

## In-person versus virtual therapy in outpatient eating-disorder treatment:

### A COVID-19 inspired study

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Running head: Virtual treatment for eating disorders

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## DATA AVAILABILITY STATEMENT

Data upon which this study were based are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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## Abstract

Objective: Findings show “virtual” therapy (conducted using internet-based videoconferencing techniques) to be a viable alternative to in-person therapy for a variety of mental-health problems. COVID-19 social-distancing imperatives required us to substitute virtual interventions for in-person sessions routinely offered in our outpatient eating disorder (ED) program—and afforded us an opportunity to compare the two treatment formats for clinical efficacy.

Methods: Using self-report assessments, we compared outcomes in a historical sample of 49 adults with heterogeneous EDs (treated in-person over 10 to 14 weeks in individual and group therapies) to those of 76 patients receiving comparable treatments virtually during the COVID-19 outbreak. Linear mixed models were used to study symptom changes over time and to test for differential effects of treatment modality.

Results: Participants in both groups showed similar improvements on eating symptoms, levels of weight gain (in individuals in whom gain was indicated), and satisfaction with services.

Discussion: Our results suggest that in-treatment clinical outcomes with virtual and in-person eating-disorder therapies are comparable, and point to potentials of virtual therapy for situations in which geographical distance or other barriers impede physical access to trained therapists or specialized treatments.

## KEY WORDS

eating disorders; anorexia nervosa; bulimia nervosa; covid-19; pandemic; virtual therapy; online therapy; psychotherapy

## 1. INTRODUCTION

Virtual interventions offered by trained therapists using web-based video-conferencing platforms have been shown to be effective for diverse mental-health problems--including eating disorders. Notably, such treatments are reported to yield clinical gains and satisfaction with treatment similar to those associated with comparable in-person therapies (Hilty, Rabinowitz, McCarron, Katzelnick, Chang, Bauer, et al., 2018; Berryhill, Culmer, Williams, Halli-Tierney, Betancourt, Roberts, et al., 2019; Sproch & Anderson, 2019).

A recent scoping review addressing impacts of the COVID-19 pandemic upon people with eating disorders (EDs) documented several adverse consequences, including increased demand for services, worsening of eating symptoms, and exacerbation of mental-health problems (Linardon, Messer, Rodgers, & Fuller-Tyszkiewicz, 2021). The review also identified three reports on patients' responses to virtual adaptations of ED outpatient or day-program treatments. Two of these, both uncontrolled, documented promising pre-post symptom changes in small groups ( $n = 9$  and  $n = 25$ , respectively) receiving routine treatments that had been adapted to virtual formats (Plumley, Kristensen, & Jenkins, 2021; Raykos, Erceg-Hurn, Hill, Campbell, & McEvoy, 2021). The third study found responses of 33 people treated in a virtual day program to be indistinguishable from those of 60 people treated in a comparable in-person day program run prior to the COVID-19 outbreak (Levinson, Spoor, Keshishian, & Pruitt, 2021). Here, we report on findings from a study comparing responses of patients

who, following the COVID-19 outbreak, received a virtual adaptation of a routine outpatient treatment “package” offered in a specialized ED program, to responses of a historical sample receiving the same treatment package in person prior to the outbreak.

## 2. METHOD

### 2.1 Participants.

Participants in this research ethics board approved study were consenting adults treated in person between September 2017 and Feb 2020 and virtually between April 2020 and May 2021. We included people with Anorexia Nervosa (AN), Bulimia Nervosa (BN), Other Specified Feeding and Eating Disorder (OSFED), or Avoidant Restrictive Food Intake Disorder (ARFID), who started treatment as outpatients, and who had Body Mass Index (BMI) below 30. We excluded people who attended less than 30% of their group sessions, or who failed to complete Eating Disorder Examination-Questionnaires (EDE-Q), our main outcome measure, on both assessment occasions. DSM-5 diagnoses, determined by experienced clinicians following semi-structured interviews, were ratified by multidisciplinary team consensus.

This study used two sources of data: Archival data on outpatients who received in-person treatment prior to the COVID-19 outbreak, and newly collected data on outpatients receiving virtual treatments during the pandemic. Final samples involved 49 in-person and 76 virtual participants. Evaluating representativeness of these samples was challenging, as this was an “impromptu” study, for which we had no full patient tracking mechanism in place during archived in-person data collection. Nonetheless, based on a reconstruction of patient flow during the in-person phase, we estimate that

comparable proportions of people offered therapy accepted to start in both conditions (194 of 211 in-person participants, or 91.9%, vs. 173 of 201 virtual participants, or 86.1%), and comparable proportions of people who started therapy completed it (150 of 194 in-person cases, or 77.3%, vs. 138 of 173 virtual cases, or 79.8%). Where a between-condition discrepancy was visible, it indicated a larger percentage of virtual participants having returned needed questionnaires (76 of 138, or 55.1%) compared to 49 of 150, or 32.7% in-person participants [ $\chi^2 = 14.69$ ,  $df = 1$ ,  $p < .001$ ]. In other words, between-condition retention rates seemed to be similar, whereas questionnaire return rates apparently differed. We address implications of differential completion rates, and reasons for believing that they do not compromise our findings, in the Discussion (to follow).

## 2.2 Treatment.

The Douglas Institute Eating Disorders Continuum (EDC) offers various care options, organized around a sequential (stepped-care) model in which time-limited segments of outpatient, day treatment and inpatient care can be linked successively to adjust treatment durations and intensities. Here, we focus on the response of adults who started their current episode of treatment as outpatients. Modal format of treatment involved weekly group therapy, bimonthly individual sessions, and adjunctive nutritional and pharmacological consultations. Precise frequency of individual and adjunctive sessions varied according to patients' clinical status. Therapy process and content drew upon commonly applied motivational and cognitive-behavioral techniques (see Steiger, 2017). Group contents were standardized using in-house manuals (e.g.,

Steiger, 1999) and Power Point slide decks and handouts. Groups provided psychoeducation on biopsychosocial factors, and training in techniques for eating-symptom management, distress tolerance, behavioral chain analysis, self-compassion and other themes. Individual therapy adhered to cognitive-behavioral principles, with bimonthly peer-supervision meetings used to maintain fidelity. Although we have published no controlled outcome studies on the treatments in question, we have documented effect sizes comparable to those of established treatments of similar duration (Mansour, Bruce, Steiger, Zuroff, Horowitz, Anestin et al., 2012; Steiger, Sansfaçon, Thaler, Leonard, Cottier, Kahan, et al., 2017).

Following the COVID-19 outbreak, the EDC substituted virtual therapy sessions for in-person sessions in its outpatient clinic. Therapy process and content were unchanged, except that patients met with therapists and participated in groups via the Zoom® videoconferencing platform—which enabled secure video and audio communications, and the sharing of documents and slides used in psychoeducation. Groups in the virtual therapy studied here always ran for 10 weeks. In the in-person condition, groups ran for 10 to 14 weeks, owing either to intentional shifts in treatment protocols, or practical factors (e.g., holiday breaks) that affected group length. We accounted statistically for variations in the number of group sessions by including a random factor reflecting group duration (see Statistical Analyses).

### 2.3 Clinical Measures

Assessments, conducted at the start and end of therapy groups, used paper-and-pencil questionnaires to assess responses to in-person therapy, and web-based

questionnaires for virtual therapy participants. In both cases, eating disorder symptoms were assessed using the EDE-Q, version 6.0 (Fairburn & Beglin, 2008), a 28 -item questionnaire measuring Dietary Restraint, Eating Concerns, Shape Concerns, and Weight Concerns, and global ED severity. A recent review notes the EDE-Q global and subscale scores to evince good test-retest reliability, internal consistency, and temporal stability—although some controversy exists surrounding the repeatability of the scale’s intended 4-factor structure (Berg, Peterson, Frazier & Crowe, 2021). In our data set, Cronbach alphas for the EDE-Q global severity scale were .96 and .94 for in-person and virtual conditions, respectively. Likewise, Cronbach alphas were acceptable-to-excellent for each of the EDE-Q subscales for both in-person and virtual conditions (in-person condition: Dietary Restraint:  $\alpha = .91$ ; Eating Concerns:  $\alpha = .82$ ; Shape Concerns:  $\alpha = .88$ ; Weight Concerns:  $\alpha = .73$ ; Virtual condition: Dietary Restraint:  $\alpha = .84$ ; Eating Concerns:  $\alpha = .79$ ; Shape Concerns:  $\alpha = .91$ ; Weight Concerns:  $\alpha = .81$ ). Given the preceding, we felt it acceptable to analyze subscale scores, providing they would be interpreted judiciously. BMI was based on EDE-Q items or, if unavailable, data from patient files. Anxiety and depression symptoms were assessed using the Generalized Anxiety Disorder Questionnaire (GAD-7: Spitzer, Kroenke, Williams, & Löwe, 2006) and the Patient Health Questionnaire (PHQ-9: Kroenke, Spitzer, & Williams, 2001), respectively. In our dataset, Cronbach’s  $\alpha$  for the GAD-7 was .94 in the in-person condition, and .91 in the virtual condition. The PHQ-9, believed to be a reliable and valid measure of depression severity (Kroenke et al, 2001), taps symptoms of DSM-IV

depression. In our dataset, the PHQ-9 yielded a Cronbach's  $\alpha$  of .89 in the in-person condition, and .86 in the virtual condition.

Satisfaction with therapy was measured using the statement: "Generally, how satisfied were you with the services you received?"), rated on a 4-point "very dissatisfied" to "very satisfied" scale. Twelve additional items evaluated participants' experiences of virtual therapies on a 5-point scale (see Table S1). Added part-way through the study, the latter items were completed by 44 virtual therapy participants.

## 2.4 Statistical Analyses

Data were analyzed with SPSS version 27. Baseline differences on continuous variables were compared using one-way ANOVAs and using chi-squared tests for categorical variables. A Mann-Whitney test was used to compare satisfaction ratings between conditions. Linear mixed models (LMMs) were used to study treatment outcomes, with separate models run for each of the symptom measures. LMMs accommodated missing data, accounted for autocorrelations, and enabled inclusion of fixed and random effects (Heck et al., 2014). The Akaike Information Criterion (AIC) served to estimate prediction error and quality of the fit of statistical models to the data. In all cases, modality (in-person vs. virtual) and time (pre vs. post) were included as fixed factors, and a modality x time interaction term was included to identify differential effects of modality over time. An autoregressive covariance structure was used. "Participants" and "group duration" were included as random factors with variable intercepts. Based on previous work (Mansour et al., 2012), we expected a medium effect of treatment on ED

symptoms. If so, 37 participants would have been sufficient to detect a significant change.

## 2. RESULTS

Table 1 provides data describing patients and treatments. People in the two groups had comparable mean age, BMI, and stated gender identifications. Distributions of diagnoses in the two conditions were comparable except that, according to chi-squared tests and follow-up adjusted residual analyses, the in-person condition included slightly more people with ARFID. Predictably, people in the in-person condition received slightly more group sessions than did those in the virtual condition, but there was no between-group difference as to percentage of sessions attended.

### 3.1 Treatment outcome

Mean scores ( $M \pm SD$ ) on scales measuring eating-disorder, depression and anxiety symptoms at pre- and post-treatment are shown as a function of treatment modality in Table 2. Varying *ns* on different measures, attributable to non-systematically missing data, are indicated in a footnote. Linear mixed models showed global EDE-Q symptom-severity scores to decrease during therapy ( $AIC = 633.04$ ,  $F = 14.89$ ,  $p < .001$ ). A similar pattern was observed for each of the EDEQ subscales: dietary restraint ( $AIC = 714.59$ ,  $F = 9.38$ ,  $p = .003$ ), eating concerns ( $AIC = 688.11$ ,  $F = 10.87$ ,  $p = .001$ ), shape concerns ( $AIC = 669.71$ ,  $F = 5.88$ ,  $p = .018$ ) and weight concerns ( $AIC = 704.15$ ,  $F = 10.94$ ,  $p = .001$ ). There were no group x time interactions.

To calculate whether or not the effect size for overall EDEQ-scores differed between treatment modalities, we used a pretest-posttest-control design for Cohen's *d*

as proposed by Morris (2008). Calculation of this effect size was based on the mean pre-post change in the virtual group minus the mean pre-post change in the in-person condition (considered as the “control group”), divided by the pooled pretest standard deviation. The effect size (-0.0061) obtained suggested negligible difference between treatments.

The effect of treatment on BMI was analyzed separately for individuals who were considered to clearly require weight gain (i.e., with BMI < 18, in-person  $n = 15$ ; virtual  $n = 24$ ). There was a significant increase in BMI over time in the selected participants ( $AIC = 290.64$ ,  $F = 6.75$ ,  $p = .011$ ), without a difference associated with in-person or virtual therapy ( $p = .98$ ). Conducting the same analyses with a BMI threshold < 20 also yielded no group difference ( $AIC = 499.45$ ,  $F = 8.40$ ,  $p = .005$ ). There were no main or interaction effects on GAD-7 or PHQ-9 indices. Although the preceding results were based on a minimum attendance rate of 30%, results were similar when the minimum attendance rate was set at 50, 60 or 70%. Likewise, a rerun of the analyses excluding patients with an ARFID diagnosis yielded effectively the same results.

### 3.2 Patient Satisfaction and Experience

Participants reported comparable satisfaction with in-person and virtual treatments ( $M \pm SD$ :  $3.28 \pm 0.8$  vs.  $3.29 \pm 0.6$ , respectively;  $Z = -0.29$ ,  $p = .77$ ). In addition, responses of 44 virtual therapy participants to the added “experience” items (see Table S1) suggest that virtual therapy was generally experienced positively. Results showed no evidence of adverse experiences related to concerns about confidentiality or online security.

## 3. DISCUSSION

This study compared effects of outpatient eating-disorder treatments provided using a traditional in-person therapy format to effects of comparable treatments provided using internet-based virtual techniques. The two formats yielded similar improvements on indices of eating-disorder symptoms and satisfaction with therapy. In this respect, our results parallel those of other studies that have found no differences between responses of patients to standardized eating-disorder treatments presented using in-person or virtual formats (e.g., Levinson et al, 2021; Plumley et al, 2021; Raykos et al, 2021; Sproch & Anderson, 2019). Similarly, our patient-experience indices suggested that virtual therapies were well tolerated and, surprisingly, did not reveal concerns we had expected to see related to confidentiality or limited connection with therapists. Our results on patient experience of virtual therapy corroborate favorable reports from other studies evaluating this question (e.g., Raykos et al. (2021). However, we note that reports on experience factors from some COVID-19 era virtual therapy studies are more mitigated (e.g., Lewis et al., 2021; Plumley et al., 2021). Taken together, findings consistently portray virtual therapy favorably when evaluated on outcome indices, whereas acceptability indices support slightly guarded enthusiasm.

Anxiety and depression did not improve during the segment of therapy studied. We consider that the preceding may simply reflect a tendency for the latter symptoms to have been less-responsive to a course of therapy as brief as the one examined here.

We add a comment on limitations of this study. Given lack of randomization of participants to treatment modalities, findings must be interpreted with caution. Low rates of participation, and differential participation rates between treatment conditions,

are obvious concerns. However, data on retention rates reported earlier suggest that a main factor underlying a better completion rate in our virtual treatment was the increased effectiveness of online versus paper-and-pencil assessments. In contrast, we found no evidence of inferior therapy retention in the virtual treatment condition—which reduces concerns about the possibility that virtual therapy might be experienced as less “personal”, and hence as less engaging. We remind readers that some studies suggest that validity of individual EDE-Q subscales is uncertain, so that cautious interpretation of the results using subscale scores is required. As a final note, we add that slightly longer average group durations in the in-person condition, although less-than ideal from a design standpoint, would (if anything) have biased in favor of better response in that condition. That this did not occur indirectly supports the interpretation that findings suggest no inferiority of the virtual treatment.

#### 4.1 Conclusions

Our findings suggest that virtual therapies supported by internet-based teleconferencing methods represent a viable treatment option for people with eating-disorder variants that are amenable to outpatient treatment. Overall, results point to potentials of virtual therapy, especially when circumstances impede peoples’ access to trained therapists or specialized programs.

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Table 1. Descriptive data on participants and treatments.

Variable	In-person treatment ( <i>n</i> = 49)	Virtual treatment ( <i>n</i> = 76)
Age in years ( <i>M</i> $\pm$ <i>SD</i> )	30.22 $\pm$ 9.9	28.41 $\pm$ 10.3
BMI at pre-treatment ( <i>M</i> $\pm$ <i>SD</i> )	20.05 $\pm$ 3.6	19.62 $\pm$ 3.3
Gender identification ( <i>n</i> , %)		
Female	46 (93.9)	65 (85.5)
Male	3 (6.1)	5 (6.6)
Non-binary	0 (0)	4 (5.3)
Prefer not to say	0 (0)	2 (2.6)
Diagnosis ( <i>n</i> , %) <sup>†</sup>	AN: 16 (32.7) BN: 12 (24.5) OSFED: 13 (26.5) ARFID: 8 (16.3)	AN: 32 (42.1) BN: 21 (27.6) OSFED: 21 (27.6) ARFID: 2 (2.6) *
Duration of group therapy in weeks ( <i>M</i> $\pm$ <i>SD</i> )	12.79 $\pm$ 1.8	10 $\pm$ 0 **
Number of weeks attended group ( <i>M</i> $\pm$ <i>SD</i> )	10.0 $\pm$ 2.1	8.04 $\pm$ 2.0**
% of group sessions attended ( <i>M</i> $\pm$ <i>SD</i> )	78.06 $\pm$ 12.5	80.39 $\pm$ 20.4

Note. BMI = Body Mass Index; AN = Anorexia Nervosa; BN = Bulimia Nervosa; OSFED = Other Specified Feeding and Eating Disorder; ARFID: Avoidant Restrictive Food Intake Disorder

<sup>†</sup> Overall difference in diagnosis: chi-square = 7.80, *df* = 3, *p* = .05; with a higher number of individuals with ARFID in the in-person than in the virtual treatment condition

\**p* = .05

\*\**p* < .01

Table 2. Effects of treatment on symptoms, as a function of treatment modality.

Questionnaire	In-person treatment		Virtual treatment		Statistical Test	
	Pre-Mean ( $\pm$ SD)	Post-Mean ( $\pm$ SD)	Pre-Mean ( $\pm$ SD)	Post-Mean ( $\pm$ SD)	Time	Time by treatment modality
EDE-Q						
Global severity†	3.65 ( $\pm$ 1.5)	3.22 ( $\pm$ 1.7)	3.90 ( $\pm$ 1.4)	3.38 ( $\pm$ 1.4)	$F(77.82) = 14.89$ $p < .001$	$F(77.82) = 0.31$ $p = .58$
Dietary restraint	3.19 ( $\pm$ 2.1)	2.82 ( $\pm$ 2.2)	3.36 ( $\pm$ 1.7)	2.72 ( $\pm$ 1.6)	$F(76.20) = 9.38$ $p = .003$	$F(76.20) = 1.68$ $p = .20$
Eating concerns	2.92 ( $\pm$ 1.6)	2.66 ( $\pm$ 1.7)	3.27 ( $\pm$ 1.6)	2.71 ( $\pm$ 1.5)	$F(80.56) = 10.87$ $p = .001$	$F(80.56) = 0.56$ $p = .46$
Shape Concerns	4.37 ( $\pm$ 1.6)	3.98 ( $\pm$ 1.8)	4.77 ( $\pm$ 1.4)	4.37 ( $\pm$ 1.5)	$F(79.11) = 5.88$ $p = .018$	$F(79.11) = 0.23$ $p = .63$
Weight concerns	4.03 ( $\pm$ 1.6)	3.40 ( $\pm$ 1.9)	4.21 ( $\pm$ 1.4)	3.72 ( $\pm$ 1.6)	$F(83.51) = 10.94$ $p = .001$	$F(83.51) = 0.12$ $p = .73$
PHQ-9 total	15.52 ( $\pm$ 6.9)	15.88 ( $\pm$ 6.3)	16.22 ( $\pm$ 7.4)	15.96 ( $\pm$ 6.5)	$F(83.73) = 0.02$ $p = .97$	$F(83.73) = 0.10$ $p = .75$
GAD-7 total	14.42 ( $\pm$ 6.4)	13.50 ( $\pm$ 6.8)	14.64 ( $\pm$ 5.4)	14.18 ( $\pm$ 5.9)	$F(81.60) = 1.10$ $p = .30$	$F(81.60) = 0.09$ $p = .76$

Note. EDE-Q = Eating Disorder Examination Questionnaire; ED = eating disorder; PHQ-9 = patient health questionnaire; GAD-7 = generalized anxiety disorder scale; Pre-mean = symptom scores prior to the start of treatment; Post-mean = symptom scores at end of group therapy.

EDE-Q: in-person treatment:  $n = 41$  (pre);  $n = 35$  (post). Virtual treatment:  $n = 65$  (pre),  $n = 54$  (post).

PHQ-9: in-person treatment:  $n = 40$  (pre);  $n = 34$  (post). Virtual treatment:  $n = 73$  (pre),  $n = 52$  (post); GAD-7: in-person treatment  $n = 40$  (pre);  $n = 34$  (post). Virtual treatment:  $n = 70$  (pre),  $n = 51$  (post). For each of the questionnaires. Results were very similar when only people with pre and post data were included. † Overall effect size Cohen's  $d$  of change in global ED severity is 0.54 ( $r$  between pre-and post treatment time points is .81).