Can Narrative Bibliotherapy Reduce Vulnerability to Eating Disorders? Evidence from a

Reading Experiment

Rocío Riestra-Camacho,[1] James Carney,[2] and Emily Troscianko[3]

[1]University of Oviedo

[2]London Interdisciplinary School

[3]University of Oxford

Abstract

No research has yet experimentally evaluated the role of narrative fiction in relation to eating disorders (EDs). This study used a between-participants design to assess vulnerability to EDs before and after reading two contemporary US young adult sports novels. ED vulnerability was measured using the EAT-26 and a tailored questionnaire. The experimental group (n = 32) received the books with text-specific reading guides. The control group (n = 33) received only the novels. Our hypothesis was that post-reading measures would be lower (improved) in both groups, but more markedly in the experimental group. Scores were typically lower in the experimental group and higher in the control group, but these differences were not statistically significant after correction for multiple comparisons. These findings underline the need to expand empirical evidence on the effects of narrative reading in the context of EDs, while the innovative methods trialled here open up new methodological avenues.

Keywords

Reading experiment, bibliotherapy, eating disorders, fiction, narrative, reading guides, US young adult sports fiction

Introduction

Eating disorders (EDs) are a common health problem with high human and economic costs, and mainstream treatments still have disappointing success rates, especially for anorexia nervosa (AN) (Troscianko & Leon, 2020). The nature of EDs as complex biobehavioural disorders that are also socioculturally inflected offers a rationale for trialling interventions that target interpretive engagement with narrative (Troscianko, 2018a). *Creative bibliotherapy* involves reading literary texts (e.g. poetry or narrative fiction) for therapeutic purposes, especially in the context of mental health conditions (McCardle & Byrt, 2003). This form of bibliotherapy shows some promise for treatment of non-ED forms of mental distress, such as depression (Billington et al., 2010; Billington, 2011), adolescent aggression (Shechtman, 2006), and anxiety and emotional suppression (Tegnér et al., 2009) or reduced autonomy, competence, and relatedness (Andersen, 2022) in cancer patients. These results vary in robustness, and some (such as Billington et al.'s research) involve a group rather than individual format for the reading. But the fact that bibliotherapy is relatively cheap and readily accessible, along with the urgent need for better ED treatments and the obvious potential for cultural artefacts to either exacerbate or counteract problematic ED-relevant cultural ideals, means there is a good case for investigating bibliotherapy for EDs.

In the sphere of EDs specifically, only a handful of creative bibliotherapy studies have been conducted, and these are mainly observational rather than experimental. Our ambition here is to experimentally test the claim that bibliotherapy can be useful for preventing or treating EDs. We tested whether reading narrative fiction with or without prompts to guided reflection could helpfully impact on ED-inflected modes of thinking, by way of both standardized questionnaires and a bespoke corpus of questions, in order to establish whether this promising line of inquiry is worth developing further. Before presenting our study and findings, we offer a review of the existing literature on individual creative bibliotherapy for EDs.

Dramatherapy

In dramatherapy, participants enact desired behaviours and rehearse life roles through different techniques which include storytelling, projective play, improvisation, or performance, amongst others. Focused on this form of bibliotherapy, Dokter's canonical work *Arts Therapies and Clients with Eating Disorders: Fragile Board* (1994) reviews classic techniques in the use of dramatic texts for treatment of EDs. More recently, Brooke's *The Creative Therapies and Eating Disorders* (2008) is a collection of essays exploring creative approaches relevant to patients with EDs, including music and poetry therapy. Wurr and Pope-Carter's (1998) study documented how participants' attitudes towards eating and the body can be steered towards recovery by use of journey metaphors. Finally, Agiman's pilot dramatherapy study (2013) aimed to reduce anxiety and inflexibility, as well as improve emotional balance and self-conceptualization, in participants with eating problems. These latter two studies report minor to moderate positive outcomes.

Methodological weaknesses mean that results generated in these studies remain provisional. It is not yet possible to claim that dramatherapy is an effective method in the treatment or prevention of EDs, since no controlled experimental studies have been conducted. Meyer (2010) offers a warning about the gap between practice and evidence:

> drama therapy has been documented as a treatment intervention for EDs and numerous authors have purported success with their drama therapy groups. It is important to note, however, that these groups are case study examples and should not be interpreted as empirical support for using drama therapy with eating disorders. (2010, p. 5)

The evidence base remains similar 13 years on.

Poetry therapy

Turning to poetry therapy, which involves a combination of reading and creative writing, Ramsey-Wade, Williamson, & Meyrick (2021) conducted a meta-analysis of studies in which poetry therapy was used to improve ED outcomes. Analysis of quantitative results in studies of moderate to high quality showed a positive trend. The authors conclude that "emotional expression, group cohesion, de-centring or distraction could all be causal pathways for therapeutic writing" (p. 14), although they

found some evidence that control tasks equalled or outperformed the expressive writing paradigms being investigated, and that expressive writing was contraindicated for some individuals. Ramsey-Wade's own (2016) qualitative interview study in poetry therapy, meanwhile, generated evidence that expressive writing tasks can decrease symptoms of alexithymia in groups diagnosed with EDs. Her conclusions highlight the beneficial role of writing as opposed to reading, however, and are limited to retrospective self-report. In her PhD dissertation, June Alexander (2016) also used writing therapy (specifically journaling) in the context of ED recovery. In this study, 70 diarists offered testimony on the role of journaling during their illness and recovery. Findings included the suggestion that guided journaling can enhance recovery motivation. Again, these data are limited to observational self-report, with the attendant limitations and biases despite their richness.

Narrative bibliotherapy

Next, we consider existing evidence on the interactions between narrative reading and eating disorders. This genre arguably has the most ecological validity in that narrative fiction is by far the most commonly read "literary" genre. People with EDs often choose to engage with ED-specific narrative materials, including novels and memoirs about EDs (Troscianko, 2018b). Thomas, Brownell and Vartanian (2006) found that reading ED memoirs had no effect on eating attitudes, drive for thinness, or implicit associations between AN and glamour/danger in a nonclinical population. Troscianko (2018b) presented survey data on fiction-reading habits and preferences and the self-reported effects of such reading on people with and without personal experience of an ED. A key finding was that fiction thematically related to EDs was widely reported as significantly exacerbating ED-related attitudes and behaviours, while reading one's preferred type of other fiction, unrelated to EDs, was reported as generating more positive effects and fewer negative ones than ED-specific reading.[1] One mediating mechanism for the negative effects in ED-specific reading may be readers' emulation of the pathological behaviours and attitudes exhibited by textual characters, e.g. the

---

[1] For anecdotal evidence compatible with this finding, see Freeman (2018).

protagonists of ED memoirs (respondents did not systematically distinguish between narrative

fiction and nonfiction in their retrospective reports). This finding contradicts the widespread belief in

bibliotherapy theory and practice that reading narratives specifically about the illness or problem the

patient/client wishes to address will lead to a beneficial process of identification followed by

catharsis followed by insight and problem-solving, a hypothesis originally postulated by Caroline

Schrodes (1949) and echoed by many researchers and practitioners since (Troscianko, 2018a).

The stark negative effects reported for ED fiction in Troscianko's (2018b) data suggest a

range of possible influencing factors behind the potential of narrative fiction to generate positive

versus negative effects on ED-related dimensions. These potential influencing factors shaped our

study design.

1. The most obvious possibility is that thematic content is a primary determinant of positive

   versus negative consequences: that an ED focus raises potential for harm and/or lowers

   potential for benefits. This effect may be mediated by the fact that ED-specific texts are

   sometimes sought out by people with EDs specifically for the purpose of "self-triggering", i.e.

   behaviourally mediated worsening of ED symptoms (Troscianko, 2018b).

2. It is also possible that EDs may be an exception to the broader (if still weak) evidence that

   creative bibliotherapy may have positive effects on mental health. On this hypothesis,

   reading narrative fiction in general is less likely to be helpful and/or more likely to be

   harmful when an ED is the reader's health context. Such a pattern might be attributable to

   the egosyntonic aspects of many individuals' ED experience and the ways in which

   disordered eating is encouraged (and the processes needed for full recovery discouraged) by

   many cultural trends in the realms of eating, exercise, and the body. This alignment may

   make it easier for a narrative to support the ED mindset than is likely for, say, depression.

3. The distinction between everyday reading and structured bibliotherapy may interact with

   the texts' thematic focus, for example in that accidentally encountering ED fiction may have

   harmful effects whereas the same text presented as part of a supported intervention might

elicit more positive responses. This hypothesis would be compatible with Carney &

Robertson's (2022) 5-study paper, which reported no effects on mental health and mood of

direct exposure to narrative fiction, but did find that reflective engagement with fiction

through mnemonic integration and social discussion had positive impacts. This finding

relates to the distinction in bibliotherapy between *pure* and *guided* interventions, where

pure involves simply reading a book and *guided* involves prompts to engage with the

materials in formally structured ways, for example in conversation or writing. If accidental

reading generally offers fewer benefits than more structured forms of engagement as found

in guided bibliotherapy, this discrepancy may be heightened in the ED context such that

accidental engagement not only offers few or no benefits but in fact poses significant risks.

A research design question raised by Troscianko's survey results is that observational self-

report data may or may not align with controlled experimental data. One might expect self-

report about engagement with cultural artefacts to skew positive in line with social signalling

priorities. This effect was not found in the survey, but there is substantial potential for

different biases and errors to creep into interpretive recall of personal experiences.

4. EDs (particularly AN and bulimia nervosa [BN]) are more prevalent among women than men

(Franceschini & Fattore, 2021). Identification with stereotypical constructs of femininity and

feminine roles has been shown to correlate positively with underlying ED symptomatology

(Sheikh, Botindari & White, , 2013, p. 512). Gender dysphoria has also been identified as a

factor increasing ED susceptibility, which accounts for the fact that trans individuals are at a

much higher risk of developing an ED than cisgender people (Murray, Boon, & Touyz, 2013).

An intervention that empowers readers to challenge maladaptive constructs—specifically

traditional feminine attitudes and roles—may be predicted to reduce their vulnerability to

developing a full-blown disorder.

Hypotheses

This study's starting point was the idea that reading YA sports fiction could be beneficial in the treatment and/or prevention of EDs, and that this positive effect could be enhanced with the use of reading guides designed to direct participants' attention in constructive, gender-sensitive ways towards textual features relating to eating, exercise, and the body. Participants received two contemporary US YA sports novels with or without accompanying reading guides. We predicted that post-reading survey scores would be lower (i.e. improved) in both groups, but more markedly in the experimental group. This prediction was tested through the following pair of hypotheses:

1. H1: Post-reading EAT-26 scores will be lower than pre-reading scores, and scores will decrease more in the experimental group than in the control group.

2. H2: Post-reading scores for a) eating, b) exercise, and c) body items in the tailored questionnaire will be lower than pre-reading ones, decreasing more in the experimental than in the control group.

Methods and materials

The study was conducted between September 2019 and March 2020. It was approved by the Ethical Committee in Research at the University of Oviedo (ref. 40/19) and by Oxford University's Central University Research Ethics Committee (CUREC) (ref. R65698/RE001). Data collection began on 1 October 2019 and ended on 1 March 2020.

Novels and reading guides

The narrative texts chosen for this experiment were *Breathe, Annie, Breathe* (*BAB*) and *Coming Up for Air* (*CUA*), two contemporary US young adult (YA) sports novels written by Miranda Kenneally in 2014 and 2017. We selected these texts to present to individuals vulnerable to developing an ED for two reasons. First, exercise addiction is a common component of eating disorders (Bratland-Sanda et al., 2010; Dalle Grave, Calugi, & Marchesini, 2008) and sports fiction foregrounds eating, exercise, and the body, making this genre meaningful for individuals at risk of developing disordered attitudes in these areas. However, this genre also bypasses the direct evocations of ED habits and value

systems contained in ED-themed narratives, which have been found to risk exacerbating readers'

EDs. The female protagonists in Kenneally's works emphasise the nourishing, performance-

enhancing value of food and functional motivations for exercising that include skill development and

fun rather than weight loss (Riestra-Camacho, 2021). As such, they offer an opportunity to

constructively modulate eating-, exercise-, and body-related attitudes associated with ED

vulnerability. Secondly, the "traditionally highly gendered nature of athletic competition makes

fictional representations of sports inherently reflective of gender issues in society" (Cummins, 2009,

p. 202). This thematic focus provides a readymade context in which gender questions can be raised

and readers can develop new awareness of them, with the potential to reduce ED vulnerability.

The two novels are presented with or without a specially constructed reading guide to

structure participants' interpretive engagement with the text. The theoretical underpinning for this

choice includes the apparent benefits of more structured interpretive engagements discussed

above, as well as Montgomery and Maunders' (2015) suggestion that engaging with narratives may

have therapeutic efficacy via the same forms of cognitive restructuring as achieved by cognitive

behavioural therapy (CBT). Like CBT, reading may allow participants to transform ED-aligned

attitudes to eating, exercise, and the body into more constructive forms. The reading guides are

intended to intensify this potentially protective or therapeutic interpretive engagement with the

novels, by directing readers' attention to particular passages and offering text-specific ED- and

gender-related guidance for their reading.

The materials and measures employed in this study were directly calibrated to one another

and to existing ED research. Figure 1 shows the four-layered structure connecting the research

literature, the novels, the reading guides, and the questionnaire. First, a survey of the clinical

literature on EDs was conducted and used to guide selection of relevant features and passages in the

novels. Second, the selected passages were used to build the reading guide items. And third, these

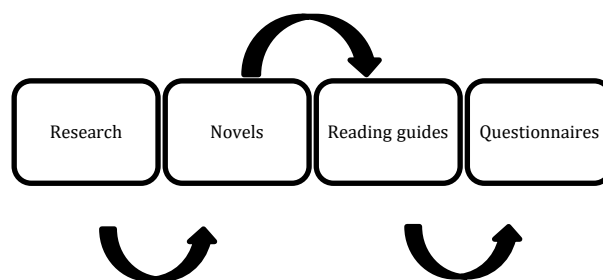items were incorporated into the tailored questionnaire.

Figure 1: Four-layered experiment design methodology

More specifically, the reading guides consisted of messages that highlighted the body-positive attitudes and behaviours displayed by the characters in *BAB* and *CUA*. A set of prominent cognitive biases are thought to underlie susceptibility to EDs (Siep et al., 2011) and the aim of these messages was to reverse the maladaptive interpretations that might be made by a vulnerable reader. The messages covered three broad categories—eating, exercise, and body—and addressed 12 factors in total. The eating category comprised a set of seven factors contributing to ED vulnerability:

1) Messages addressing **guilty eating** emphasised the pleasure of eating food treats or comfort food, and aimed to reduce feelings of remorse associated with their consumption.

2) **Anxiety over food control** messages presented positive interpretations of reduced control over food, including where food is prepared by others.

3) Messages about **eating inflexibility** highlighted that there need be no rigid mealtime boundaries, and that food can be eaten distractedly.

4) **Food anxiety** messages aimed to reduce feelings of fear associated with food encounters.

5) **Calorie control** comments made explicit the need to eat an adequate quantity of high-quality nutrients, and decreased the salience and perceived value of calorie tracking.

6) Messages about **excuses and dieting** attempted to debunk the validity of deceptive reasons to miss meals (i.e. those where calorie control is the unspoken motivation).

7) Messages focusing on **diet salience** were created to reduce the salience of energy-restrictive dieting behaviours in ambiguous situations.

The exercise category contained three further factors:

1) **Weight loss-oriented exercise** messages were designed to decrease the salience of size-, weight-, and shape-related reasons to exercise.

2) **Performance-oriented exercise** messages highlighted pragmatic performance-related motivations to exercise in contrast to the aim to achieve appearance/size/weight/shape-related changes.[2]

3) **Exercise inflexibility** messages emphasised the enjoyment to be found in practising sport, in contrast to the feeling of forcing oneself to do so. They also contained comments on pain, highlighting that whenever pain or injuries are experienced, the responsible option is to stop exercising and focus on rest and rehabilitation.

Body, the third and final message category, comprised two factors:

1) **Body perception** messages underscored ways in which the body can be misperceived in response to temporary changes such as bloating.

2) Messages about **gender stereotypes** were designed to debunk stereotypes associating femininity with skinniness or food restriction, and to strengthen links between femininity and muscularity or strength.

Each message was either *expository* or *interactive*, depending on the relationship that the reader was asked to establish with it. Expository prompts elicited interpretive reflection by elaborating on content in the novel. Interactive messages asked readers to actively engage with this content, for example by prompting them a) to connect a passage in the novel with their own life, b) to think a particular type of thought or recall a particular type of memory, c) to perform a specific type of behaviour (e.g. drink or eat while reading), or d) to change a habit in a more lasting sense

---

[2] The tailored questionnaire score values are reversed in these questions (as well as in several others; see Appendix 2) because this category is positively valenced.

(e.g. eat around friends instead of alone). None of the messages required participants to type

anything. For the sake of concision, we offer two examples here:[3]

> *Expository message from BAB:* On page 9, we learn of the pain Annie endured the first time
> she tried to start running at her school track. *The cool February air burned my lungs and
> throat and my shins felt like somebody had kicked soccer balls at them for hours.* Remember
> that, even though she felt very disappointed at herself, she stopped running that day
> because it was too painful to endure.
>
> *Interactive message from CUA:* On page 110, Maggie compares the feelings she experiences
> when kissing Levi to "*lemonade on a hot day*". Can you establish a similar comparison to
> suggest physical pleasure? For example, complete the sentence *Having a good dinner after a
> long day feels like* _____.

This example from *BAB* fits within the four-layered construction illustrated in Figure 1 as follows.

Often, people with EDs cannot resist the compulsion to exercise, despite pain or injury (Dalle Grave,

Calugi, & Marchesini, 2008). Based on this finding, the *BAB* message encourages readers to stop

exercising in such contexts by highlighting the protagonist's decision to do so. Question 33 in the

tailored questionnaire ("I try to stick to my exercise routine even when I have an injury"), in turn,

evaluates potential changes to this dysfunctional habit. Meanwhile, for the *CUA* message, the

starting point in existing research is that associations between food and pleasure are often

obfuscated in EDs (Holsen et al., 2012). The message asks readers to generate such associations for

themselves. Then, question 75 in the tailored questionnaire ("I very much enjoy having a good meal

after a long day") assesses potentially increased sensibility to these associations after reading with

or without the reading guide as an explicit intermediary between the books and the questionnaire.

On average across both novels, a message appeared once every four pages. Of the messages

in *BAB*, 47 (56.6%) were expository and 36 (43.4%) were interactive. In *CUA,* 46 (56.7%) were

interactive and 35 (43.3%) were expository. The reading guides represented a roughly 5% increase in

reading content. In order to monitor readers' progress, additional messages served as checkpoints.

---

[3] We hope that these comments give a useful sense of how the dependent variables were operationalized in the study. For comprehensive details of the interpretive and classificatory decisions made in the construction of the reading guide and associated questionnaire, see the full set of reading-guide items and corresponding text excerpts in Riestra-Camacho, 2021, pp. 289–319.

On pages selected at random, a total of 20 bubbles per novel incorporated checkpoints, and each read "check point: reply writing ['1', '2'…'20']". These checkpoints occurred in both conditions. The books were read in non-downloadable PDF format via Google Drive, and the reading guides were presented in the form of user-generated comments (tagged as posted by "Rocío") in the right-hand margin, using the sticky-note function.

Participants

The absence of data directly concerning potential dangers associated with reading this type of text mandated caution in participant selection criteria, and Oxford University's ethics review board (CUREC) required that an active ED diagnosis be an exclusion criterion for participation. The intended sample size was 60 (n = 30 per group). A potential participant was a person with no current diagnosis of an ED, aged 18–35 years old, interested in sport and fitness, and willing to read young adult sport novels. Sampling people with an interest in fitness was an indirect way of reaching a clinically relevant population, since EDs are known to be more prevalent amongst individuals who engage in physical activity and sports (Nazem & Ackerman, 2012). The age requirement also targeted a relevant population as regards ED onset (Volpe et al. [2016], for example, found that 18 years was the mean age of onset for AN andBN) and regarding reading preferences; the 18–35 age group is "the single largest purchasing group for YA" books (Whitford & Vineyard, 2013, par. 4).

Recruitment adverts were posted online and in physical locations around Oxford and Oviedo. 163 people responded to the call and signed up for the study, and 65 completed all reading and questionnaires. Group allocation used alternating assignment, meaning that the first participant was allocated to the experimental group and the second was placed in the control group, and so on.

55 participants identified as women, nine identified as men, and one identified as a trans man. The initial sample consisted of 133 women, 28 men and 2 people who identified as trans men, and it did not differ from the final sample in substantial ways that could have skewed results. The small number of participants in the final sample identifying as other than women meant that sex and

gender were ignored as independent variables. English was the native language of 20 participants

and a second language (SL) for the remaining 45. For those who used English as a SL, a minimum

intermediate level in English was established as a prerequisite for taking part in the study (B2 level,

following the Common European Framework of Reference for Languages). Mean participant age was

26.7 (SD = 6.77).

Measures

Two types of measure were applied. Quantitative measures included two questionnaires, which

participants completed through the JISC online survey platform (the UK higher education sector's

open-access survey tool). The qualitative measure consisted of an optional interview conducted via

Skype to evaluate participants' perceptions of their involvement in the study. RRC conducted the

interviews (n = 49), transcribed the recordings, and analysed the transcripts. This paper deals with

the quantitative measures (on the qualitative findings, see Riestra-Camacho, 2021).

The first questionnaire comprised the 31 items of the Eating Attitudes Test (EAT-26) (Garner

et al., 1982), including 26 attitudinal questions and five behavioural questions evaluating

characteristic of EDs.[4] The tailored questionnaire consisted of 86 items formulated in alignment with

the information presented in the reading guides. These items were sorted into three categories, the

same used to categorize the messages in the reading guides: eating, exercise, and body. Each

category contained items corresponding to the 12 factors listed above, which served as dependent

variables. The tailored questions were answered using a five-point Likert scale ranging from

"strongly disagree" to "strongly agree". The survey also included 10 questions about the novels, to

verify that participants had read them. In the experimental group, participants answered an

additional set of 10 questions about the reading guides to check that they had read them.

---

[4] EAT-26 reliability is high (alpha = 0.90 for the ED group) and test–retest reliability ranges from .84 to .89 (Banasiak et al., 2001).

Higher scores reflected higher ED vulnerability. For the EAT-26, scores were calculated following Garner et al. (1982). For the tailored questionnaire, a customized scale was used (see Appendix 2).[5] Participants completed the questionnaires twice, before and after reading the books.

Procedure

Participants entered the JISC platform through a link provided on the adverts. They were able to proceed to the questionnaire only after giving their informed consent and declaring that they met the inclusion criteria. After completing the questionnaires, they were assigned to one of the two groups. A week later they received a link to read the novels. When a participant clicked on the link, a permission request to access the first text was received and approved by the experimenters.

The procedure for distribution of the books amongst participants complied with copyright Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001, which at the time was the regime operative in the UK and the European Union. Google Drive allowed for the sharing of files with a limited number of people (the participants), giving them permission only to view the file, and preventing them from copying, editing, downloading, and sharing it with others. Each participant had access to their own file and when each finished reading, their access was removed.

Once they accessed the novels, participants could read them at their own pace in their own homes. Reading time guidelines were provided, however. Three deadlines were established. For those participants who started to read the novels in September 2019, the deadline was December 20, 2019. For those who started to read the novels between September and December 2019, it was February 1, 2020. For those who started the novels later than December 2019, it was March 1, 2020. Participants who deviated from the time guidelines received reminders to keep reading. Once a participant approached the end of the second novel, an email was sent providing a questionnaire link and asking them to complete it as soon as they finished the novel. Once a participant completed

---

[5] This scale roughly replicates Garner et al.'s scoring rationale but substitutes the 1 score category for a 0 category because the NA/ND category cannot be imputed as a positive value in line with Garner et al.'s sometimes/often 1 score category.

the second questionnaire, a second email was sent requesting their consent to be interviewed

(making clear that this was entirely optional). After completion, with or without the interview, all

participants were placed into a draw to win one of three £250 prizes, which were transferred to

winners via PayPal.

Results

Data consisted of 65 completed responses, with 33 in the Reading Guide (RG) condition and 32 in

the Non Reading Guide (NRG) condition. RG participants had a mean age of 26.03 (*SD* = 5.49) and

included 28 females; NRG participants had a mean age of 27.39 (*SD* = 7.68) and included 27 females.

Reading time—calculated as the difference between the administration of the first survey and

conclusion of the last survey—had a mean of 42.68 days (*SD* = 33.14).

The effects of condition and time were assessed using a mixed analysis of variance (ANOVA)

model implemented in the pingouin statistics library for python 3, version 0.5.0 (Vallat, 2018). This

model took time of survey administration (pre-reading, post-reading) as the within-participants

condition; the presence or absence of the reading guide was the between-participants condition.

Dependent variables were created by summing the relevant questions on the EAT-26 subscales into

the three outcome variables (oral control, dieting, and bulimia & food preoccupation). The tailored

variables were summed into 12 dependent variables: guilty eating, anxiety over food control, eating

inflexibility, food anxiety, calorie control, excuses and dieting, dieting saliency, weight-loss oriented

exercise, performance-oriented exercise, exercise inflexibility, body perception, and gender

stereotypes. (See Table 1 for summary statistics and Figure 2 for a variable correlation matrix;

Appendix 3 gives details of variable construction and reliability testing.)

Table 1: Summary statistics for dependent variables

Variable	N	Mean	SD	SE	95% CI lower	95% CI upper
guilty	131	4.2308	3.718	0.3248	3.5881	4.8734
control	130	5.2462	4.9196	0.4315	4.3925	6.0998

|					
eating inflexibility	131	1.1374	1.7531	0.1532	0.8344	1.4404
anxiety	130	2.2769	2.728	0.2393	1.8035	2.7503
calorie	130	2.0308	2.3058	0.2022	1.6306	2.4309
excuses	130	4.9308	3.8321	0.3361	4.2658	5.5957
weightloss	130	6.0077	4.0548	0.3556	5.3041	6.7113
salience	130	3.3308	2.2701	0.1991	2.9368	3.7247
performance	130	0.0385	0.3151	0.0276	-0.0162	0.0931
exercise inflexibility	130	7.7308	5.9855	0.525	6.6921	8.7694
body	130	4.8385	3.6489	0.32	4.2053	5.4717
gender	130	1.8231	3.0613	0.2685	1.2919	2.3543
EAT dieting	130	4.7154	6.0518	0.5308	3.6652	5.7655
EAT food	130	1.2077	2.1806	0.1913	0.8293	1.5861
EAT oral control	130	1.8769	2.3362	0.2049	1.4715	2.2823
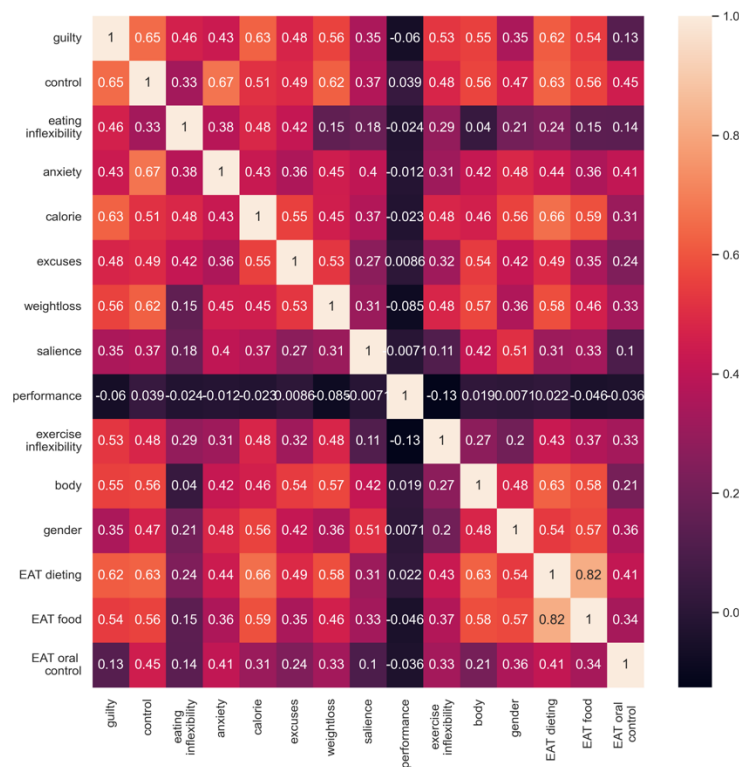
Figure 2: Correlation matrix for dependent variables across all four experimental conditions. Most variables positively correlated with each other. The exception is the performance variable, which either did not correlate or negatively correlated with the other variables.

Testing the resulting 15 variables returned no statistically significant effects of condition for nine of the variables; these included the three EAT-26 variables, which showed a trend towards worsening in the control group and no clear trend for the experimental group. Table 2 gives the results for the six variables that evinced a significant effect of condition (see Appendix 4 for results of all statistical testing). Whilst the application of Bonferroni correction for multiple comparisons caused these effects to fall below the corrected significance threshold ($\alpha = 0.00333$), it should be noted that the η^2 effect sizes are all moderate-to-large (>0.06) and the results for the experimental group are consistently in the predicted direction (Figure 3). Nevertheless, the only variable that showed clear differences between pre- and post- reading was gender stereotypes, where there was an interaction of time and group that was significant before correction. That is, readers in the RG condition scored lower on the gender stereotypes question after they had been exposed to the intervention.

Given the large variation in reading time across group conditions, the effect of time was investigated. This was done using a linear mixed effects regression model with random slopes and random intercepts implemented in the python 3 statsmodels statistics library, version 0.12.2 (Skipper & Perktold, 2010). Reading time was taken as the independent variable, change score on each of the 15 relevant variables as the dependent variable, and group condition as the level. Reading time was calculated in seconds using the python 3 datetime parser library, which converted date strings from the survey software into native datetime objects. Multicollinearity was tested for by calculating a variable inflation factor (VIF) for each variable (Appendix 4, Table 5). All models converged, with one significant effect of reading time on *calorie control*, but after a Bonferroni correction for multiple comparisons this was no longer significant (see Appendix 4 for results of testing and VIF scores). We therefore concluded that duration of reading was not an important factor in determining any effects of condition.

Table 2: Significance values and effect sizes for all variables showing a statistically significant difference between experimental groups. [*source*: source of significant difference; *df*: degrees of freedom; *F*: *F*-statistic; *p-unc*: uncorrected *p*-value; *η²*: eta-squared; *p-corr*: corrected *p*-value; *var*: summed questionnaire variable]

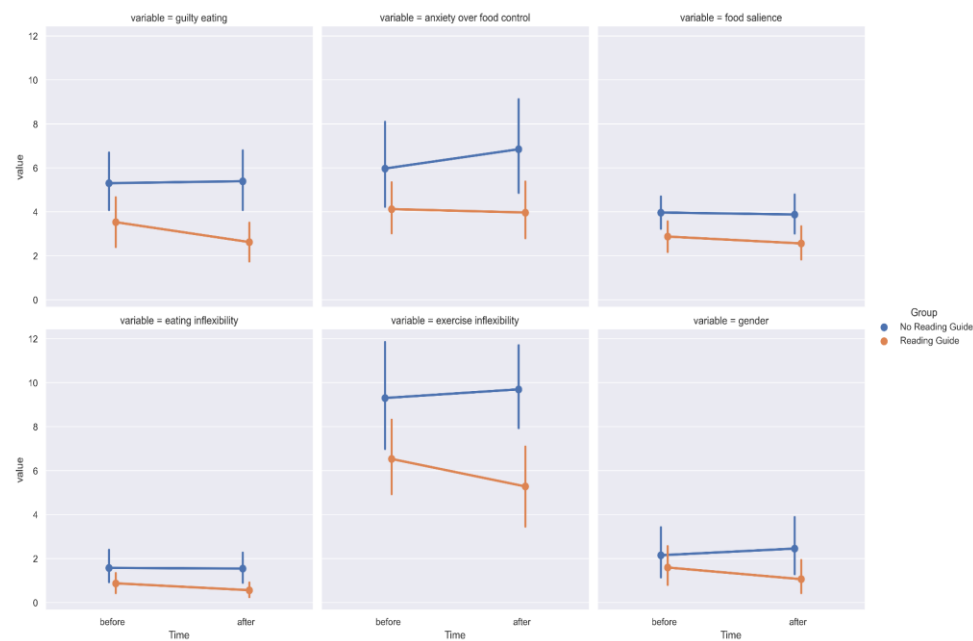| source	DF1	DF2	F	p-unc	η²	p-corr	var
group	1	63	7.309	.008	0.104	ns	guilty eating
group	1	63	4.341	.041	0.064	ns	anxiety over food control
group	1	63	4.595	.035	0.067	ns	eating inflexibility
group	1	63	6.275	.014	0.090	ns	food salience
group	1	63	7.252	.009	0.103	ns	exercise inflexibility
group x time	1	63	5.701	.019	0.0829	ns	gender stereotypes

Figure 3: Between-group differences across experimental conditions pre- and post-reading. Although no results are significant after correction for multiple comparisons, there is an overall trend where readers in the RG condition do better (or no worse) than readers in the NRG condition. The most robust effect is for the gender stereotype questions.

Discussion

This study used a between-participants design to assess ED vulnerability before and after reading

two US YA sports novels. ED vulnerability was measured using the EAT-26 and a tailored

questionnaire. In the experimental group, participants received the novels with reading guides,

whereas the control group received only the novels. Our hypothesis was that post-reading measures

would be lower (improved) in both groups, but more markedly in the experimental group in 1) the

EAT-26 and 2) in the tailored questionnaire, including (a) eating, b) exercise, and c) body factors.

The results did not support hypothesis 1, and only partially supported hypotheses 2a), 2b),

and 2c). Generally, post-test analyses revealed that EAT-26 scores showed a trend towards

increasing (worsening) for the control group and that tailored questionnaire scores trended towards

improvement in the experimental group and the opposite in the control group. This latter was an

unexpected observation, since our hypotheses predicted that scoring in all factors would improve

(i.e. decrease) in both groups. However, the fact that these were effects for Group (i.e. textual

condition) but not for Time means they cannot be attributed to changes occurring during or after

the reading process, and must therefore reflect differences between groups (as discussed below).

The most robust result of the present study is the interaction between Group and Time

(suggesting an effect that can be traced back to the experimental intervention) with respect to the

gender stereotypes question. Participants showed a reduction in gender stereotypes after they had

been exposed to the text plus reading guide. This finding is in line with the study by Fong, Mullin and

Mar (2015), which showed that exposure to fiction, but not other forms of media, is related to

reduced gender role stereotyping. Whilst this result is no longer significant after the application of a

Bonferroni correction, the variance in responses is considerably lower than in other questions,

strengthening the implication that guided reading can have impacts on cultural stereotypes. This can

only be of value when it comes to tackling EDs, which exist in a complex interplay with cultural and

biological conceptions of gender.

Returning to the procedural aspects of bibliotherapeutic interventions, our findings suggest

that if people read these books unsupported, reading may be less likely to be helpful or more likely

to be unhelpful than if the reading is supported by guides (or other methods of interpretive

support). This aligns with the emphasis in group bibliotherapy research on the "shared reading"

model in which readers read a text aloud to each other and engage in discussion guided by a trained

facilitator (e.g. Billington, 2011; Billington et al., 2010), rather than, for example, reading the text

alone and/or discussing it in less formally supported ways. We offer the reading guide method as an example of how supported reading can serve to challenge dysfunctional cognitions and can thus constitute an elegant way of adapting an ED therapy intervention to a fiction bibliotherapy context. The text- and context-aligned reading guide method attunes readers' attention to anti-ED aspects of a text. As such, it sidesteps the documented hazards of everyday encounters with ED-specific textual material and may heighten the positive potential of more formal bibliotherapeutic interventions. Experimentally, the use of the guides also allows us to account in a controlled manner for the post-reading effects of readers' attentional shifts on ED-relevant dimensions during the reading process, offering one answer to the perennially tricky question of what counts as a control condition for the process of reading a book (see also Troscianko & Carney, 2021, pp. 46–47).

The use of reading guides to reduce the novels' iatrogenic potential (Troscianko, 2018b) was complemented by our choice of text. Rather than giving participants a text about EDs—as in Thomas et al.'s (2006) study, for example, which used ED memoirs—in this experiment we tested an intermediate text type, featuring characters whose behaviours and attitudes have eating- and body-related emphases but are not maladaptive. It is possible that exposure to the experiences of characters highly engaged in sports and meal plans may, despite the body-positive nature of this activity, have made some readers feel uneasy about being more sedentary and less food-conscious than the protagonists (Riestra-Camacho, 2021), but the risks here seem likely to be considerably less than for ED fiction, read with or especially without an accompanying reading guide.

Limitations, strengths, and future directions

This study has a number of limitations. Initially, recruitment difficulties prevented us from accounting for pre-test results in group allocation, and we therefore had to use a nonequivalent-groups design. Before the experiment, the control group scored higher than the experimental group on all factors (except *excuses* and *dieting*) and displayed higher variance levels on all factors (with the exception of *performance-oriented exercise*). This indicates that scoring in the control group was

less homogenous than in the experimental group, so the principle of homoscedasticity was not met. These differences can be probably attributed to the small overall sample. (However, between-group testing on age and bodyweight—the two most relevant demographic factors—showed no significant differences between experimental conditions.) In future replications, a more homogeneous sample and an equivalent-groups design would be desirable. Moreover, the small number of male and trans participants resulted in high variance in their responses. In the future, it would be desirable either to have more non-female participants to include sex and gender as independent variables or to exclude these altogether.

An additional constraint of the study concerned timing. Some of the participants took two weeks to read the books, while others spent one or two months. The longer participants took to read, the less controlled were their life circumstances, which decreased the internal validity of the results. Conversely, readers engage with books at different paces depending on many personal and contextual factors, so freedom to read at their own pace increased the ecological validity of the study. Nevertheless, no significant effect of time was found on the relevant variables.

A third limitation was the large number of survey questions. Moreover, the tailored questionnaire was created *ad hoc* for this study, and psychometric evidence for its statistical power is unavailable. This means that conclusions about the results obtained through it should be drawn with caution. In future studies, this questionnaire could be streamlined to a smaller set of questions and be formally validated. Finally, some participants' decision to take part may have been influenced by the monetary incentive, although the relatively time-consuming nature of the tasks reduces this danger.

Future studies could investigate the underlying mechanisms at play in the guided reading context. One may be the creation of cognitive dissonance followed by its reduction. If the reader initially endorses ED-aligned values and norms regarding eating, exercise, and the body and the reading guide appended to the text invites readers to challenge them, dissonance (between the two opposing sets of beliefs) may result that demands resolution, for example via attitude change in

which the prior beliefs are abandoned in favour of those encouraged by the reading guide. The

potential for heightened dissonance and therefore greater attitude change could be increased by

raising the stakes of the challenge made to the initial beliefs, for example by inviting participants to

make their critique public in some way. Guidance here could be taken from the ED intervention

program The Body Project (Becker & Stice, 2017), in which dissonance reduction has been identified

as a driver of positive intervention effects (Troscianko, 2020). Methods of this kind might also be

adopted to allow narrative texts that themselves espouse pro-ED or equivocal values to be used for

positive therapeutic or preventive ends. This possibility would radically expand the potential corpus

for ED bibliotherapy, creating connections between "accidental" bibliotherapy and more formalized

types, for instance by training individuals in critical reading practices with which to approach

standard endorsements of the thin ideal. This is just one illustration of the avenues for further

investigation of mechanisms and effects opened up by the present study.

Conclusions

This was, to our knowledge, the first controlled experiment performed in the field of

bibliotherapy research that included a text-specific reading aid, testing the effects of prompts

designed to increase the salience of textual elements that run counter to ED vulnerability. It was also

the first to involve people reading two full-length novels, in the comfort of their own environments

and at times that suited them, offering a precedent for future ecologically valid research in the area.

Notwithstanding the study limitations, the protocols generated a modestly clear pattern of

results and some experimentally provocative outcomes. Whilst effects of reading in the two

conditions did not reach statistical significance after the application of a correction for multiple

comparisons, the consistent pattern of results in the predicted direction for the RG condition

indicates that there is likely to be an underlying structure in the data towards reduced espousal of

cognitions and biases about eating, exercise, and the body. This is particularly so for the gender

stereotypes question, wherein participants showed the clearest changes after exposure to the

experimental condition.

Methodologically, we suggest that a major part of the value of this study lies in its innovative

four-layer experimental design. The reading guide method serves as a way to implement a

structured bibliotherapy intervention and to tackle particular ED-related biases, but it has also

opened up possibilities for evaluation of post-reading effects. In conclusion, our findings suggest that

guided reading with a gender-informed perspective has potential to improve attitudes and thought

patterns characteristic of vulnerability to EDs. In light of the ongoing elusiveness of reliable

treatment methods for EDs, especially restrictive EDs, this finding may be relevant to improving

outcomes in clinical settings and/or to preventing the onset of EDs in vulnerable populations.

Nonetheless, potential iatrogenic effects of reading novels that thematically focus on women's

bodies and the way characters eat and exercise should be borne in mind, and all research should be

guided by acknowledgement of the potential for damaging as well as beneficial reader responses to

textual material. More empirical evidence regarding the effects of fiction reading is needed,

particularly in the form of controlled experiments involving the reading of full-length books in

naturalistic settings.

References

Alexander, J. (2016). *Using writing as a therapy for eating disorders: The diary healer*. London: Routledge.

Agiman, D. (2013). L'emprise de la restriction cognitive: le corps en gage. Étude de cas d'un processus de dramathérapie avec un groupe de personnes souffrant de troubles alimentaires. [Unpublished master's thesis]. University of Concordia.

Andersen, T. R. (2022). Regaining autonomy, competence, and relatedness: Experiences from two Shared Reading groups for people diagnosed with cancer. *Frontiers in Psychology*, *13*, 1017166.

Banasiak, S. J., Wertheim, E. H., Koerner, J., & Voudouris, N. J. (2001). Test-retest reliability and internal consistency of a variety of measures of dietary restraint and body concerns in a sample of adolescent girls. *International Journal of Eating Disorders*, *29*(1), 85–89.

Becker, C. B., & Stice, E. (2017). From efficacy to effectiveness to broad implementation: Evolution of the Body Project. *Journal of Consulting and Clinical Psychology, 85*(8), 767.

Billington, J., Dowrick, C., Hamer, A., Robinson, J., & Williams, C. (2010). *An investigation into the therapeutic benefits of reading in relation to depression and well-being*. University of Liverpool: The Reader Organisation.

Billington, J. (2011). "Reading for Life": Prison reading groups in practice and theory. *Critical Survey*, *23*, 67–85.

Bratland-Sanda, S., Sundgot-Borgen, J., Rø, Ø., Rosenvinge, J. H., Hoffart, A., & Martinsen, E. W. (2010). Physical activity and exercise dependence during inpatient treatment of longstanding eating disorders: An exploratory study of excessive and non-excessive exercisers. *International Journal of Eating Disorders*, *43*(3), 266–273.

Brooke, L. S. (2008). *The creative therapies and eating disorders.* Springfield: Charles C. Thomas.

Carney, J., & Robertson, C. (2022). Five studies evaluating the impact on mental health and mood of recalling, reading, and discussing fiction. *PLoS ONE 17*(4): e0266323.

Cummins, G. (2009). Sports fiction: Critical and empirical perspectives. In A.A. Raney & J. Bryant (Eds.), *Handbook of sports and media* (pp. 198–219). Mahwah: Lawrence Erlbaum Associates.

Dalle Grave, R., Calugi, S., & Marchesini, G. (2008). Underweight eating disorder without over-evaluation of shape and weight: Atypical anorexia nervosa? *International Journal of Eating Disorders 41*(8), 705–712.

Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society.

Dokter, D. (1994)*. Arts therapies and clients with eating disorders: Fragile board*. London: Jessica Kingsley.

Franceschini, A., & Fattore, L. (2021). Gender-specific approach in psychiatric diseases: Because sex matters. *European Journal of Pharmacology*, *896*, 173895.

Freeman, L. (2018). *The reading cure: How books restored my appetite*. London: Orion.

Fong, K., Mullin, J. B., & Mar, R. A. (2015). How exposure to literary genres relates to attitudes toward gender roles and sexual behavior. *Psychology of Aesthetics, Creativity, and the Arts*, *9*(3), 274–285.

Garner, D. M., Olmsted, M., Bohr, Y., & Garfinkel, P. E. (1982). EAT-26. *Psychological Medicine*, *12*, 871–878.

Holsen, L., Lawson, E., Blum, J., Ko, E., Makris, N., Fazeli, P., Klibanski, A., & Goldstein, J. (2012). Food motivation circuitry hypoactivation related to hedonic and nonhedonic aspects of hunger and satiety in women with active anorexia nervosa and weight-restored women with anorexia nervosa. *Journal of Psychiatry & Neuroscience, 37*(5), 322–332.

Kenneally, M. (2014). *Breathe, Annie, breathe.* Naperville: Sourcebooks Fire.

Kenneally, M. (2017). *Coming up for air*. Naperville: Sourcebooks Fire.

Marsick, E. (2010) "Cinematherapy with preadolescents experiencing parental divorce: A collective case study." *The Arts in Psychotherapy 37*, 311–318.

McAllister, M., Lee Brien, D., Flynn, T., & Alexander, J. (2014). Things you can learn from books: Exploring the therapeutic potential of eating disorder memoirs. *International Journal of Mental Health Nursing, 23,* 553–560.

McCardle, S., & Byrt, R. (2003). Fiction, poetry and mental health: Expressive and therapeutic uses of literature. *Journal of Psychiatric Mental Health Nursing*, *8*, 517–524.

Meyer, D. (2010). Drama therapy as a counseling intervention for individuals with eating disorders. *Counseling and Values*, *57*, 241–251.

Montgomery, P., & Maunders, K. (2015). The effectiveness of creative bibliotherapy for internalizing, externalizing, and prosocial behaviors in children: A systematic review. *Children and Youth Services Review, 55*, 37–47.

Murray, S., Boon, E., & Touyz, S. (2013). Diverging eating psychopathology in transgendered eating disorder patients: A report of two cases. *Eating Disorders*, *21*(1), 70–74.

Nazem, T. G., & Ackerman, K. E. (2012). The female athlete triad. *Sports health, 4*(4), 302–311.

Oliva, V. H. S., Vianna, A., & Neto, F. L. (2010). Cinematherapy as psychotherapeutic intervention: characteristics, applications and identification of Cognitive-Behavior techniques. *Archives of Clinical Psychiatry*, *37*, 138–144.

Ramsey-Wade, C. E., Williamson, H., & Meyrick, J. (2021). Therapeutic writing for disordered eating: A systematic review. *Journal of Creativity in Mental Health*, *16*(1), 59–76.

Ramsey-Wade, C. (2016). Group poetry therapy for clients recovering from anorexia: An interpretative phenomenological analysis of client experience [Poster presentation]. Appearance Matters 7th Conference, Royal College of Surgeons, London, United Kingdom.

Riestra-Camacho, R. (2021). US Young adult sports fiction in a bibliotherapy experiment on anorexia. [Unpublished doctoral dissertation]. University of Oviedo.

Roberts, M. E., Tchanturia, K., & Treasure, J. L. (2013). Is attention to detail a similarly strong candidate endophenotype for anorexia nervosa and bulimia nervosa? *World Journal of Biological Psychiatry 4*(6), 452–463.

Schrodes, C. (1949). Bibliotherapy: A theoretical and clinical-experimental study. [Unpublished doctoral dissertation]. University of California.

Schentman, Z. (2006). *Treating child and adolescent aggression through bibliotherapy*. Springer.

Seabold, S., & Perktold, J. (2010). statsmodels: Econometric and statistical modeling with python. Proceedings of the 9th Python in Science Conference.

Sheikh, S., Botindari, L., & White, E. (2013). Embodied metaphors and emotions in the moralization of restrained eating practices. *Journal of Experimental Social Psychology*, *49*, 509–513.

Siep, N., Jansen, A., Havermans, R., & Roef, A. (2011). Cognitions and emotions in eating disorders. In R. A. H. Adan & W. H. Kaye (Eds), *Behavioural neurobiology of eating disorders* (pp. 18–30). New York: Springer.

Tegnér, I., Fox, J., Philipp, R., & Thorne, P. (2009). Evaluating the use of poetry to improve well-being and emotional resilience in cancer patients. *Journal of Poetry Therapy*, *22*(3), 121–131.

Thomas, J., Judge, A. M., Brownell, K. D., & Vartanian, L. R. (2006). Evaluating the effects of eating disorder memoirs on readers' eating attitudes and behaviours. *International Journal of Eating Disorders, 39*(5), 418–425.

Troscianko, E. T. (2018a). Fiction-reading for good or ill: Eating disorders, interpretation and the case for creative bibliotherapy research. *Medical Humanities*, *44*(3), 201–211.

Troscianko, E. T. (2018b). Literary reading and eating disorders: Survey evidence of therapeutic help and harm. *Journal of Eating Disorders*, *6*, 1–17.

Troscianko, E. (2020). Cognitive dissonance and anorexia nervosa: Existing evidence. *Psychology Today*, 21 November.

Troscianko, E. T., & Carney, J. (2021). Drawing Kafka's *Castle*: An experimental expansion of the theory of cognitive realism. *Scientific Study of Literature*, *11*(1), 35–73.

Troscianko, E. T., & Leon, M. (2020). Treating eating: A dynamical systems model of eating disorders. *Frontiers in Psychology*, *11*, 1801.

Vallat, R. (2018). Pingouin: statistics in Python. *Journal of Open Source Software*, *3*(31), 1026.

Volpe, U., Tortorella, A., Manchia, M., Monteleone, A. M., Albert, U., & Monteleone, P. (2016). Eating disorders: What age at onset? *Psychiatry Research*, *238*, 225–227.

Whitford, E., & Vineyard, J. (2013). The five: The young-adult bubble. *New York Magazine*, 1–5.

Wurr, C. & Pope-Carter, J. (1998). The journey of a group: Dramatherapy for adolescents with eating disorders. *Clinical Child Psychology and Psychiatry*, *3*(4): n.p.

Appendix 1

Tailored Questionnaire Questions

1. When I exercise, I think of the effects it may have on my body size, weight, or shape.
2. When I exercise, I think of the positive effects it may have on my performance.
3. When I exercise, I like the setting to be as attractive as possible (e.g. beautiful countryside, nice gym).
4. I like to have dessert at most meals.
5. If I feel some kind of pain or discomfort when exercising, I stop.
6. I prefer to eat in the company of my loved ones rather than alone.
7. When deciding whether to stop exercising, I think of how many calories I will burn if I exercise longer.
8. Being given food by others makes me uncomfortable. I prefer to pick my own food.
9. If a doctor or trainer advises me to eat more, I follow their advice because I trust their knowledge.
10. I find watching others cook pleasing.
11. The mere sight of food, particularly fatty foods, makes me uncomfortable.
12. If given a choice, I always choose low calorie foods over food higher in calories.
13. If I feel sweaty but extremely tired, I postpone showering to rest.
14. If I'm sad and don't feel like eating, I don't eat even though I know I need to.
15. My favourite food causes me a slight headache or other kind of pain. I eat it anyway.
16. I dislike the idea of exercising in a different place from usual.
17. Thinking about food makes me uncomfortable.
18. I like snacking while I watch television.
19. I check myself in the mirror after eating and, even though I know it's the result of the temporary presence of food in my stomach, I feel fat.
20. I never have non-diet drinks; I always ask for a diet one.
21. I compare my body to others' even though I know that natural (e.g. genetic) variation means the comparison is not meaningful.
22. If I've just started dieting or exercising, I keep checking my body for changes.
23. When I exercise, I don't stop to have a break or to catch my breath.
24. I think it's normal for people to make themselves vomit because they are sad.
25. I like it when people give me my favourite drink or food without me asking.
26. I prefer to exercise in the company of friends rather than alone.
27. If I'm getting skinnier through exercise, I reduce the intensity or increase my calorie intake.

28. If I'm sick with gastroenteritis, I think positively about its weight loss consequences.

29. I don't eat if I'm doing something else (e.g. watching television or reading).

30. I think playing with food is disgusting.

31. I think being offered free food or a discount at a restaurant is cool.

32. Exercising can serve useful purposes in life.

33. I try to stick to my exercise routine even when I have an injury.

34. Many drinks and dishes look beautiful to me.

35. If someone is making weird faces while eating, I assume she does not like whatever she's having.

36. I avoid bread and sweet foods, even though I like them.

37. I feel uncomfortable about eating dessert.

38. If I'm feeling low and I fancy a food or drink treat, I have it without much consideration, simply because I like it.

39. I think it is unfeminine to eat a lot.

40. I'm wearing a horizontal-striped shirt and it makes me look fatter, but I'm aware of the optical effect and know I'm not really fatter.

41. If I'm starting a weight loss plan, I restrict my calorie intake as well as exercising more.

42. When I'm exercising, about to exercise, or afterwards, I don't eat a snack, even if I'm hungry.

43. If I feel a new exercise routine or goal is too much for me (e.g. too many kilometers to run or too much weight to lift), I pursue it anyway.

44. If others prepare food for me, I feel anxious.

45. I prevent myself from grazing, even if I'm hungry.

46. If I miss some meals, I feel satisfied.

47. I lie about my feelings of hunger to avoid eating.

48. I find it hard to believe that eating more than usual when exercising builds muscle but no fat.

49. I sometimes feel that others have forced me to eat and this makes me uncomfortable.

50. I think girls should eat less than boys.

51. I think willpower is more important than proper nourishment and proper rest to finish an intense workout routine.

52. I think it is unfeminine for girls to look muscular and strong.

53. If it is not explicitly narrated, I tend to think that characters in a novel do not eat.

54. If I don't have the time, I don't eat.

55. I feel anxious about varying my exercise routine.

56. I find super-size food or drinks quite threatening.

57. I always complete my workout, even if it's too early or too late for me to do it.

58. I can't stand eating when others might be looking at me.

59. I never eat or drink something I do not like the taste of, even if I'm hungry or thirsty.

60. I exercise every week. I don't skip a week.

61. I don't particularly perceive the good taste of food or drinks when I'm having them.

62. I think exercising means you have to eat more.

63. I associate eating slowly, cutting food in pieces, and pushing it around with eating less.

64. I think it makes sense to follow a restrictive diet in sports, particularly gymnastics or cheerleading.

65. If I have body issues, I ask a friend for support.

66. No matter where I am, I always manage to do my workout routine.

67. I work out even if I'm tired.

68. When training for a competition, I think achieving a good body shape is more important than winning.

69. I think being skinny and being strong are incompatible.

70. If I see someone refusing food or drink, I tend to think this person is dieting.

71. Even if I'm hungry, I don't stop to eat when I'm studying, since I will have lunch or dinner later.

72. If I'm sad and I overeat, I tend to feel guilty afterwards.

73. If I want to relax, I prefer to exercise for a couple of hours rather than meditate.

74. I force myself to exercise but I don't enjoy it.

75. I very much enjoy having a good meal after a long day.

76. When I go to friends' houses, I don't eat much because eating a lot in these situations makes me very uncomfortable.

77. I never eat when I'm not hungry.

78. I sometimes reject food others offer me even though I want it.

79. Exercising means you need to eat enough of everything, including carbohydrates.

80. If I decide to abandon exercise, I start worrying about eating too much.

81. I think femininity is bound to slimness.

82. When doing sport, it's important to have friends to support you.

83. I pay a lot of attention to the quantity of food I eat.

84. If I'm feeling low, I treat myself to comfort food in the good company of friends and family.

85. I think it is important to both feel satiated and experience pleasure when eating.

86. When thinking about pregnancy, I get anxious about gaining weight and bodily changes.

Appendix 2

Tailored Questionnaire Score Scale

Questions 1, 7, 8, 11, 12, 14, 16, 17, 19, 20, 21, 22, 23, 24, 28, 29, 30, 33, 35, 36, 37, 39, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 63, 64, 66, 67, 68, 69, 70, 71, 72, 73, 74, 76, 77, 78, 80, 81, 83, 86	SA = 3	A = 2	NA/ND = 0	D = 0	SD = 0
	SA = 0	A = 0	NA/ND = 0	D = 2	SD = 3
Questions 2, 3, 4, 5, 6, 9, 10, 13, 15, 18, 25, 26, 27, 31, 32, 34, 38, 40, 62, 65, 75, 79, 82, 84, 85					

[*SA* = "Strongly agree", *A* = "Agree", *NA/ND* = "Neither agree nor disagree", *D* = "Disagree", *SD* = "Strongly disagree"]

Appendix 3

Summed Variables from Tailored Questionnaire

- Guilty eating: Qs 4, 36, 37, 72, 80, 84

- Anxiety over food control: Qs 6, 8, 9, 25, 42, 44, 45, 49, 58, 59, 65, 76, 77, 78

- Eating inflexibility: Qs 17, 18, 29, 75

- Food anxiety: Qs 10, 11, 30, 31, 34, 56

- Calorie control: Qs 12, 20, 38, 83

- Excuses and dieting: Qs 14, 15, 24, 28, 46, 47, 53, 54, 71

- Dieting saliency: Qs 35, 48, 61, 63, 70, 85

- Weight-loss oriented exercise: Qs 1, 7, 27, 41, 51, 62, 68, 79

- Performance-oriented exercise: Qs 2, 32

- Exercise inflexibility: Qs 3, 5, 13, 16, 23, 26, 33, 43, 55, 60, 66, 67, 73, 74, 82

- Body perception: Qs 19, 21, 22, 40, 86

- Gender stereotypes: Qs 39, 50, 52, 64, 69, 81

Internal reliability of tailored questions

Cronbach's alphas with 95% confidence intervals with were calculated across the four experimental conditions for the tailored questionnaire (Table 3). High alphas showed that there were consistent patterns of answering by condition, indicating that the questions exhibited internal reliability.

Table 3: Cronbach's alphas by condition for internal reliability of tailored questions by experimental condition

	Before	After
Reading guide	$\alpha = 0.873$ 95% CI = [0.799, 0.929]	$\alpha = 0.776$ 95% CI = [0.642, 0.876]
No reading guide	$\alpha = 0.845$ 95% CI = [0.753, 0.914]	$\alpha = 0.869$ 95% CI = [0.793, 0.927]

Appendix 4

Results of the mixed ANOVAs on all 15 variables are summarised in Table 4. Variable inflation scores (VIF) for all variables are shown on Table 5. Table 6 gives the output of the mixed linear models that regressed each variable against reading time, nested in experimental condition.

Table 4: Results of all ANOVAs on the 15 dependent variables

Source	SS	DF1	DF2	MS	F	p-unc	η²	eps	variable
Group	167.4827	1	63	167.4827	7.309125	0.008809	0.103957		guilty
Time	5.2	1	63	5.2	1.896678	0.173324	0.029226	1	guilty
Interaction	8.076989	1	63	8.076989	2.946048	0.091001	0.044674		guilty
Group	181.3092	1	63	181.3092	4.341803	0.04125	0.064474		control
Time	4.430769	1	63	4.430769	0.940281	0.335914	0.014706	1	control
Interaction	8.70228	1	63	8.70228	1.846765	0.179005	0.028479		control
Group	23.028	1	63	23.028	4.59546	0.035924	0.067985		eating inflexibility
Time	0.930769	1	63	0.930769	1.012363	0.318186	0.015815	1	eating inflexibility
Interaction	0.646882	1	63	0.646882	0.70359	0.404752	0.011045		eating inflexibility
Group	39.27509	1	63	39.27509	2.918683	0.092482	0.044277		anxiety
Time	0.276923	1	63	0.276923	0.24001	0.625901	0.003795	1	anxiety
Interaction	0.033683	1	63	0.033683	0.029193	0.864882	0.000463		anxiety
Group	29.51755	1	63	29.51755	3.460637	0.067515	0.05207		calorie
Time	3.076923	1	63	3.076923	1.672788	0.200608	0.025865	1	calorie
Interaction	0.040975	1	63	0.040975	0.022276	0.881832	0.000353		calorie
Group	13.02134	1	63	13.02134	0.508628	0.478367	0.008009		excuses
Time	10.53077	1	63	10.53077	2.62292	0.110326	0.03997	1	excuses
Interaction	5.03031	1	63	5.03031	1.252909	0.267247	0.0195		excuses
Group	91.38814	1	63	91.38814	3.545002	0.064344	0.053272		weightloss
Time	14.22308	1	63	14.22308	2.2902	0.135194	0.035077	1	weightloss
Interaction	0.021241	1	63	0.021241	0.00342	0.953549	5.43E-05		weightloss
Group	47.21821	1	63	47.21821	6.275061	0.014843	0.090582		salience
Time	1.3	1	63	1.3	0.577569	0.450101	0.009084	1	salience
Interaction	0.398864	1	63	0.398864	0.177209	0.675216	0.002805		salience
Group	0.198317	1	63	0.198317	2.045052	0.157643	0.031441		performance
Time	0.192308	1	63	0.192308	1.983081	0.163982	0.030517	1	performance
Interaction	0.198317	1	63	0.198317	2.045052	0.157643	0.031441		performance
Group	419.6394	1	63	419.6394	7.252157	0.009062	0.10323		exercise inflexibility
Time	5.607692	1	63	5.607692	0.667911	0.416861	0.010491	1	exercise inflexibility
Interaction	21.95291	1	63	21.95291	2.61473	0.110872	0.03985		exercise inflexibility
Group	64.1683	1	63	64.1683	2.859106	0.0958	0.043412		body
Time	2.223077	1	63	2.223077	0.593377	0.443995	0.009331	1	body
Interaction	1.248514	1	63	1.248514	0.33325	0.565809	0.005262		body
Group	30.882	1	63	30.882	1.753475	0.190225	0.027079		gender
Time	0.376923	1	63	0.376923	0.380126	0.539758	0.005998	1	gender

Interaction	5.653853	1	63	5.653853	5.701892	0.019957	0.082995		gender
Group	121.3182	1	63	121.3182	1.913799	0.171425	0.029482		EAT dieting
Time	9.423077	1	63	9.423077	0.999679	0.321213	0.01562	1	EAT dieting
Interaction	6.2327	1	63	6.2327	0.661217	0.419193	0.010387		EAT dieting
Group	7.197232	1	63	7.197232	0.852793	0.359287	0.013356		EAT food
Time	1.730769	1	63	1.730769	1.498654	0.225437	0.023235	1	EAT food
Interaction	0.011655	1	63	0.011655	0.010092	0.920299	0.00016		EAT food
Group	17.90956	1	63	17.90956	1.822425	0.181855	0.028114		EAT oral control
Time	0.769231	1	63	0.769231	0.740042	0.392909	0.01161	1	EAT oral control
Interaction	0.745921	1	63	0.745921	0.717616	0.400134	0.011262		EAT oral control

Table 5: Variable inflation factors (VIF) for all regression variables. As all scores are below 5, variables do not exhibit significant collinearity and linear modelling is appropriate.

feature	VIF
guilty change	1.624502
control change	1.588322
eating inflexibility change	1.374559
anxiety change	1.454955
calorie change	1.824451
excuses change	1.570615
weightloss change	1.621931
salience change	1.332848
performance change	1.150821
exercise inflexibility change	1.502611
body change	1.527263
gender change	1.250635
EAT diet change	1.848556
EAT oral change	1.625718
EAT food change	1.932987

Table 6: Results of multilevel linear model with Time as independent variable and Group set as random intercept.

Dependent variable	Coef.	Std.Err.	z	P>|z|	[0.025	0.975]
guilty change	0.008	0.015	0.520	0.603	-0.022	0.038
control change	0.022	0.010	2.230	0.026	0.003	0.042
eating inflexibility change	0.006	0.005	1.116	0.264	-0.004	0.015
anxiety change	0.002	0.006	0.427	0.669	-0.009	0.014
calorie change	0.004	0.007	0.620	0.535	-0.009	0.017
excuses change	0.019	0.011	1.780	0.075	-0.002	0.039
weightloss change	0.005	0.011	0.443	0.658	-0.016	0.026
salience change	0.009	0.008	1.156	0.248	-0.006	0.024
performance change	-0.000	0.003	-0.024	0.981	-0.005	0.005
body change	0.004	0.009	0.394	0.694	-0.015	0.022
gender change	-0.007	0.007	-0.940	0.347	-0.021	0.008
EAT diet change	0.001	0.029	0.018	0.986	-0.055	0.057
EAT oral change	0.003	0.011	0.228	0.819	-0.019	0.024
EAT food change	-0.006	0.012	-0.454	0.650	-0.030	0.019