed no significant
468 associations between restraint and orienting, shown in *Figure 5* (HG=0.013 [-0.170, 0.196] P=0.888;
469 Q=36.754 P=0.004 I²=53.75%). Heterogeneity was moderate.

470 **Figure 5. Meta-analysis of associations between dietary restraint and attentional orienting**
471 **(K=18)**

472 *(Insert Figure 5 here)*

473 Furthermore, we found no significant associations between dietary restraint and orienting in any
474 subgroups of mode of AB investigation, type of response task or stimuli task relevance. Nor did we
475 find any relative differences in restraint-orienting associations across these subgroups. The mixed
476 food subgroup for type of stimuli only had two samples so we were unable to complete the subgroup
477 analysis and meta-regression. The HC subgroup showed no significant associations between
478 restraint and orienting *(Please see Supplementary Material for effect sizes and forest plots, Fig. 9-*
479 *17).*

480 ***ABs and ED symptoms***

481 We ran an exploratory analysis to investigate whether ED symptoms may be associated with ABs in
482 the ten samples that reported or provided data to calculate these associations. Included studies
483 investigated attentional maintenance, mostly captured by the dot-probe task and two studies used
484 free-viewing paradigms (Garcia-Burgos et al, 2017; Xu et al, 2023), shown in *Table 2*.

485 **Table 2. Studies included in ED symptoms analysis (K=10)**

486 *(Insert Table 2 here)*

487 We found no associations between ABs and ED symptoms: $HG=0.042$ $[-0.237, 0.321]$ $P=0.767$;
488 $Q=24.499$ $P=0.004$ $I^2=63.26\%$, shown in *Figure 6*. Heterogeneity was moderate-high amongst
489 studies. We explored whether controlling for whether clinical EDs were screened out could reveal an
490 association between attentional maintenance and ED symptoms. The overall model and coefficient
491 remained non-significant ($B=0.025$ $[-0.613, 0.662]$ $P=0.939$, $R^2=-0.28$; $Q=0.01$ $P=0.939$ $I^2=66.8\%$).

492 **Figure 6. Meta-analysis of associations between ED symptoms and attentional maintenance**
493 **(K=10)**

494 *(Insert Figure 6 here)*

495 We also explored whether associations between ABs and ED symptoms may differ across ED
496 outcome measure. We created three subgroups so that each group had a minimum of three samples
497 to analyse: *EDEQ* (K=4), *EDI-2* (K=3), *Other* (K=3). No significant associations were found between
498 ABs and ED symptoms in each subgroup: *EDEQ* HG=0.275 [-0.203, 0.752] P=0.259, Q=6.792
499 P=0.079 I²=55.83%; *EDI-2* HG= -0.243 [-0.603, 0.118] P=0.187, Q=2.402 P=0.301 I²=16.734; K=3;
500 *Other* HG=0.022 [-0.531, 0.575] P=0.939, Q=9.369 P=0.009 I²=78.654% (Please see *Supplementary*
501 *Materials Fig. 18-20*).

502 **Publication Bias**

503 Although some subgroups had less than ten studies (Page et al, 2021), we still checked for
504 publication bias in each of our subgroups using Egger's Test and visual inspections of funnel plots.
505 We found no evidence of publication bias (Please see *Supplementary Materials* for funnel plots and
506 Egger's Test P-values, *Fig. 21-30*).

Discussion

Existing evidence indicates that dietary restraint may contribute to the development and maintenance of EDs, with food-related ABs as a key underlying mechanism. So far, only one study provided a systematic synthesis of the literature on ABs and dietary restraint, which was largely inconclusive due to high statistical heterogeneity between studies (Watson and Le Pelley, 2021). To reduce such heterogeneity, our work focused on one cognitive bias – i.e., ABs – and isolated its different mechanisms by distinguishing between orienting and maintenance processes. In addition, we conducted analyses to assess how various factors, including the mode of AB investigation, the type of response task, the relevance or irrelevance of stimuli to the task, and the characteristics of food-related stimuli, may influence the link between ABs and dietary restraint.

When investigating the type of AB mechanism across each dataset, we found no significant associations between restraint and attentional maintenance or attentional orienting. These results were unsurprising, as we hypothesised that different methodological features could contribute to the inconsistent findings observed in previous studies. This aligns with the conclusions of Watson and Le Pelley (2021), who suggested that unaccounted heterogeneity could be masking these associations.

When investigating the influence of our chosen methodological factors, we only found significant associations between dietary restraint and ABs for attentional maintenance indices, but not for orienting indices. The absence of preferential orienting to food-related cues among dietary restrainers suggests a lack of a bottom-up, stimulus-driven processing of food cues. This contrasts with findings in those with clinical EDs, who consistently demonstrate food-related orienting ABs (Meregalli et al, 2023; Schmitz et al, 2014). Such orienting biases have been interpreted as evidence of reward- (Schag et al, 2013) or threat-driven vigilance (Booth, 2014; Radix et al, 2023), which may either encourage binge eating (Schag et al, 2013), or drive severe energy restriction (Meregalli et al, 2023). Although this pattern might initially appear inconsistent with the conceptualisation of dietary restraint

537 as a risk factor for EDs, it does align with some evidence suggesting that subclinical disordered
538 eating may be more strongly associated with attentional maintenance (Jin et al, 2023; Soleymani et
539 al, 2022) than orienting (Freccero et al, 2025), possibly reflecting better self-regulatory control over
540 food cues in those below a clinical threshold for EDs. As a result, ABs in ED-vulnerable groups, such
541 as dietary restrainers, may still predominantly manifest as maintenance rather than orienting,
542 reflecting purposeful, top-down processing (Grubb et al., 2015) and a more goal-directed attentional
543 strategy.

544 Furthermore, we found significant associations between dietary restraint and attentional maintenance
545 when stimuli were relevant, rather than irrelevant, to the task. This corroborates the idea that dietary
546 restrainers activate self-regulatory processes when food is relevant to their current goals and actions
547 (Papies and Hamstra, 2010).

548 Taken together, our findings suggest that such top-down processing in food-relevant contexts could
549 indicate more strategic monitoring that facilitates dietary restraint (Johnson et al, 2012; Moore et al,
550 2022). The degree of success in dietary restraint may indeed be influential in our findings. While
551 successful restrainers (i.e., maintaining restraint without periods of disinhibited eating; Johnson et al,
552 2012) may bypass bottom-up, stimulus driven attention (i.e., orienting), in favour of more purposeful
553 monitoring in relevant contexts, unsuccessful restrainers, who tend to show higher ED pathology and
554 maladaptive regulation of eating behaviours (Meule et al, 2012), may manifest both more orienting
555 (Jiang et al, 2024; Alblas et al, 2020) and maintenance (Weng et al, 2012) regardless of context. In
556 line with this reasoning, we found no associations between dietary restraint and attentional
557 maintenance across HC or mixed food stimuli, nor any relative group differences. This could reflect
558 strategic downregulation of the motivational salience system (Xie and Chen, 2025), reducing ABs to
559 diet-incongruent cues (Weng et al, 2012; Higgs et al, 2015). In turn, this may facilitate successful,
560 rather than unsuccessful restraint, whereby heightened motivational salience to HC cues can override

561 energy homeostasis (Xie and Chen, 2025) and reinforce the counterregulatory eating (Hagerman et
562 al, 2021) that contributes to binge-eating pathology (Schag et al, 2013).

563 We tried to confirm whether the degree of success in dietary restraint influenced our findings,
564 however not enough papers made this distinction. Instead, we ran a meta-analysis of correlations
565 between ED symptoms and ABs in the hope to indirectly gauge maladaptive forms of dietary restraint.
566 However, we found no associations between maintenance and global ED symptoms. It is possible
567 that a threshold effect may exist, whereby associations are more likely to emerge when ED symptoms
568 reach a certain level of severity (Soleymani et al, 2022), perhaps not captured if more successful
569 restrainers were included in our samples (Meule et al, 2012). Global ED symptom scores may have
570 also masked more specific associations between attentional maintenance and dietary restraint which
571 may have emerged if considering specific ED profiles such as binge-eating (Sablotny et al, 2025) or
572 restrictive symptoms (Mercado et al, 2020; Meregalli et al, 2023). In addition, as attentional orienting
573 is linked to disorder-driven saliency processing across different EDs (Meregalli et al, 2023; Schmitz et
574 al, 2014; Sablotny et al, 2025), this AB mechanism may instead show stronger associations with
575 global ED pathology.

576 The body of literature on dietary restraint and ABs also diverges in the way in which ABs are
577 investigated, which may account for some of the conflicting findings. Specifically, we investigated AB
578 investigation mode and type of response task. We found significant dietary restraint and maintenance
579 associations in the response tasks group versus the eye-tracking group One possible explanation lies
580 in the increased AB index consistency in the response tasks compared to the eye-tracking indices.
581 For instance, gaze fixations have no standardised definition (e.g., Hummel et al, 2018; Liu et al, 2021;
582 Chen et al, 2023). Another source of variance was the inclusion of both free-viewing and instructed-
583 viewing paradigms, with free-viewing being too heterogeneous to glean any meaningful differences
584 between them.

585 We also found significant associations between dietary restraint and maintenance in the alternative
586 response tasks compared to the dot-probe. While this may at first be surprising, as the alternative
587 tasks group was inevitably a less homogenous group, it is in line with what is consistently reported in
588 the literature regarding the unreliability of the dot probe task as a measure of AB (Price et al, 2015;
589 Chapman et al, 2019; Xu et al, 2025). Moreover, in line with the significant effects found for task-
590 relevant food stimuli, we note that five out of six alternative-task studies used stimuli that were
591 relevant to the task instructions. Therefore, this finding may be attributable to the relevance of the
592 food stimuli to the task, reflecting top-down attentional processing in dietary restrainers.

593 Our results need to be considered in light of some limitations. Firstly, we only considered a select
594 number of methodological factors, and other existing factors, such as the induction of certain moods
595 (Hepworth et al, 2010) or homeostatic states (Feighan et al, 2025) could also influence associations
596 between dietary restraint and ABs. Second, despite our efforts, we were unable to retrieve data from
597 24 studies, which made our results somewhat incomplete. Third, due to the constraints imposed by
598 univariate analytical methods, we were forced to prioritise specific factors, leading to the exclusion of
599 specific stimuli comparisons, modes of AB investigation, attentional mechanisms and gaze and
600 performance indices. Lastly, our investigations of attentional orienting and ED symptoms were
601 exploratory only and should be confirmed in future research. Although the following points are not
602 directly related to this meta-analysis, they represent shortcomings in the literature that warrant
603 consideration. First, most of our samples were young adult females from universities in Europe and
604 the UK, and we were unable to make further inferences about race or ethnicity as only three studies
605 reported this information. Furthermore, as only two studies reported socioeconomic information, we
606 could not explore the potential impact of any socioeconomic variables. Hence, the generalisability of
607 our findings remains unclear. Second, while we made efforts to screen out studies involving clinical
608 samples exclusively, some studies did not screen for clinical EDs so may have captured individuals

609 above the clinical threshold. Where possible, we controlled for whether clinical ED screening took
610 place, to extend findings to non-clinical groups who may therefore be at risk of ED development. As
611 data on dietary restraint success level was not available, it remains unknown whether, unsuccessful
612 dietary restrainers (i.e., a group that may be at higher risk of ED development) may show stronger
613 associations between ABs and ED symptoms than successful restrainers.

614 Overall, our meta-analysis highlights that some of the inconsistencies observed in the relationship
615 between dietary restraint and ABs could be attributable to varying methodological approaches used in
616 the literature. Specifically, our findings suggest that dietary restrainers may show strategic top-down
617 processing of food cues when food is relevant to their goals and actions, and certain response tasks
618 may be more reliable in capturing this phenomenon. Furthermore, attentional orienting may not
619 reliably characterise food cue processing in dietary restrainers. Future research should explore how
620 dietary restraint may relate to differing AB mechanisms, and whether the degree of restraint success
621 is influential in this. Further research is also needed to confirm whether such associations are related
622 to ED pathology. This should be explored in populations that tend to be underrepresented in ED
623 research, such as males and minority ethnic groups. This would help clarify whether unsuccessful
624 restraint is more strongly associated with AB mechanisms that indicate maladaptive salience
625 processing, and whether this contributes to higher risk of ED development across populations.

634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665

References

- Ahern, A. L., Field, M., Yokum, S., Bohon, C., & Stice, E. (2010). Relation of dietary restraint scores to cognitive biases and reward sensitivity. *Appetite*, *55*(1), 61-68.
- Albery, I. P., Wilcockson, T., Frings, D., Moss, A. C., Caselli, G., & Spada, M. M. (2016). Examining the relationship between selective attentional bias for food-and body-related stimuli and purging behaviour in bulimia nervosa. *Appetite*, *107*, 208-212.
- Alblas, M. C., Mollen, S., Fransen, M. L., & van den Putte, B. (2020). Food at first sight: Visual attention to palatable food cues on TV and subsequent unhealthy food intake in unsuccessful restrained eaters. *Appetite*, *147*, 104574.
- Alqahtani, R. M., & Alhazmi, A. (2025). Association between cognitive restraint, emotional eating, uncontrolled eating, and body mass index among health care professionals. *Scientific Reports*, *15*(1), 2570.
- Baldofski, S., Lüthold, P., Sperling, I., & Hilbert, A. (2018). Visual attention to pictorial food stimuli in individuals with night eating syndrome: an eye-tracking study. *Behavior therapy*, *49*(2), 262-272.
- Bongers, P., van de Giessen, E., Roefs, A., Nederkoorn, C., Booij, J., van den Brink, W., & Jansen, A. (2015). Being impulsive and obese increases susceptibility to speeded detection of high-calorie foods. *Health Psychology*, *34*(6), 677.
- Booth, R. W. (2014). Uncontrolled avoidance of threat: Vigilance-avoidance, executive control, inhibition and shifting. *Cognition and Emotion*, *28*(8), 1465–1473.
<https://doi.org/10.1080/02699931.2014.882294>
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2021). Introduction to meta-analysis. *John Wiley & sons*.

666 Brand, J., Yeum, D., Stewart, T., Emond, J. A., & Gilbert-Diamond, D. (2024). The associations
667 between attentional bias to food cues, parent-report appetitive traits, and concurrent adiposity among
668 adolescents. *Eating behaviors*, 53, 101874.

669

670 Brignell, C., Griffiths, T., Bradley, B. P., & Mogg, K. (2009). Attentional and approach biases for
671 pictorial food cues. Influence of external eating. *Appetite*, 52(2), 299-306.

672

673 Broadley, M. M., Bishop, T., White, M. J., & Andrew, B. (2019). The relationship between attentional
674 bias to food and disordered eating in females with type 1 diabetes. *Appetite*, 140, 269-276.

675

676 Burmester, V., Butler, G. K., & Terry, P. (2022). Intranasal oxytocin reduces attentional bias to food
677 stimuli. *Appetite*, 168, 105684.

678

679 Calcaterra, V., Cena, H., Rossi, V., Santero, S., Bianchi, A., & Zuccotti, G. (2023). Ultra-processed
680 food, reward system and childhood obesity. *Children*, 10(5), 804.

681

682 Chandler, J., Cumpston, M., Li, T., Page, M. J., & Welch, V. J. H. W. (2019). Cochrane handbook for
683 systematic reviews of interventions. *Hoboken: Wiley*, 4(1002), 14651858.

684

685 Chapman, A., Devue, C., & Grimshaw, G. M. (2019). Fleeting reliability in the dot-probe task.
686 *Psychological research*, 83(2), 308-320.

687

688 Chen, Q., Peng, S., Luo, C., Zhuang, X., & Ma, G. (2023). Measuring early-stage attentional bias
689 towards food images using saccade trajectory deviations. *Current Psychology*, 42(34), 29838-29850.

690

691 Deluchi, M., Costa, F. S., Friedman, R., Gonçalves, R., & Bizarro, L. (2017). Attentional bias to
692 unhealthy food in individuals with severe obesity and binge eating. *Appetite*, 108, 471-476.

693

694 Dondzilo, L., Mills, C., Pollitt, S., & MacLeod, C. (2022). Enhanced capacity to switch but not to
695 maintain: The basis of attentional bias to high calorie foods in restrained eaters. *Appetite*, 172,
696 105969.

697

698 Donofry, S. D., Van Zoest, W., Moonen, A., Sacchetti, S., Nederkoorn, C., & Roefs, A. (2019). Effect
699 of dietary restraint and mood state on attentional processing of food cues. *Journal of Behavior*
700 *Therapy and Experimental Psychiatry*, 62, 117-124.

701

702 Duc, A. H., Bays, P., & Husain, M. (2008). Eye movements as a probe of attention. *Progress in brain*
703 *research*, 171, 403-411.

704

705 Feighan, S. M., McArdle, K., Lisanti, L., Roche, E., Ormonde, C., Heron, E., ... & Gallagher, L. (2025).
706 Measuring Shifts in Attentional Bias Following Satiety: A Within-Subject Eye-Tracking Study in
707 Healthy-Weight Adults. *Physiology & Behavior*, 114993.

708

709 Field, A. E., Austin, S. B., Taylor, C. B., Malspeis, S., Rosner, B., Rockett, H. R., ... & Colditz, G. A.
710 (2003). Relation between dieting and weight change among preadolescents and
711 adolescents. *Pediatrics*, 112(4), 900-906.

712

713 Field, M., & Cox, W. M. (2008). Attentional bias in addictive behaviors: a review of its development,
714 causes, and consequences. *Drug and alcohol dependence*, 97(1-2), 1-20.

715

716 Flynn, M. (2023). An Investigation of Concurrent Attention Bias Modification Training and Self-
717 administered Transcranial Direct Current Stimulation in Binge Eating Disorder (Doctoral dissertation,
718 King's College London).

719

720 Forestell, C. A., Lau, P., Gyurovski, I. I., Dickter, C. L., & Haque, S. S. (2012). Attentional biases to
721 foods: The effects of caloric content and cognitive restraint. *Appetite*, 59(3), 748-754.

722

723 Frayn, M., Sears, C. R., & von Ranson, K. M. (2016). A sad mood increases attention to unhealthy
724 food images in women with food addiction. *Appetite*, 100, 55-63.

725

726 Freccero, A., Burmester, V., Rodrigues, R., Gallucci, A., Nicholls, D., & Simplicio, M. D. (2025).
727 Attentional Processing Biases in Young People With Binging and Purging Behavior. *Brain and*
728 *Behavior*, 15(2), e70322.

729

730 Freijy, T., Mullan, B., & Sharpe, L. (2014). Food-related attentional bias. Word versus pictorial stimuli
731 and the importance of stimuli calorific value in the dot probe task. *Appetite*, 83, 202-208.

732

733 Garcia-Burgos, D., Lao, J., Munsch, S., & Caldarà, R. (2017). Visual attention to food cues is
734 differentially modulated by gustatory-hedonic and post-ingestive attributes. *Food Research*
735 *International*, 97, 199-208.

736

737 Gearhardt, A. N., Treat, T. A., Hollingworth, A., & Corbin, W. R. (2012). The relationship between
738 eating-related individual differences and visual attention to foods high in added fat and sugar. *Eating*
739 *Behaviors*, 13(4), 371-374.

740

741 Geyskens, K., Soetens, B., & Roets, A. (2010). Exposure makes the heart grow less fond! The effects
742 of exposure to palatable foods on the subsequent attention processing of food cues. *Journal of health*
743 *psychology*, 15(2), 230-238.

744

745 Graham, R., Hoover, A., Ceballos, N. A., & Komogortsev, O. (2011). Body mass index moderates
746 gaze orienting biases and pupil diameter to high and low calorie food images. *Appetite*, 56(3), 577-
747 586.

748

749 Grubb, M. A., White, A. L., Heeger, D. J., & Carrasco, M. (2015). Interactions between voluntary and
750 involuntary attention modulate the quality and temporal dynamics of visual processing. *Psychonomic*
751 *bulletin & review*, 22(2), 437-444.

752

753 Hagerman, C. J., Stock, M. L., Beekman, J. B., Yeung, E. W., & Persky, S. (2021). The ironic effects
754 of dietary restraint in situations that undermine self-regulation. *Eating behaviors*, 43, 101579.

755

756 Hardman, C. A., Jones, A., Burton, S., Duckworth, J. J., McGale, L. S., Mead, B. R., ... & Werthmann,
757 J. (2021). Food-related attentional bias and its associations with appetitive motivation and body
758 weight: A systematic review and meta-analysis. *Appetite*, 157, 104986.

759

760 Hardman, C. A., Rogers, P. J., Etchells, K. A., Houstoun, K. V., & Munafò, M. R. (2013). The effects of
761 food-related attentional bias training on appetite and food intake. *Appetite*, 71, 295-300.

762

763 Hardman, C. A., Scott, J., Field, M., & Jones, A. (2014). To eat or not to eat. The effects of expectancy
764 on reactivity to food cues. *Appetite*, 76, 153-160.

765

766 Hege, M. A., Stingl, K. T., Veit, R., & Preissl, H. (2017). Modulation of attentional networks by food-
767 related disinhibition. *Physiology & Behavior*, 176, 84-92.

768

769 Hepworth, R., Mogg, K., Brignell, C., & Bradley, B. P. (2010). Negative mood increases selective
770 attention to food cues and subjective appetite. *Appetite*, 54(1), 134-142.

771

772 Herman, C. P., & Polivy, J. (1975). Anxiety, restraint, and eating behavior. *Journal of abnormal*
773 *psychology*, 84(6), 666.

774

775 Higgins, J. P., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in
776 meta-analyses. *bmj*, 327(7414), 557-560.

777

778 Higgs, S., Dolmans, D., Humphreys, G. W., & Rutters, F. (2015). Dietary self-control influences top-
779 down guidance of attention to food cues. *Frontiers in Psychology*, 6, 427.

780

781 Higgs, S., Rutters, F., Thomas, J. M., Naish, K., & Humphreys, G. W. (2012). Top down modulation of
782 attention to food cues via working memory. *Appetite*, 59(1), 71-75.

783

784 Hopewell, S., McDonald, S., Clarke, M. J., & Egger, M. (2007). Grey literature in meta-analyses of
785 randomized trials of health care interventions. *Cochrane Database of Systematic Reviews*, (2).

786

787 Hou, R., Mogg, K., Bradley, B. P., Moss-Morris, R., Peveler, R., & Roefs, A. (2011). External eating,
788 impulsivity and attentional bias to food cues. *Appetite*, 56(2), 424-427.

789

790 Hummel, G., Ehret, J., Zerweck, I., Winter, S. S., & Stroebele-Benschop, N. (2018). How eating
791 behavior, food stimuli and gender may affect visual attention—An eye tracking study. *Eating behaviors*,
792 31, 60-67.

793

794 Hummel, G., Zerweck, I., Ehret, J., Winter, S. S., & Stroebele-Benschop, N. (2017). The influence of
795 the arrangement of different food images on participants' attention: An experimental eye-tracking
796 study. *Food Quality and Preference*, *62*, 111-119.

797
798 Husted, M., Banks, A. P., & Seiss, E. (2016). Eating behaviour associated with differences in conflict
799 adaptation for food pictures. *Appetite*, *105*, 630-637.

800
801 Jiang, W., Zhang, H., Yang, H., Zhang, Z., & Wang, A. (2024). The Absence of Attentional Bias to
802 Low-Calorie Food Stimuli in Restrictive Dieters: Differences in the Allocation of Attentional Resources
803 to High-Calorie Foods. *Brain Sciences*, *14*(6), 551.

804
805 Jin, L., Han, W., & Zheng, Z. (2023). Attentional vigilance of food information in disordered eating
806 behaviors. *Frontiers in Psychiatry*, *14*, 1108995.

807
808 Johnson, F., Pratt, M., & Wardle, J. (2012). Dietary restraint and self-regulation in eating behavior.
809 *International journal of obesity*, *36*(5), 665-674.

810
811 Jonker, N. C., Heitmann, J., Ostafin, B. D., MacLeod, C., Glashouwer, K. A., & de Jong, P. J. (2019). A
812 new approach to facilitating attentional disengagement from food cues in unsuccessful dieters: the
813 bouncing image training task. *Behaviour Research and Therapy*, *120*, 103445.

814
815 Kakoschke, N., Kemps, E., & Tiggemann, M. (2015). Combined effects of cognitive bias for food cues
816 and poor inhibitory control on unhealthy food intake. *Appetite*, *87*, 358-364.

817
818 Kim, Y. R., Kim, C. H., Cardi, V., Eom, J. S., Seong, Y., & Treasure, J. (2014). Intranasal oxytocin
819 attenuates attentional bias for eating and fat shape stimuli in patients with anorexia nervosa.
820 *Psychoneuroendocrinology*, *44*, 133-142.

821
822 Kirsten, H., Seib-Pfeifer, L. E., Koppehele-Gossel, J., & Gibbons, H. (2019). Food has the right of
823 way: Evidence for prioritised processing of visual food stimuli irrespective of eating style. *Appetite*,
824 *142*, 104372.

826 Kochs, S., Pimpini, L., van Zoest, W., Jansen, A., & Roefs, A. (2022). Effects of mindset and dietary
827 restraint on attention bias for food and food intake. *Journal of Cognition*, 5(1), 43.

828

829 Kong, F., Zhang, Y., You, Z., Fan, C., Tian, Y., & Zhou, Z. (2013). Body dissatisfaction and restrained
830 eating: Mediating effects of self-esteem. *Social Behavior and Personality: an international journal*,
831 41(7), 1165-1170.

832

833 LaFata, E. M., Allison, K. C., Audrain-McGovern, J., & Forman, E. M. (2024). Ultra-processed food
834 addiction: a research update. *Current Obesity Reports*, 13(2), 214-223.

835

836 Landis, J.R. and Koch, G.G. (1977). An Application of Hierarchical Kappa-Type Statistics in the
837 Assessment of Majority Agreement among Multiple Observers. *Biometrics*, 33, 363-374.

838

839 Leppanen, J., Cardi, V., Ng, K. W., Paloyelis, Y., Stein, D., Tchanturia, K., & Treasure, J. (2017). The
840 effects of intranasal oxytocin on smoothie intake, cortisol and attentional bias in anorexia nervosa.
841 *Psychoneuroendocrinology*, 79, 167-174.

842

843 Linardon, J., Messer, M., Helms, E. R., McLean, C., Incerti, L., & Fuller-Tyszkiewicz, M. (2020).
844 Interactions between different eating patterns on recurrent binge-eating behavior: A machine learning
845 approach. *International Journal of Eating Disorders*, 53(4), 533-540.

846

847 Liu, X., Pei, G., Zhao, J., Xu, M., Cao, L., Zhang, J., ... & Wang, L. (2025). Attention Affecting
848 Response Inhibition in Overweight Adults with Food Addiction. *Biosensors*, 15(3), 180.

849

850 Liu, Y., Roefs, A., & Nederkoorn, C. (2021). Food palatability directs our eyes across contexts.
851 *Frontiers in psychology*, 12, 664893.

852

853 Loeber, S., Grosshans, M., Herpertz, S., Kiefer, F., & Herpertz, S. C. (2013). Hunger modulates
854 behavioral disinhibition and attention allocation to food-associated cues in normal-weight controls.
855 *Appetite*, 71, 32-39.

856

857 Loeber, S., Grosshans, M., Korucuoglu, O., Vollmert, C., Vollstädt-Klein, S., Schneider, S., ... & Kiefer,
858 F. (2012). Impairment of inhibitory control in response to food-associated cues and attentional bias of
859 obese participants and normal-weight controls. *International journal of obesity*, 36(10), 1334-1339.

860 Mercado, D., Schmidt, U., O'Daly, O. G., Campbell, I. C., & Werthmann, J. (2020). Food related
861 attention bias modification training for anorexia nervosa and its potential underpinning mechanisms.
862 *Journal of Eating Disorders*, 8(1), 1.

863

864 Meregalli, V., Tenconi, E., Cardi, V., Bonifanti, A., Meneguzzo, P., Favaro, A., & Collantoni, E. (2023).
865 Strategic avoidance of food stimuli in patients with restrictive anorexia nervosa: An eye-tracking
866 evaluation. *European Eating Disorders Review*, 31(6), 813-821.

867

868 Meule, A., Papiés, E. K., & Kübler, A. (2012). Differentiating between successful and unsuccessful
869 dieters. Validity and reliability of the Perceived Self-Regulatory Success in Dieting Scale. *Appetite*,
870 58(3), 822-826.

871

872 Meule, A., Vögele, C., & Kübler, A. (2012). Restrained eating is related to accelerated reaction to high
873 caloric foods and cardiac autonomic dysregulation. *Appetite*, 58(2), 638-644.

874

875 Moore, K., Walker, D., & Laczniak, R. (2022). Attention mediates restrained eaters' food consumption
876 intentions. *Food Quality and Preference*, 96, 104382.

877

878 Nannt, J., van den Hoek Ostende, M. M., Tuschen-Caffier, B., Heinrichs, M., Sippel, D., Hallschmid,
879 M., & Svaldi, J. (2025). Oxytocin Effects on Food Stimulus Processing and Food Intake in Females
880 With or Without Binge Eating Disorder. *International Journal of Eating Disorders*, 59(2), 249-259.

881

882 Neimeijer, R. A., de Jong, P. J., & Roefs, A. (2013). Temporal attention for visual food stimuli in
883 restrained eaters. *Appetite*, 64, 5-11.

884

885 Neimeijer, R. A., Roefs, A., & de Jong, P. J. (2017). Heightened attentional capture by visual food
886 stimuli in anorexia nervosa. *Journal of abnormal psychology*, 126(6), 805.

887

888 Olea López, A. L., & Johnson, L. (2016). Associations between restrained eating and the size and
889 frequency of overall intake, meal, snack and drink occasions in the UK adult national diet and nutrition
890 survey. *PLoS One*, 11(5), e0156320.

891

892 Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher,
893 D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *bmj*,
894 372.

895
896 Page, M. J., Sterne, J. A., Higgins, J. P., & Egger, M. (2021). Investigating and dealing with
897 publication bias and other reporting biases in meta-analyses of health research: A review. *Research*
898 *synthesis methods*, 12(2), 248-259.

899
900 Papies, E. K., & Hamstra, P. (2010). Goal priming and eating behavior: enhancing self-regulation by
901 environmental cues. *Health Psychology*, 29(4), 384.

902
903 Pasqualette, L., & Kulke, L. (2024). Differences between overt, covert and natural attention shifts to
904 emotional faces. *Neuroscience*, 559, 283-292.

905
906 Polivy, J., & Herman, C. P. (2020). Overeating in restrained and unrestrained eaters. *Frontiers in*
907 *Nutrition*, 7, 513340.

908
909 Price, M. J., Blake, H. A., Kenyon, S., White, I. R., Jackson, D., Kirkham, J. J., Neilson, J. P., Deeks,
910 J. J., & Riley, R. D. (2019). Empirical comparison of univariate and multivariate meta-analyses in
911 Cochrane Pregnancy and Childbirth reviews with multiple binary outcomes. *Research synthesis*
912 *methods*, 10(3), 440–451. <https://doi.org/10.1002/jrsm.1353>

913
914 Price, R. B., Kuckertz, J. M., Siegle, G. J., Ladouceur, C. D., Silk, J. S., Ryan, N. D., ... & Amir, N.
915 (2015). Empirical recommendations for improving the stability of the dot-probe task in clinical
916 research. *Psychological assessment*, 27(2), 365.

917
918 Puttevils, L., De Bruecker, M., Allaert, J., Sanchez-Lopez, A., De Schryver, N., Vervaet, M., ... &
919 Vanderhasselt, M. A. (2023). Attentional bias to food during free and instructed viewing in anorexia
920 nervosa: An eye tracking study. *Journal of Psychiatric Research*, 164, 468-476.

921
922 Racine, S. E., Burt, S. A., Iacono, W. G., McGue, M., & Klump, K. L. (2011). Dietary restraint
923 moderates genetic risk for binge eating. *Journal of Abnormal Psychology*, 120(1), 119.

925 Ramírez-Contreras, C., Farrán-Codina, A., Izquierdo-Pulido, M., & Zerón-Ruggerio, M. F. (2021). A
926 higher dietary restraint is associated with higher BMI: a cross-sectional study in college students.
927 *Physiology & Behavior*, *240*, 113536.

928

929 Radix, A. K., Sfarlea, A., Rinck, M., Becker, E. S., Platt, B., Schulte-Körne, G., & Legenbauer, T.
930 (2023). Watch out! A path from anxiety to anorexia nervosa through biased attention?. *European*
931 *Eating Disorders Review*, *31*(5), 670-684.

932

933 Sablotny, L., Werle, D., Svaldi, J., Thörel, N., Caffier, D., & Tuschen-Caffier, B. (2025). Attentional
934 bias toward food in binge eating disorder: baseline differences and the limits of attention modification
935 training. *Journal of Eating Disorders*, *13*(1), 1-17.

936

937 Sambal, H., Bohon, C., & Weinbach, N. (2021). The effect of mood on food versus non-food
938 interference among females who are high and low on emotional eating. *Journal of Eating Disorders*,
939 *9*(1), 140.

940

941 Schag, K., Teufel, M., Junne, F., Preissl, H., Hautzinger, M., Zipfel, S., & Giel, K. E. (2013). Impulsivity
942 in binge eating disorder: food cues elicit increased reward responses and disinhibition. *PloS one*,
943 *8*(10), e76542.

944

945 Schmid, C.H., Stijnen, T., & White, I. (Eds.). (2020). Handbook of Meta-Analysis (1st ed.). Chapman
946 and Hall/CRC. <https://doi.org/10.1201/9781315119403>

947

948 Schmidt, R., Lüthold, P., Kittel, R., Tetzlaff, A., & Hilbert, A. (2016). Visual attentional bias for food in
949 adolescents with binge-eating disorder. *Journal of Psychiatric Research*, *80*, 22-29.

950

951 Schmitz, F., Naumann, E., Trentowska, M., & Svaldi, J. (2014). Attentional bias for food cues in binge
952 eating disorder. *Appetite*, *80*, 70-80.

953

954 Seage, C. H., & Lee, M. (2017). Do disinhibited eaters pay increased attention to food cues?.
955 *Appetite*, *108*, 151-155.

956

957 Seo, C. L., & Lee, J. H. (2021). Attentional bias to high-calorie food in binge eaters with high
958 shape/weight concern. *Frontiers in psychiatry*, *12*, 606296.

959 Skinner, I. W., Hübscher, M., Moseley, G. L., Lee, H., Wand, B. M., Traeger, A. C., ... & McAuley, J. H.
960 (2018). The reliability of eye-tracking to assess attentional bias to threatening words in healthy
961 individuals. *Behavior research methods*, 50(5), 1778-1792.

962
963 Smeets, E., Roefs, A., & Jansen, A. (2009). Experimentally induced chocolate craving leads to an
964 attentional bias in increased distraction but not in speeded detection. *Appetite*, 53(3), 370-375.

965
966 Soetens, B., Braet, C., & Bosmans, G. (2008). No evidence for a food-related attention bias after
967 thought suppression. *Psychologica Belgica*, 48(1).

968
969 Soleymani, A., Mazidi, M., Neimeijer, R., & de Jong, P. J. (2022). Eating disorder-specific rumination
970 moderates the association between attentional bias to high-calorie foods and eating disorder
971 symptoms: Evidence from a reliable free-viewing eye-tracking task. *Appetite*, 171, 105934.

972
973 Sperling, I., Baldofski, S., Lüthold, P., & Hilbert, A. (2017). Cognitive food processing in binge-eating
974 disorder: an eye-tracking study. *Nutrients*, 9(8), 903.

975
976 Stamataki, N. S., Scott, C., Elliott, R., McKie, S., Bosscher, D., & McLaughlin, J. T. (2020). Stevia
977 beverage consumption prior to lunch reduces appetite and total energy intake without affecting
978 glycemia or attentional bias to food cues: A double-blind randomized controlled trial in healthy adults.
979 *The Journal of nutrition*, 150(5), 1126-1134.

980
981 Stormark, K. M., & Torkildsen, Ø. (2004). Selective processing of linguistic and pictorial food stimuli in
982 females with anorexia and bulimia nervosa. *Eating behaviors*, 5(1), 27-33.

983
984 Stott, N., Fox, J. R., & Williams, M. O. (2021). Attentional bias in eating disorders: A meta-review.
985 *International Journal of Eating Disorders*, 54(8), 1377-1399.

986
987 Taylor, J. M., & Alanazi, S. (2023). Cohen's and Hedges'g. *Journal of Nursing Education*, 62(5), 316-
988 317.

989
990 Valenzuela, A. U. Z. (2019). *Attentional Bias for Food Cues After Sleeve Gastrectomy: A Behavioral
991 and Electrophysiological Study*. Pontificia Universidad Catolica de Chile (Chile).

- 992 van Ens, W., Schmidt, U., Campbell, I. C., Roefs, A., & Werthmann, J. (2019). Test-retest reliability of
993 attention bias for food: Robust eye-tracking and reaction time indices. *Appetite*, 136, 86-92.
- 994
- 995 van Strien, T., & Bazelier, F. G. (2007). Perceived parental control of food intake is related to external,
996 restrained and emotional eating in 7–12-year-old boys and girls. *Appetite*, 49(3), 618-625.
- 997
- 998 Veenstra, E. M., de Jong, P. J., Koster, E. H., & Roefs, A. (2010). Attentional avoidance of high-fat
999 food in unsuccessful dieters. *Journal of Behavior Therapy and Experimental Psychiatry*, 41(3), 282-
000 288.
- 001
- 002 Waliłko, J., Bronowicka, P., He, J., & Brytek-Matera, A. (2021). Dieting and disinhibited eating patterns
003 in adult women with normal body weight: Does rumination matter?. *Nutrients*, 13(7), 2475.
- 004
- 005 Wang, Y., Dong, D., Todd, J., Du, J., Yang, Z., Lu, H., & Chen, H. (2016). Neural correlates of
006 restrained eaters' high susceptibility to food cues: An fMRI study. *Neuroscience letters*, 631, 56-62.
- 007
- 008 Watson, P., & Le Pelley, M. E. (2021). A meta-analysis of the relationship between eating restraint,
009 impaired cognitive control and cognitive bias to food in non-clinical samples. *Clinical psychology*
010 *review*, 89, 102082.
- 011
- 012 Waechter, S., Nelson, A. L., Wright, C., Hyatt, A., & Oakman, J. (2014). Measuring attentional bias to
013 threat: Reliability of dot probe and eye movement indices. *Cognitive therapy and research*, 38(3),
014 313-333.
- 015
- 016 Weng, C. Y., Chen, H., & Zhu, L. (2012). Attentional biases toward food-related information among
017 restrained eaters based on the goal conflict model of eating. *Acta Psychologica Sinica*, 44(5), 680.
- 018
- 019 Wells, G. A., Shea, B., O'Connell, D., Peterson, J., Welch, V., Losos, M., & Tugwell, P. (2000). The
020 Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses.
021 URL: [https://web.archive.org/web/20210716121605id/www3.med.unipmn.it/dispense_ebm/2009-
022 2010/Corso%20Perfezionamento%20EBM_Faggiano/NOS_oxford.pdf](https://web.archive.org/web/20210716121605id/www3.med.unipmn.it/dispense_ebm/2009-2010/Corso%20Perfezionamento%20EBM_Faggiano/NOS_oxford.pdf)
- 023

024 Werle, D., Sablottny, L., Tuschen-Caffier, B., & Svaldi, J. (2024). Modifying biased attention towards
025 food stimuli in binge eating disorder: A multi-session training study. *Appetite*, 107284.

026
027 Werthmann, J., Field, M., Roefs, A., Nederkoorn, C., & Jansen, A. (2014). Attention bias for chocolate
028 increases chocolate consumption—an attention bias modification study. *Journal of Behavior Therapy*
029 *and Experimental Psychiatry*, 45(1), 136-143.

030
031 Werthmann, J., Roefs, A., Nederkoorn, C., & Jansen, A. (2013). Desire lies in the eyes: attention bias
032 for chocolate is related to craving and self-endorsed eating permission. *Appetite*, 70, 81-89.

033
034 Werthmann, J., Roefs, A., Nederkoorn, C., Mogg, K., Bradley, B. P., & Jansen, A. (2013). Attention
035 bias for food is independent of restraint in healthy weight individuals—An eye tracking study. *Eating*
036 *behaviors*, 14(3), 397-400.

037
038 Wilson, C., & Wallis, D. J. (2013). Can the dot probe task detect food-related attentional biases in
039 restrained eaters?. *Appetite*, 71, 490.

040
041 Xie, X., & Chen, H. (2025). Dissociation between wanting and liking for high-calorie foods across
042 physiological states in restrained eating subgroups. *Eating Behaviors*, 102048.

043
044 Xu, I., Passell, E., Strong, R. W., Grinspoon, E., Jung, L., Wilmer, J. B., & Germine, L. T. (2025). No
045 evidence of reliability across 36 variations of the emotional dot-probe task in 9,600 participants.
046 *Clinical Psychological Science*, 13(2), 261-277.

047
048 Xu, M., Rowe, K., & Purdon, C. (2023). To Approach or to Avoid: The Role of Ambivalent Motivation
049 Towards High Calorie Food Images in Restrained Eaters. *Cognitive Therapy and Research*, 47(4),
050 669-680.

051
052 Yamamiya, Y., & Stice, E. (2024). Risk factors that predict future onset of anorexia nervosa, bulimia
053 nervosa, binge eating disorder, and purging disorder in adolescent girls. *Behavior Therapy*, 55(4),
054 712-723.

056 Yong, C., Liu, H., Yang, Q., Luo, J., Ouyang, Y., Sun, M., ... & Lin, Q. (2021). The relationship
057 between restrained eating, body image, and dietary intake among university students in China: a
058 cross-sectional study. *Nutrients*, 13(3), 990.

059

060 Zhou, S., & Shen, C. (2022). Avoiding definitive conclusions in meta-analysis of heterogeneous
061 studies with small sample sizes. *JAMA Otolaryngology–Head & Neck Surgery*, 148(11), 1003-1004.