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# An 8-month longitudinal exploration of body image and disordered eating in the UK during the COVID-19 pandemic

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## ABSTRACT

Research suggests that the COVID-19 pandemic is negatively impacting mental health, with rates of eating disorder referrals in particular rising steeply during the pandemic. This study aimed to examine 8-month changes in body image and disordered eating during the COVID-19 pandemic, and explore whether any changes were moderated by gender, age, or eating disorder history. This study used a longitudinal survey design in which 587 adults living in the UK (85 % women; mean age = 32.87 years) completed assessments every two months over five timepoints from May/June 2020 to January/February 2021. Measures included body esteem, disordered eating, and psychological distress. Mixed effect models showed small but significant improvements in body esteem and disordered eating symptoms from May/June 2020 to January/February 2021. These improvements were independent of changes in psychological distress, and did not vary by gender, age or eating disorder history. Whilst poor body image and disordered eating may have been elevated in the early period of the pandemic, this study suggests improvements, rather than worsening, of these outcomes over time. This may reflect adaptation to this changing context.

## 1. Introduction

The COVID-19 pandemic led to many countries imposing strict public health measures designed to contain the virus including lockdowns, self-isolation, and social distancing. Concerns were raised about the inadvertent impact of these measures on mental health (Holmes et al., 2020; Reger et al., 2020). Cross-sectional evidence suggested increased levels of distress and mental health problems internationally during the initial stages of the pandemic, in comparison to population norms (e.g. Jia et al., 2020; Rossi et al., 2020; Wang et al., 2020). This effect was mirrored in longitudinal studies, indicating that mental health initially deteriorated in comparison to pre-pandemic levels, before typically improving following easing of lockdown restrictions (Richter et al., 2021). However, women, young people, those from socially disadvantaged backgrounds, and individuals with prior mental health difficulties were disproportionately affected (NHS Digital, 2020; O'Connor et al., 2021; Robertson et al., 2021).

Several authors have highlighted the potential impact of the COVID

lockdown on the development or exacerbation of eating disorder psychopathology as a result of changes to eating and exercise routines, social media use and levels of social support (Rodgers et al., 2020; Touyz et al., 2020; Weissman et al., 2020). A recent meta-analysis (Sideli et al., 2021) found that the majority (65 %) of individuals with pre-existing eating disorders reported a worsening of symptoms during the COVID-19 related confinement. Longitudinal work highlights an overall increase in restrictive eating behaviours in the general population and in individuals with eating disorders, in relation to second waves/lockdowns in Australia (Phillipou et al., 2021). This appears to be reflected in demand for clinical services: researchers have reported an increase in eating disorder related inpatient admissions and readmissions during the pandemic (Hansen et al., 2021; Mathews et al., 2021), and an increase in the acuity and volume of outpatient referrals (Hansen et al., 2021; Solmi et al., 2021). However, most studies to date have been primarily cross-sectional and/or focused on the early months of the pandemic, restricting capacity to predict and plan future service-related activity. It is also not clear to what extent any observed changes are

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specific to eating disorder psychopathology or relate to shifting levels of distress more generally.

The current study examined 8-month changes in body image and disordered eating during the COVID-19 pandemic in adults in the UK. Whilst analyses were exploratory, earlier studies of the effect of the pandemic on mental health more broadly reported that women, young people and those with a history of mental illness were more negatively affected (e.g., O'Connor et al., 2021). On the basis of these findings, we also tested whether gender, age, and history of an ED moderated the change in BI and ED symptoms over time, in anticipation that participants who were female, young and had a past or current ED diagnosis may be more vulnerable to worsening symptoms over time. The study aimed to answer the following research questions (RQ):

1. RQ1. How did levels of body esteem and disordered eating vary over 8 months from May/June 2020 to Jan/Feb 2021?
2. RQ2. Were any changes in body esteem and disordered eating observed over this period independent of changes in psychological distress?
3. RQ3. Did changes in body esteem and disordered eating over this period vary by age group, gender, or having a history of an eating disorder?

## 2. Method

### 2.1. Study design

This study used a longitudinal survey design, with assessments conducted every two months over five timepoints from May/June 2020 to January/February 2021. This period spanned three national lockdowns, as well as local restrictions of varying levels (see supplementary materials for details). Broadly, timepoint 1 took place as restrictions associated with the first national lockdown were starting to ease, with further lifting of restrictions occurring over timepoint 2. Timepoint 3 occurred during the introduction of a tiered restriction systems and some local lockdowns. Timepoint 4 and 5 occurred during a return to more widespread restrictions, including national lockdowns in November 2020 and January 2021.

### 2.2. Sample

Adults (18+ years) living in the UK were invited to participate in a study exploring the effects of COVID-19 on their eating habits and body image using social media adverts (Twitter posts and Facebook advertisement) in two waves. Our original sample ( $n = 294$ ) joined the study in May/June 2020. An additional 316 participants were recruited in July/August 2020, with the help of an additional advert placed on the charity Beat's website, and their baseline data was added to timepoint 2 (i.e., "boost sample"). Participants who provided at least one response to one of our two outcomes (body esteem, disordered eating) was included in the current analysis: of the 610 participants who accessed the survey, 587 (96 %) were included in the current analysis. Rates of missing data varied between 27 % and 57 % by timepoint (see missing data section for further details).

The mean age of the sample was 32.87 years ( $SD = 13.02$ ; range = 18 to 79 years), most identified as being White women (85 % women,  $n = 497$ ; 93 % White,  $n = 546$ ). Sixty-two percent ( $n = 361$ ) were living in England, 35 % ( $n = 206$ ) in Scotland and 3 % ( $n = 20$ ) in Wales or Northern Ireland. Most had an undergraduate degree or higher level of education ( $n = 433$ , 74 %). Thirty-three percent ( $n = 194$ ) reported a past or current eating disorder. (Full demographics included in supplementary materials).

### 2.3. Measures

Demographic characteristics were assessed at baseline (timepoint 1

for the original sample, timepoints 2 for the boost sample). Outcome variables were assessed at all timepoints.

#### 2.3.1. Demographic characteristics

Participants provided their age, gender, ethnicity, education level, and country of residence. For analysis, age was categorised into <30 years vs. 30+ years to capture potential differences for participants during the period of emerging adulthood, which is often operationalised as 18 years to mid-late 20s (Arnett, 2000). Most ( $n = 582$ , 99.3 %) reported being in the same country throughout the study. Participants were asked to self-report if they have a current diagnosis of an eating disorder (*Yes, No, I'm not sure*), and if they had been diagnosed with an eating disorder in the past (*Yes, No, I'm not sure*).

#### 2.3.2. Body image

Participants completed the ten-item Appearance subscale of the Body Esteem Scale for Adolescents and Adults (BESAA-A; Mendelson et al., 2001). Items are answered using a five-point scale (0 – *Never*, 4 – *Always*) and averaged to create a total Appearance Satisfaction score (internal consistency in current sample:  $\alpha = 0.95$ ). Higher scores reflect a more positive evaluation of one's appearance.

#### 2.3.3. Disordered eating

Participants completed the 12-item Eating Disorder Examination Questionnaire Short version (EDE-QS; Gideon et al., 2016). The EDE-QS assesses eating disorder psychopathology over the past seven days using a four-point scale (0–0 days, 3–6–7 days). Items are summed to create a total score of eating disorder psychopathology (internal consistency in current sample:  $\alpha = 0.91$ ). Higher scores reflect more severe eating disorder psychopathology.

#### 2.3.4. Psychological distress

Psychological distress was captured using the 4-item version of the Patient Health Questionnaire (PHQ-4) (Kroenke et al., 2009). Items relate to symptoms of anxiety and depression in the past 2 weeks. The total score is a composite of the 4 items, with a possible range of 0 to 12.

## 2.4. Procedures

The project received ethical approval from the University of Edinburgh (Ref: STAFF181, 05/06/20). The survey was hosted online using Qualtrics. Participants were given study information and required to provide consent before entering the main survey. Invitations to complete follow up surveys were emailed every two months.

## 2.5. Data analysis

### 2.5.1. Missing data

Missing data by timepoint were 50 % at timepoint 1 (i.e., missing the boost sample), 27 % at timepoint 2, 48 % at timepoint 3, 57 % at timepoint 4 and 57 % at timepoint 5, and were generally non-monotonic. Ten percent of participants provided data at all five timepoints ( $n = 57$ ), 18 % ( $n = 103$ ) provided four timepoints, 23 % ( $n = 137$ ) provided three timepoints, 22 % ( $n = 132$ ) provided two timepoints, and 37 % ( $n = 158$ ) provided one timepoint. At timepoints 1 and 2, age, gender, country, educational level and having a current/past eating disorder all predicted missingness. This reflected differences between the original and boost sample (with the boost generally being more diverse). From timepoint 3 onwards, age and country predicted missingness, with younger participants being significantly less likely to complete each timepoint, and participants from Scotland more likely to be missing at timepoint 3 only.

### 2.5.2. Analytic plan

Analyses were conducted using Stata v15. Preliminary analyses tested demographic predictors of each outcome using *t*-tests or oneway

ANOVA with Bonferroni adjusted post-hoc testing. For RQ1, we used mixed effects linear regression models fitted using maximum likelihood, with a fixed effect for time (Month 0 [ref], 2, 4, 6, 8) for each outcome (body esteem, disordered eating) and a random intercept for each individual to account for the repeated measures design and manage the missing data across timepoints. For RQ2 we ran the same models including an additional fixed effect for psychological distress. For RQ3, we further included a time \* moderator interaction term in each model. Given variations in timings of lockdown within the United Kingdom we included country (England [ref], Scotland, Wales & Northern Island) as a covariate in all analyses. Based on predictors of missing data, and demographic variables associated with the outcomes (see Descriptive statistics, below), age (<30 years [ref], ≥30 years), gender (woman [ref], not woman), educational level (postgraduate [ref], undergraduate, college/vocational training, secondary school), and history of eating disorder (no history of eating disorder [ref], past or current eating disorder) were included as covariates in all models.

### 3. Results

#### 3.1. Descriptive statistics

Descriptive statistics for each outcome by timepoint are available in the supplementary materials. Exploring demographic predictors of outcomes showed in general, body esteem, disordered eating and psychological distress were all significantly worse in women (compared to non-women), younger participants (<30 years compared with ≥30 years), those with postgraduate degrees (compared with all other levels of education), and those with a past/current eating disorder (compared to no eating disorder history) (full results available upon request).

#### 3.2. RQ1. How did levels of body esteem and disordered eating vary over 8 months from May/June 2020 to Jan/Feb 2021?

The results of the mixed effects regression models are shown in Table 1 and estimated marginal means are illustrated in Fig. 1. There was no change in body esteem between May/June 2020 and Sept/Oct 2020, followed by a small but significant increase in body esteem at Nov/Dec 2020 (compared with May/June), which was maintained at Jan/Feb 2021 (Table 1, Model 1). A similar pattern emerged for disordered eating behaviours (Table 1, Model 3), with lower levels of disordered eating in all future time points compared with May/June 2020.

**Table 1**

Estimated model fixed effects showing how body esteem and disordered eating change over time between May/June 2020 and Jan/Feb 2021, before and after adjusting for levels of psychological distress.

		Body esteem				Disordered eating			
		(1)		(2)		(3)		(4)	
		B (SE)	p	B (SE)	p	B (SE)	p	B (SE)	p
Time	2: Jul/Aug 20	0.003 (0.029)	0.907	-0.014 (0.029)	0.633	-0.654 (0.304)	0.032	-0.407 (0.306)	0.182
	3: Sept/Oct 20	0.057 (0.030)	0.056	0.027 (0.030)	0.373	-1.779 (0.319)	<0.001	-1.452(0.320)	<0.001
	4: Nov/Dec 20	0.102 (0.032)	0.001	0.081 (0.032)	0.010	-2.538 (0.338)	<0.001	-2.273 (0.336)	<0.001
	5: Jan/Feb 21	0.109 (0.032)	0.001	0.086 (0.032)	0.007	-2.306 (0.339)	<0.001	-2.009 (0.339)	<0.001
					-0.060 (0.005)	<0.001		0.659 (0.050)	<0.001
Psychological distress									
Age	Over 30	0.164 (0.080)	0.040	0.088 (0.070)	0.210	-1.836 (0.732)	0.012	-1.007 (0.640)	
Gender	Not woman	0.554 (0.113)	<0.001	0.503 (0.099)	<0.001	-4.814 (1.028)	<0.001	-4.283 (0.894)	<0.001
Education	Undergraduate degree	-0.260 (0.090)	0.004	-0.204 (0.079)	0.010	1.244 (0.826)	0.132	0.584 (0.720)	0.417
	College/vocational	-0.368 (0.119)	0.002	-0.297 (0.104)	0.004	2.760 (1.083)	0.011	1.966 (0.944)	0.037
	Secondary school	-0.374 (0.144)	0.009	-0.274 (0.127)	0.030	3.006 (1.317)	0.022	1.781 (1.150)	0.121
Country	Scotland	0.061 (0.082)	0.454	0.062 (0.072)	0.384	0.124 (0.747)	0.868	0.132 (0.650)	0.840
	Wales & NI	-0.211 (0.209)	0.314	-0.139 (0.183)	0.449	4.260 (1.912)	0.026	3.427 (1.664)	0.039
History of eating disorder	Yes	-0.700 (0.085)	<0.001	-0.543 (0.076)	<0.001	6.459 (0.777)	<0.001	4.747 (0.690)	<0.001
Constant		1.689 (0.098)	<0.001	1.979 (0.089)	<0.001	13.920 (0.899)	<0.001	10.779 (0.821)	<0.001

Notes.

Reference categories: Time: 1: May/June 2020; age: Under 30; gender: Woman; education: Postgraduate degree; country: England; history of eating disorder: No.

#### 3.3. RQ2. Were any changes in body esteem and disordered eating observed over this period independent of changes in psychological distress?

Results for the mixed effects model further adjusted for psychological distress are shown in Table 1. The overall pattern of findings remains similar, with a small but significant increase in body esteem between May/June 2020 and Nov/Dec 2020 which was then maintained (Table 1, Model 2), and a significant decrease in disordered eating between May/June 2020 and Sept/Oct 2020 which was then maintained. These findings suggest the changes observed in body esteem and disordered eating existed over and above changes in psychological distress.

#### 3.4. RQ3. Did changes in body esteem and disordered eating over this period vary by age group, gender, or having a history of an eating disorder?

In the final moderation models, there were no significant interactions between age group and time (body esteem: Wald  $\chi^2(4) = 3.83, p = .429$ ; disordered eating: Wald  $\chi^2(4) = 7.33, p = .120$ ), gender and time (body esteem: Wald  $\chi^2(4) = 2.17, p = .705$ ; disordered eating: Wald  $\chi^2(4) = 1.55, p = .817$ ), or history of an eating disorder and time (body esteem: Wald  $\chi^2(4) = 2.22, p = .695$ ; disordered eating: Wald  $\chi^2(4) = 7.28, p = .122$ ) (full model results available on request). These models suggest that the rate of change over time in body esteem and disordered eating between May/June 2020 and later time points did not vary by age, gender or having a history of an eating disorder.

### 4. Discussion

This study assessed disordered eating and body image over the COVID-19 pandemic, through a UK longitudinal survey. Body esteem improved over time, with a significant increase by November/December 2020 compared with May/June of that year, which was maintained in January/February 2021. Similarly, disordered eating decreased over time, and was lower at all timepoints after our initial survey in May/June 2020. There was no evidence of fluctuations aligned with further national lockdowns across the UK. Although women, younger participants, and those with a history of an eating disorder reported higher disordered eating symptoms and lower body esteem overall, patterns of longitudinal change in these groups mirrored those of the wider sample.

Research has indicated that for individuals both with and without an eating disorder, disordered eating symptoms increased during the first lockdown (Phillipou et al., 2020; Sideli et al., 2021). Data from our first survey revealed that participants retrospectively reported greater

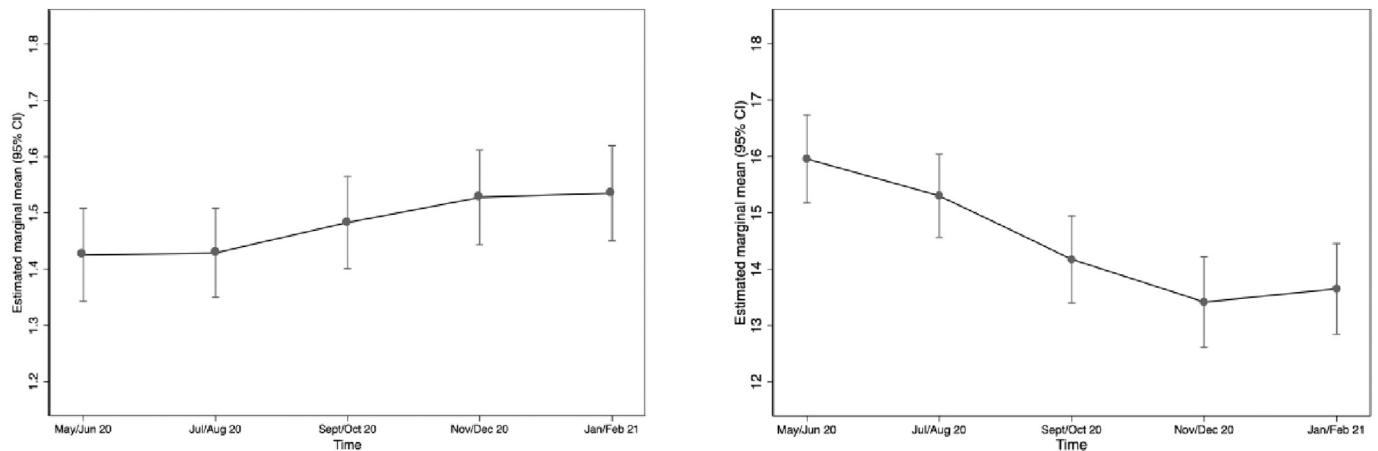


Fig. 1. Line graph showing estimated marginal means for body image (left panel) and disordered eating (right panel) over time.

preoccupation with food and eating, greater concern about their appearance, and greater difficulty in regulating eating, compared with pre-lockdown (Robertson et al., 2021). Our interpretation of the current findings is therefore that disordered eating was elevated, and body image esteem lower than usual, at the time of our first survey (during first lockdown), and that symptoms improved over time.

The main implication from these findings is that elevated disordered eating symptoms and lowered body esteem reported at the early stages of UK lockdown may not have been maintained over time, a trend that was also found within the subsample with a history of an eating disorder. These results contrast with longitudinal research from Australia which suggested that cumulative lockdowns may exacerbate disordered eating in those with and without a history of an eating disorder (Phillipou et al., 2021). This may be due to international differences in the management of COVID or could be complicated by seasonal variation in body image (Griffiths et al., 2021). Other UK based longitudinal studies showed that anxiety and depression were raised at the start of lockdown, but decreased quickly (Fancourt et al., 2021). However, the same data suggest different trajectories within subgroups of the population (Saunders et al., 2021). Future research (e.g., the COLLATE project; Tan et al., 2020) should continue to monitor symptoms within the population, as well as the long-term impact of the pandemic on eating disorder services.

The main strength of the present study is that measures were collected over a period of eight months within the same individuals, including a sizeable sample of individuals with a history of an eating disorder. However, whilst we were able to observe patterns of change over this time period, we cannot ascertain what mechanisms were involved. Secondly, we have missing data at our different timepoints, and experienced a loss of participants over time, which may introduce bias. The recruitment of participants through social media is another source of potential bias towards individuals who use the platform, and who follow accounts that originally posted and shared the recruitment materials. Though we were able to reach those who had a current or past diagnosis of an eating disorder, our sample is not likely to be representative of the wider population. Collectively these limitations do mean we should be cautious with forming strong conclusions based on these exploratory analyses alone; future work drawing on large, representative samples, with pre-specified hypotheses are now invaluable for exploring whether these preliminary findings can be replicated.

This paper reports one of the first longitudinal analyses of changes in body image and disordered eating behaviours over the COVID-19 pandemic in the UK. Whilst early reports show increases in disordered eating behaviours and body dissatisfaction during initial lockdowns, the data presented here may indicate adaptation within the adult population, with outcomes improving over the subsequent 8-month period. Whilst ongoing monitoring and studies using nationally representative

samples are important next steps, this work suggests that the rising referral rates for eating disorders during the pandemic may represent a temporary trend.

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### CRediT authorship contribution statement

All authors were involved in the study design and protocol. MR and MO led on data collection and HS and EN led on data analysis. All authors supported write up.

### Declaration of competing interest

The authors have no conflicts of interest to declare.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.eatbeh.2022.101660>.

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