

A systematic scoping review of research on COVID-19 impacts on eating disorders: A critical appraisal of the evidence and recommendations for the field

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Abstract

Objective: Research investigating the effects of COVID-19 on eating disorders is growing rapidly. A comprehensive evaluation of this literature is needed to identify key findings and evidence gaps to better inform policy decisions related to the management of eating disorders during and after this crisis. We conducted a systematic scoping review synthesizing and appraising this literature.

Method: Empirical research on COVID-19 impacts on eating disorder severity, prevalence, and demand for treatment was searched. No sample restrictions were applied. Findings ($n = 70$ studies) were synthesized across six themes: (a) suspected eating disorder cases during COVID-19; (b) perceived pandemic impacts on symptoms; (c) symptom severity pre versus during the pandemic; (d) pandemic-related correlates of symptom severity; (e) impacts on carers/parents; and (f) treatment experiences during COVID-19.

Results: Pandemic impacts on rates of probable eating disorders, symptom deterioration, and general mental health varied substantially. Symptom escalation and mental health worsening during—and due to—the pandemic were commonly reported, and those most susceptible included confirmed eating disorder cases, at-risk populations (young women, athletes, parent/carers), and individuals highly anxious or fearful of COVID-19. Evidence emerged for increased demand for specialist eating disorder services during the pandemic. The forced transition to online treatment was challenging for many, yet telehealth alternatives seemed feasible and effective.

Discussion: Evidence for COVID-19 effects is mostly limited to participant self-report or retrospective recall, cross-sectional and descriptive studies, and samples of convenience. Several novel pathways for future research that aim to better understand, monitor, and support those negatively affected by the pandemic are formulated.

Resumen

Objetivo: La investigación que se hace sobre los efectos de COVID-19 en los trastornos de la conducta alimentaria está creciendo rápidamente. Se necesita una evaluación exhaustiva de esta literatura para identificar los hallazgos clave y evidenciar las brechas para informar mejor las decisiones de políticas públicas relacionadas con el manejo de los trastornos de la conducta alimentaria durante y

después de esta crisis. Se realizó una revisión sistemática del alcance que sintetizó y valoró esta literatura.

Método: Se buscó investigación empírica sobre los impactos de COVID-19 en la gravedad, prevalencia y demanda de tratamiento de los trastornos de la conducta alimentaria. No se aplicaron restricciones a la muestra. Los hallazgos ($n = 70$ estudios) se sintetizaron en seis temas: (1) casos sospechosos de trastornos de la conducta alimentaria durante COVID-19; (2) impacto percibido en los síntomas; (3) gravedad de los síntomas antes versus durante la pandemia; (4) correlatos relacionados con la pandemia de la gravedad de los síntomas; (5) impactos en los cuidadores/padres; (6) experiencias de tratamiento durante COVID-19.

Resultados: El impacto de la pandemia en las tasas de probables trastornos de la conducta alimentaria, deterioro de los síntomas y salud mental en general variaron sustancialmente. La escala de síntomas y el empeoramiento de la salud mental durante y debido a la pandemia fueron reportados comúnmente, y los más susceptibles incluyeron casos confirmados de trastornos de la conducta alimentaria, poblaciones en riesgo (mujeres jóvenes, atletas, padres / cuidadores) e individuos con altos niveles de ansiedad o con miedo de COVID-19. Surgió alguna evidencia de una mayor demanda de servicios especializados en trastornos de la conducta alimentaria durante la pandemia. La transición forzada al tratamiento en línea fue un desafío para muchos, sin embargo, las alternativas de tele salud parecían factibles y efectivas. Conclusiones. La evidencia de los efectos de COVID-19 se limita principalmente al autoinforme de los participantes o al recuerdo retrospectivo, los estudios transversales y descriptivos, y las muestras de conveniencia. Se formulan varias vías novedosas para futuras investigaciones que tienen como objetivo comprender, monitorear y apoyar mejor a aquellos que fueron afectados negativamente por la pandemia.

KEYWORDS

carers, COVID-19, eating disorders, machine learning, mental health, open science, scoping review, systematic review, telehealth, treatment

1 | INTRODUCTION

The emergence of the novel coronavirus disease-2019 (COVID-19) has led to major disruptions in functioning of established healthcare, education, social, and economic systems (Barlow, van Schalkwyk, McKee, Labonté, & Stuckler, 2021; Blumenthal, Fowler, Abrams, & Collins, 2020). Countries across the world have implemented strict preventative measures to slow the spread of infection, including mandated stay-at-home orders and social distancing policies. These measures have profoundly impacted employment, schooling, and the global economy (McKee & Stuckler, 2020), and have also adversely impacted the mental health of many individuals (Murphy, Markey, O'Donnell, Moloney, & Doody, 2021; Panchal et al., 2021; Vindegaard & Benros, 2020; Xiong et al., 2020). Such challenges have encouraged researchers, policy makers, and healthcare professionals to deeply consider the direct and indirect consequences of COVID-19 under circumstances of significant logistical challenges (Weissman, Klump, & Rose, 2020), time pressures, and a rapidly evolving evidence base (Liu et al., 2020).

Within the eating disorders field, researchers have raised concern that restrictions to daily activities, increased isolation, threats of food shortages, increased screen time, and disruptions to mental health care may exacerbate symptom severity, incidence, and demand for treatment (Rodgers et al., 2020; Touyz, Lacey, & Hay, 2020; Weissman, Bauer, & Thomas, 2020). A growing number of studies conducted during the pandemic have reported a worsening of eating disorder symptoms and syndromes in a variety of population groups (e.g., Keel et al., 2020; Miniati et al., 2021; Phillipou et al., 2020; Sideli et al., 2021; Spigel et al., 2021). Evidence also indicates that the exacerbation of clinical symptoms has added further strain to existing healthcare systems, with the number of specialist referrals and first-ever admissions purportedly increasing (Hansen, Stephan, & Menkes, 2021; Shaw, Robertson, & Ranceva, 2021). However, the rapid rate at which research related to COVID-19 impacts is being published has led to serious concerns that the quality of evidence has markedly declined during this period (Jung et al., 2021). Thus, a careful, systematic appraisal of the rapidly evolving evidence pertaining to COVID-19 and eating disorders is critical to identify key literature

gaps, highlight priority areas for future research, and inform policy decisions related to the management of eating disorders during and beyond the pandemic.

The aim of this study was to therefore conduct a systematic scoping review to locate, examine, and summarize the existing literature on COVID-19 impacts and eating disorders. Based on evident gaps and insights identified in this review, a second aim was to provide concrete recommendations to guide further research in this field.

2 | METHOD

A scoping review was selected because its methodology is a widely adopted approach in broad fields of research that are rapidly evolving with emerging evidence (Munn et al., 2018), as is the case of COVID-19 and eating disorders. Scoping reviews are highly valuable as a form

of research synthesis with the goal to map the literature on a particular topic; they provide an opportunity to identify key concepts and themes, gaps in knowledge, and types and sources of evidence to inform practice, policy-making, and research efforts (Munn et al., 2018). This systematic scoping review was guided by the Arksey and O'Malley (2005) five-step process, including (a) establishing the research question; (b) identifying relevant studies; (c) selecting appropriate studies; (d) mapping the data; and (e) arranging, summarizing, and communicating outcomes. Our scoping review was also guided by the PRISMA guidelines for scoping reviews (Tricco et al., 2018).

2.1 | Search strategy and study selection

The primary search strategy (last search in August 2021) involved searching the PsycINFO, Medline, and Web of Science databases.

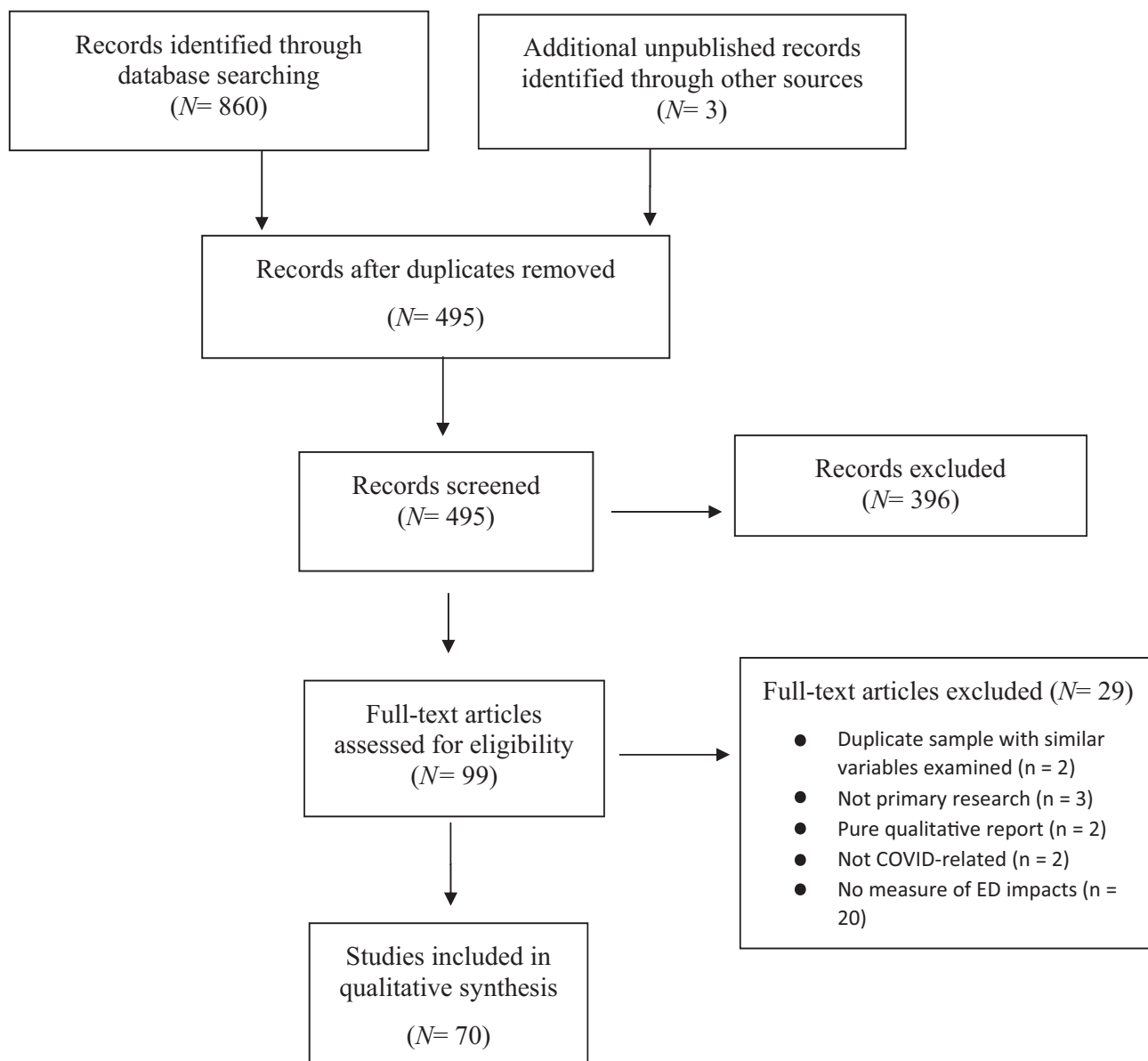


FIGURE 1 Flow-chart of literature search

TABLE 1 Characteristics and findings summary of studies that sampled a non-clinical cohort (individuals without an eating disorder)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
(Aldhuwayhi et al., 2021)	Cross	Saudi Arab	Unclear	296 adult dentists (30% women). Race/ethnicity N/R	<ul style="list-style-type: none"> 64% self-reported engaging in binge eating as a method to cope with stress due to the pandemic. 	<ul style="list-style-type: none"> Only analyzed complete cases. Unclear how binge eating was assessed.
(Alessi et al., 2020)	Cross	Braz	Unclear	120 adults with type 1/2 diabetes (56% women). 86% white	<ul style="list-style-type: none"> 76% scored above the clinical cut-off on the EAT-26, signaling a possible ED. 	<ul style="list-style-type: none"> Higher rates of probable EDs than other studies potentially due to target population.
(Athanasiadis et al., 2021)	Cross	US	Apr-20	208 adult bariatric surgery patients (86% female). 86% white; 12% black; 1% Latino/Hispanic	<ul style="list-style-type: none"> 48% self-reported an increase loss of control eating and 20% self-reported an increase in binge eating during the pandemic. 	<ul style="list-style-type: none"> Items adapted from the eating loss of control scale. 29% survey completion rate was observed from emails sent to existing registry.
(Baceviciene & Jankauskiene, 2021)	Long (retro)	US	pre-pandemic Oct-19 During pandemic Feb-21	230 university students (79% female). Race/ethnicity N/R	<ul style="list-style-type: none"> No significant changes in ED psychopathology (EDE-Q global scores) were observed from before to during the pandemic/lockdown. 	<ul style="list-style-type: none"> Complete cases analyzed (12% total sample). No differences in BMI, disordered eating, or lifestyle factors were observed between completers and drop-outs.
(Breiner, Miller, & Hormes, 2021)	Cross	US	Apr-May20	158 community-based adults (91% women). 90% white; 5% Hispanic; 6% Asian; 0.6% American Indian; 0.6% native American	<ul style="list-style-type: none"> Based on retrospective recall, no changes in eating disorder psychopathology (EDE-Q), binge eating, and purging were observed from before to during the pandemic. Decreases in overeating and loss of control eating were observed. 	<ul style="list-style-type: none"> Participants answered the EDE-Q twice at the same time, once in relation to before the pandemic and the second in relation to during the pandemic. Recruitment was solely targeted at social media and online forums.
(Buckley, Hall, Lasemillante, & Belski, 2021)	Cross	Aus	Apr-May-20	204 current/former athletes (85% women). Race/ethnicity N/R	<ul style="list-style-type: none"> 21% scored above the clinical cut-off on the EAT, signaling a possible ED. ~35% reported that their "relationship with food" and body image had worsened since the pandemic 	<ul style="list-style-type: none"> Complete cases analyzed. Recruitment targeted at social media and online forums.
(Calugi et al., 2021)	Long (retro)	Italy	June-Oct-20	206 adults (70% female) who completed CBT-OB prior to the pandemic & matched control sample (70% female) who completed CBT-OB prior to pandemic	<ul style="list-style-type: none"> No differences in binge eating between the two cohorts (one exposed to the pandemic and another who was not) at a follow-up. 	<ul style="list-style-type: none"> Cohorts were matched on gender, age, and BMI. Follow-up assessment was conducted by telephone, 6 months after completion of CBT.

TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
				(70% women); race/ethnicity N/R		<ul style="list-style-type: none"> Follow-up retention rate was ~55%, though no differences in clinical or demographic variables were observed between completers and dropouts.
(Cecchetto, Aiello, Gentili, Ionta, & Osimo, 2021)	Cross	Italy	May-20	365 community-based adults (73% female). Race/ethnicity N/R	<ul style="list-style-type: none"> Significantly more individuals screened positive for binge-eating disorder during (3%) the first lockdown compared to the second lockdown (2.46%). 	<ul style="list-style-type: none"> Participants answered the BED-7 twice at the same time, once in relation to the first lockdown and the second in relation to the next lockdown. Recruitment was targeted at social media and online forums. Only complete cases were analyzed.
(Chan & Chiu, 2021)	Cross	China	Apr-20	316 community-based adults (71% female). Race/ethnicity N/R	<ul style="list-style-type: none"> 26% screened positive for a probable ED based on the SCOFF. 	<ul style="list-style-type: none"> Convenience, snowballing and social media advertisements were used for recruitment. Unclear how survey dropouts were handled.
(Christensen et al., 2021)	Cross	US	Prelock Dec-Mar-20 During lock Apr-20	Cohort 1 of 222 university students (73% women). Cohort 2 of 357 university students (78% women); 84% white; 3% black; 1% American Indian; 5% Asian; 5% mixed race	<ul style="list-style-type: none"> No significant difference in prevalence of probable ED (based on EDDS) was observed between the cohort exposed (41.5%) or not exposed (37%) to the lockdown. Higher food insecurity scores were associated with greater likelihood of ED among the total sample. 	<ul style="list-style-type: none"> Participants recruited through emails sent to university students, stratified by race, gender, and ethnicity. Complete-cases were analyzed. The two cohorts differed on age, but not gender, race, ethnicity, BMI.
(Coimbra, Paixão, & Ferreira, 2021)	Cross	Port	April – May-20	508 community-based adult women. Race/ethnicity N/R	<ul style="list-style-type: none"> During the lockdown, ~25% reported increases in strict dietary rules, 30–60% reported increases in food restriction, and ~30% reported stricter exercise rules. Estimates differed as a function of BMI class. 	<ul style="list-style-type: none"> Recruitment strategy was unclear. Authors reported that there was no missing data. Items were self-created.

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TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
(Colleluori, Goria, Zillanti, Marucci, & Dalla Ragione, 2021)	Cross	Italy	March – May-20	76 healthcare providers who treated patients with ED during pandemic. Gender/ethnicity N/R	<ul style="list-style-type: none"> Healthcare providers reported that >30% and > 40% of their patients had respectively increased their binge eating and compensatory behavior during lockdown, while >80% had reported a worsening of mood and anxiety. Providers reported that 15–25% of their patients increased the number of visitors for care due to the lockdown, and > 5% of new patients sought help because of the lockdown. 	<ul style="list-style-type: none"> Survey was emailed nationwide to all potential healthcare providers specializing in ED. Data were based purely on retrospective self-report from an author-created questionnaire. Complete cases analyzed.
(Czeczor-Bernat, Swami, Modrzejewska, & Modrzejewska, 2021)	Cross	Pol	Dec20-Feb-21	671 community-based adult women; 99% white.	<ul style="list-style-type: none"> Higher COVID-19 stress and anxiety, coupled with a higher BMI were associated with higher symptom severity (e.g., EDI subscales). 	<ul style="list-style-type: none"> Participants recruited via flyers distributed throughout the university and workplaces. Complete cases analyzed COVID-19 stress and anxiety were assessed through a self-created survey.
(De Pasquale et al., 2021)	Cross	Italy	Mar-20-Feb-21	469 university students (53% women). Race/ethnicity N/R	<ul style="list-style-type: none"> Fear of COVID-19 was significantly correlated with higher eating disorder psychopathology (i.e., EDI bulimia, drive for thinness, and binge eating severity), but not significantly correlated with body dissatisfaction. 	<ul style="list-style-type: none"> No mention of how drop-outs or missing data were handled. Unclear how many students were invited to complete the survey.
(Flaudias et al., 2020)	Cross	Fran	Mar-20	5,738 university students (74% women). Race/ethnicity N/R	<ul style="list-style-type: none"> 38% scored above the clinical cut-off for the SCOFF, indicating a probable ED. Higher COVID-19 stress was associated with higher likelihood of binge eating and dietary restriction over the past 7 days. 	<ul style="list-style-type: none"> 7.9% response rate from all emails sent to potential participants. COVID-19 stress was assessed via self-created items.

TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
(Guo et al., 2020)	Long (prosp)	China	Mar-20	254 carers of people with ED (84% female) and 254 carers of healthy controls (84% female); race/ethnicity N/R	<ul style="list-style-type: none"> Carers of people with ED reported higher depression, anxiety and stress scores, and lower perceived social support. A brief psychoeducational intervention for carers did not lead to significant improvements in depression and anxiety. 	<ul style="list-style-type: none"> Carers and healthy controls were matched on key demographic variables. Attrition was 60% for the post-test assessment.
(Haddad et al., 2020)	Cross	Leb	Apr-20	Community-based adults ($n = 228$; 58% female) and individuals attending weight loss clinics ($n = 177$; 40%). Race/ethnicity = N/A	<ul style="list-style-type: none"> Financial difficulties, lack of contact with friends, a sense of insecurity, difficulty buying desired food, fear of COVID-19, and more physical exercise were associated with ED psychopathology (EDE-Q subscales). 	<ul style="list-style-type: none"> Recruitment geared toward social media advertisements and snowballing techniques. Unclear how drop-outs or missing data were handled. Indices of COVID-19 concerns were based on earlier work.
(Jordan et al., 2021)	Cross	US	Jul-Sept-20	140 community-based adult carers (88% female) 84% white; other races/ethnicities N/R	<ul style="list-style-type: none"> Stress and concern about weight gain during, but not before, COVID-19 were associated with ED psychopathology (EDE-Q global). 	<ul style="list-style-type: none"> Participants were assessed twice at the same time, once in relation to before the pandemic and the second in relation to during the pandemic. Recruitment methods were geared toward social media advertisements and snowballing techniques. Concern with weight gain assessed by single items created for the purpose of this study.
(Keel et al., 2020)	Long (pros)	US	T1 Jan-20 T2 Apr-20	90 university students (87% female) 78% White; 22% Latino; 12% Black; 4% Asian; 1% American Indian	<ul style="list-style-type: none"> ~60% reported that their concerns with weight, shape and eating had increased since the COVID-19 pandemic. 	<ul style="list-style-type: none"> No differences on study variables between completers and dropouts. Findings relevant for this review based on assessments at T2 (retrospective recall). Authors developed their own tool to assess perceived concerns due to COVID-19.

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TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
(Kim et al., 2021)	Cross	US	Pre-pandemic Oct-19 During pandemic May-20	Pre-pandemic cohort 1 <i>n</i> = 8,613 university students (73% women); 72% white; 8% black 9%; Asian; 1% American Indian; 1% native; Hawaiian; 8% mixed race During pandemic cohort 2 = 4,970 university students (68% women); 74% white; 5% black 14%; Asian; 1% American Indian; 1% native Hawaiian; 4% mixed race	<ul style="list-style-type: none"> Compared to a pre-pandemic cohort, higher rates of BN/BED were observed for a cohort exposed to the pandemic (10.7% vs. 14.4%); no cohort differences in anorexia nervosa rates were observed. 	<ul style="list-style-type: none"> Recruitment was targeted at different universities in geographically diverse states. Differences in sex, gender, race, and sexual orientation were observed between the two cohorts. Missing data were handled using pairwise deletion.
(Koenig et al., 2021)	Cross	Germ	Pre-pandemic Nov18-Mar20 During pandemic mar-Aug20	Cohort 1 = 324 adolescents (69% female). Cohort 2 = 324 matched adolescents (69% female). Race/ethnicity N/R	<ul style="list-style-type: none"> The two cohorts (pre vs. during pandemic) did not differ on ED psychopathology (EDE-Q) 	<ul style="list-style-type: none"> Cohorts matched on gender, age, and school type. A convenience subsample was used from a larger, representative sample of German adolescents.
(Kohls, Baldofski, Moeller, Klemm, & Rummel-Kluge, 2021)	Cross	Germ	Jul-Aug-20	3,382 university students (70% women). Race/ethnicity N/R	<ul style="list-style-type: none"> 3.8% screened positive for an ED based on the SEED. 	<ul style="list-style-type: none"> Authors reported no significant differences in demographic characteristics between survey completers and drop-outs.
(Martínez-de-Quel, Suárez-Iglesias, López-Flores, & Pérez, 2021)	Long (pros)	Spain	T1 Mar-20 T2 mar-Apr-20	161 community-based adults (37% female). Race/ethnicity N/R	<ul style="list-style-type: none"> No change in ED psychopathology (EAT-26 total scores) was observed from T1 to T2. 	<ul style="list-style-type: none"> Convenience sample of mostly university students. Both time-points were during the pandemic period, spaced 5 days apart. Time 2 drop-outs did not differ to completers on physical activity, eating disorder risk, sleep problems, weight, and wellbeing (unclear if demographics differed).
(Meda et al., 2021)	Long (pros)	Italy	Prelockdown Oct-19 During lockdown Apr-20 After lockdown Jun-20	358 university students (79% women). Race/ethnicity N/R	<ul style="list-style-type: none"> ED symptom severity (EDI scores) did not change from before, during, and after the lockdown. 	<ul style="list-style-type: none"> Students recruited at one university site. Unclear the extent of missing data, attrition biases, and

TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
					<ul style="list-style-type: none"> • Post-hoc, exploratory analyses show that students with a prior ED experienced worsening of symptoms during the lockdown. 	how missing data were handled.
(Muzi, Sansò, & Pace, 2021)	Cross	Italy	Prelockdown Jan-19/20 During lockdown mar-May-20	N = 61 pre-pandemic cohort of adolescents (67% female). During pandemic cohort of adolescents (61% female). Race/ethnicity N/R	<ul style="list-style-type: none"> • Binge eating severity scores did not differ between the two cohorts of participants. Significantly differ on binge eating severity (BES) scores. 	<ul style="list-style-type: none"> • No cohort differences in age and gender, although other potential differences were not reported. • Recruitment was geared toward one university.
(Phillipou et al., 2020)	Cross	Aus	Apr-20	5,469 community-based adults (80% women; 184 self-reporting current ED). Race/ethnicity N/R	<ul style="list-style-type: none"> • 3% of the total sample indicated that they had an eating disorder. • Of self-reported ED cases, 47% reported more exercise, 35% more frequent binge eating, 19% reported more purging, 64% reported more dietary restriction, and between 16–27% reported severe mental health problems due to the pandemic. • For the total sample, 27% reported greater dietary restriction, 35% reported increased binge eating, and 35% reported more exercise behavior due to the pandemic. 	<ul style="list-style-type: none"> • Respondents were recruited through social media and other advertisements, participant registries and non-discriminative snowball methods. • Assessments were based on retrospective recall and self-created items relevant to COVID-19. • Complete-cases used for analyses (68% retention rate); unclear whether drop-outs differed to completers.
(Quitkat et al., 2020)	Cross	Germ	Apr-May20	2,233 community-based adults (80% women); race/ethnicity N/R	<ul style="list-style-type: none"> • 2.7% scored above the clinical cut-off for the EDE-Q, indicating a possible ED. • Of these, 45% reported slight worsening of mental health during the pandemic, whereas 17% reported considerable worsening. 	<ul style="list-style-type: none"> • Recruitment included university press releases and e-mail lists, flyer, social media, institutions for education in psychotherapy, outpatient departments, mental hospitals, psychotherapist associations, self-help groups and assisted living departments. • Complete cases were used for

(Continues)

TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
(Racine, Miller, Mehak, & Trollo, 2021)	Cross	Can	Apr-Jun-20	877 community-based adults (74% women); 80% white; 6% Hispanic; 5.7% Chinese; 3.1% south Asian; 2.4% Arab; 2.2% black; 1.6% southeast Asian; 1.5% west Asian; 0.9% Filipino; 0.8% indigenous; 0.6% Japanese; 0.1% native Hawaiian	<ul style="list-style-type: none"> • 25.8% scored above the clinical cut off on the EDE-QS, signaling a possible ED. • COVID-19 stress did not moderate relationships between putative risk/protective factors on ED psychopathology. 	<p>analyses (73% of the sample who began the survey); unclear whether dropouts differed to completers.</p> <ul style="list-style-type: none"> • Assessments were based on retrospective recall and self-created items relevant to COVID-19.
(Ramalho et al., 2021)	Cross	Port	May-20	254 community-based adult participants (83% women). Race/ethnicity N/R	<ul style="list-style-type: none"> • During lockdown, 53% self-reported skipping meals, 81% grazing and overeating, 47% loss of control eating, and 39% binge eating. 	<ul style="list-style-type: none"> • Recruitment aimed at social media and academic mailing lists. • Complete cases were analyzed (69% retention rate), although it was unclear whether drop-outs differed to completers. • Single items used to retrospectively assess the prevalence of ED behaviors in the past month, during the lockdown.
(Robertson et al., 2021)	Cross	UK	May-Jun-20	264 community-based adults (78% women). Race/ethnicity N/R	<ul style="list-style-type: none"> • 53% agreed/strongly agreed that they had difficulty controlling their eating during lockdown, 60% agreed/strongly agreed that they are more preoccupied with food, 48% agreed/strongly agreed that they 	<ul style="list-style-type: none"> • Social media recruitment. • Complete cases were analyzed (65% retention rate), although it was unclear whether drop-outs differed to completers. • Assessments were based on

TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
					<ul style="list-style-type: none"> have experienced more body concerns. Ratings were higher in self-reported ED cases. 	retrospective recall and self-created items relevant to COVID-19.
(Scharmer et al., 2020)	Cross	US	Mar-Apr-20	295 university students (65% women). Race/ethnicity N/R	<ul style="list-style-type: none"> Fear of virus and intolerance of COVID-19 uncertainty scores were positively associated with ED psychopathology (EDE-Q global scores), but not compulsive exercise. The relationships between COVID-19 anxiety and criterion variables were stronger for people with lower intolerance of uncertainty scores. 	<ul style="list-style-type: none"> Unclear how missing data were handled. Some survey instruments were modified to make it relevant to the COVID-19 pandemic.
(Simone et al., 2021)	Cross	US	Apr-May-20	720 community-based adolescents/adults (62% female/women); 29% white; 24% Asian; 16% Latino/Hispanic; 18% black/African American; 11% mixed	<ul style="list-style-type: none"> 8% endorsed extreme weight control behaviors, 53% endorsed less extreme weight control behaviors, 14% endorsed binge eating during the pandemic period. Significant correlates of weight control behaviors were low stress management, financial difficulties, food insecurity and depressive symptoms. 	<ul style="list-style-type: none"> Presents on a sub-sample drawn from a large-scale, population-based study (project EAT). 46% survey completion rate. Some items were adapted to make it specific to the pandemic.
(Thompson & Bardone-Cone, 2021)	Cross	US	Apr-20	Postpartum adult women ($n = 306$); 93% white; 8% Latina. Control women ($n = 153$); 83% white; 8% Latina.	<ul style="list-style-type: none"> 8% scored above the clinical cut-off criteria for the EAT, indicating a possible ED. For the total sample, no significant relationship between COVID-19 distress and eating disorder psychopathology was observed. 	<ul style="list-style-type: none"> Recruitment included local health centers, social media advertisements, and emails to list servers. Complete cases were analyzed (61% retention rate). COVID-19 distress was assessed using author-created items.
(Troncone et al., 2020)	Cross	Italy	Apr-20	138 youth with type 1 diabetes (52%) and 276 matched controls (59% female). Race/ethnicity N/R	<ul style="list-style-type: none"> 9% of participants with type 1 diabetes and 13% of control participants scored above the cut-off for the EAT, indicating a possible ED. 	<ul style="list-style-type: none"> Complete cases analyzed.

(Continues)

TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
(Trott, Johnstone, Pardhan, Barnett, & Smith, 2021)	Long (retro)	UK	Pre-pandemic Apr-Jul-19 During pandemic Aug-Sept-20	319 adults (84% women); race/ethnicity N/R	<ul style="list-style-type: none"> No difference in rates of probable ED classification (based on EAT-26) from pre to post-lockdown (30% vs. 28%). Levels of ED psychopathology increased significantly from pre to post lockdown. 	<ul style="list-style-type: none"> No description of the recruitment method. No description of attrition rates or potential attrition biases.
(Wang et al., 2021)	Cross	China	May-Jul-20	12,186 children (48% girls); race/ethnicity N/R	<ul style="list-style-type: none"> 31% self-reported a possible eating disorder during the pandemic period. 	<ul style="list-style-type: none"> Participants were recruited from five geographical regions of China, representative of the broader Chinese child population. The authors excluded 122 participants from an entire city as the target sample size was not achieved. Complete cases appeared to be analyzed; little detail on dropout.
(Zhang et al., 2021)	Cross	China	Mar-Apr-20	315 carers for offspring with ED (79% women) and 315 carers for healthy offspring (80% women). Race/ethnicity N/R	<ul style="list-style-type: none"> Carers of offspring with ED reported significantly higher depression, anxiety, and stress, and significantly lower perceived social support than carers for healthy controls. Perceived stress, social support, family conflicts were unique correlates of distress. 	<ul style="list-style-type: none"> Appears to be overlap in the sample in the Guo et al. (2020) paper. Two groups were matched using propensity score matching methods.
(Zhou & Wade, 2021)	Long (retro)	Aus	Pre-pandemic mar-Sep-19 During pandemic Apr-20	Pre-pandemic $n = 41$ adult women with body image concerns. During pandemic $n = 59$ adult women with body image concerns; 88% Caucasian; 6% Asian; 6% other	<ul style="list-style-type: none"> 92% reported engaging in disordered eating in the past month (71% fasting; 71% driven exercise; 65% binge eating; 13% self-induced vomiting; 7% laxative misuse). The percentage who reported disordered eating behaviors increased during COVID-19: Fasting (from 61% to 78% of participants), binge-eating (61% to 68%), vomiting (7% to 	<ul style="list-style-type: none"> Little description of recruitment strategy. No matching of pre and during COVID-19 samples were applied, though groups did not differ on age.

TABLE 1 (Continued)

Study	Design	Country	Data collection	Sample description	Brief summary of relevant findings	Additional comments
					17%), and driven exercise (66% to 75%). <ul style="list-style-type: none"> • Significantly higher weight concerns (WCS), eating disorder psychopathology (EDE-Q global), and negative affect were observed for the pandemic cohort. • Exposure to the pandemic did not interact with treatment condition and pre-post assessment to influence outcomes. 	

Abbreviations: Aus, Australia; Braz, Brazil; Can, Canada; CBT-OB, cognitive-behavior therapy for obesity; Cross, cross-sectional; EAT, Eating Attitudes Test; ED, eating disorders; EDE-Q, Eating Disorder Examination Questionnaire; EDI, Eating Disorders Inventory; Fran, France; Germ, Germany; Leb, Lebanon; long (pros), longitudinal prospective design; long (retro), longitudinal retrospective design; N/R, not reported or unclear; Port, Portugal; SEED, Short Evaluation of Eating Disorders; UK, United Kingdom; US, United States; WCS, Weight Concern Scale.

The following terms were combined and searched for in the title, abstract, and keywords: (“eating disorder*” “eating pathology” “disordered eating” anorexi* bulimi* “binge-eating disorder” “binge eat*” “loss of control eating” purging “compulsive exercise” “driven exercise” “self-induced vomit*” “eating disturbance*” “dietary restriction” OSFED “other specified feeding”) and (COVID-19 SARS-CoV-2 “Severe acute respiratory syndrome coronavirus” 2019nCoV HCoV-19). Reference lists of included papers were also searched to identify any additional studies.

Once all records obtained through databases were combined into a single Endnote library, duplicates were removed. Title and abstracts were then screened by the first author to identify potentially eligible studies. Full texts of articles were then read by the first author to determine whether full inclusion criteria were met.

Studies were included if they were peer-reviewed empirical reports investigating the impact of the COVID-19 pandemic on eating disorders. Impacts on symptoms, mental health and wellbeing, help-seeking, service utilization, and treatment experiences were considered eligible for inclusion. No sample restrictions were applied. Studies were excluded if they focused solely on the impact on risk factors (e.g., body image, negative affect), were qualitative reports or case studies, and were published in languages other than English. While we acknowledge the importance of preprints as a valuable form of evidence, we made an a priori decision to exclude preprints because (a) there are no established guidelines for how to systematically search, locate and evaluate them; and (b) it is possible that significant changes may arise from a preprint version to the final, peer-reviewed version.

2.2 | Data extraction

A coding template was developed to extract necessary data from included studies. The following data were extracted: authors, design, data collection date, county, sample size and description, key findings, and other comments or limitations. Authors J.L. and M.M. extracted these data. Any discrepancies were resolved through discussion.

2.3 | Data synthesis

Given the heterogeneity of included studies, a qualitative synthesis was performed on six broad themes outlined in Section 3. Themes were developed after extensive discussion among the authors, following completion of data extraction.

3 | RESULTS

3.1 | Study characteristics

The search resulted in 860 records, and an additional three papers were identified through reference lists. Of these, 99 were included for full text review, resulting in a total of 70 included papers (see Figure 1). Study characteristics of these 70 papers are included in Tables 1 and 2.

To briefly summarize the study characteristics, two-thirds of included studies employed a cross-sectional design. Most studies

TABLE 2 Characteristics and findings summary of studies that sampled a clinical cohort

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
(Akgül et al., 2021)	Cross	Turk	May–Jun-20	38 adolescents (95% girls); AN-restrict (68%); AN-binge-purge (13%); atypical AN (8%); BN (8%); OSFED (2%); race/ethnicity N/R	<ul style="list-style-type: none"> • 21% reported that their ED overall was worse because of lockdown. • 53% reported that lockdown affected their access to mental healthcare. • 37% spent more time trying to control their weight/shape during lockdown. • 37% reported that their general and ED-specific quality of life had been negatively affected by lockdown. 	<ul style="list-style-type: none"> • Unclear how ED was confirmed. • Items were self-created. • Regressions were conducted to explore correlates of symptom deterioration, but variables modeled were not clear.
(Baenas et al., 2020)	Long (retro))	Spain	Prelockdown unclear During lockdown Apr-20	74 adult treatment-seeking patients confirmed via interview (96% women); <i>n</i> = 19 AN; <i>n</i> = 12 BN; <i>n</i> = 10 BED; <i>n</i> = 33 OSFED. race/ethnicity N/R	<ul style="list-style-type: none"> • 19 patients self-reported symptom deterioration while 55 self-reported no change in symptoms during the lockdown. • Depressive & anxiety symptoms were associated with symptom deterioration during lockdown. • 41% and 29% of participants reported significant symptoms with anxiety and depression, respectively. 	<ul style="list-style-type: none"> • Data were collected via telephone interview. • Description of missing data was missing. • Symptom deterioration items were self-created.
(Branley-Bell & Talbot, 2020)	Cross	UK	Apr-20	129 community-based adolescents/adults with current ED or recovering from ED based on self-report (94% females). Race/ethnicity N/R	<ul style="list-style-type: none"> • 87% reported that their symptoms had worsened, with 30% reporting that their symptoms were “much worse” because of the pandemic. 	<ul style="list-style-type: none"> • Recruitment targeted towards social media advertisements and snowballing methods. • Description of missing data was lacking.
(Brothwood, Baudinet, Stewart, & Simic, 2021)	Cross	UK	Mar–Nov-20	14 adolescents with AN and 19 parents participating in an intensive treatment program (93% female). Race/ethnicity N/R	<ul style="list-style-type: none"> • 16% of young people perceived online family therapy sessions to be more helpful than face-to-face family therapy sessions. • 8% of young people perceived online individual therapy sessions to be more helpful than face-to- 	<ul style="list-style-type: none"> • Survey response rate was 58% for young people and 37% for parents. • Unclear how ED diagnosis was confirmed. • Items were self-created for the purpose of this study.

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
					<ul style="list-style-type: none"> face individual sessions. Parents generally rated online therapy higher than the young people. Many young people felt that the quality of treatment was impacted by transitioning to online. 	
(Castellini et al., 2020)	Long (retro)	Italy	Pre-pandemic Jan–Sept-19 During pandemic Apr–May-20	74 treatment-seeking adults with BN/AN confirmed via interview (100% women) 97 healthy controls (100% female); 100% white; other races/ethnicities N/R	<ul style="list-style-type: none"> A significant increase in binge eating and compensatory behaviors (but not total levels of ED psychopathology) was observed from before to during the lockdown in people with ED. 10 patients who were considered recovered prior to the pandemic had relapsed during the lockdown. 	<ul style="list-style-type: none"> Clinical sample was assessed pretreatment, before lockdown, and during lockdown. Control group was matched on gender and age (but not on living situation or education level) to clinical group and recruited via “local advertisements” Only complete cases were analyzed. Regressions were conducted to explore correlates of symptom deterioration, but the variables modeled were not clear.
(Favreau et al., 2021)	Cross	Germ	Apr–Dec-20	88 individuals with AN and 30 with BN drawn from a large sample of 538 psychiatric inpatients (70% women). Race/ethnicity N/R	<ul style="list-style-type: none"> 35% and 23% of patients with AN and BN strongly agreed that their symptoms had worsened during the pandemic, respectively. Ratings of perceived burden of contact restrictions were higher for AN and BN relative to individuals with anxiety disorder. Daily structuring as a coping strategy was perceived to be more helpful by people with AN relative to people with depression and OCD. 	<ul style="list-style-type: none"> Completion rate for the online survey was 64%; unclear how partial completers were handled. All participants received inpatient treatment at six hospitals in Germany during COVID-19. Unclear how diagnoses were established. Items were self-created.

(Continues)

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
(Fernandez-Aranda et al., 2020)	Cross	Spain	Jun–Jul-20	127 adults, including 87 in-patients with an eating disorder ($n = 55$ AN, $n = 18$ BN, $n = 14$ OSFED) and 34 patients with obesity, confirmed by interviews (86% women). Race/ethnicity N/R	<ul style="list-style-type: none"> For people with AN (but not for BN and OSFED), significant reductions after COVID-19 confinement were observed for factors “impact on eating symptoms,” “changes in eating style,” and “changes in emotion regulation” from the COVID isolation eating scale. There were no significant differences in telemedicine acceptability ratings between AN, BN, and OSFED. 	<ul style="list-style-type: none"> Recruitment occurred at six different child/adolescent units in Spain, which are representative of the public and private health sectors in Barcelona. The self-created COVID isolation eating scale asks participants to rate their symptoms twice, once before confinement and one after confinement. Retrospective recall likely a significant bias in this study. Unclear whether missing data were present or how it was handled.
(Giel, Schurr, Zipfel, Junne, & Schag, 2021)	Long (retro)	Germ	Pre-pandemic May–Jun-17 During pandemic May–Jul-20	42 adults with BED who previously participated in an RCT, confirmed via interview (80% women). Race/ethnicity N/R	<ul style="list-style-type: none"> Confirmed BED cases were lower after the lockdown period compared to prelockdown period (50% vs. 100%). A significant increase in binge eating was observed for the 4 weeks during lockdown as compared to immediately before COVID-19 outbreak. Self-reported ED psychopathology (EDE-Q global) at the lockdown follow-up was higher as compared to both previous assessments (when entering the trial and prelockdown). Fewer individuals fulfilled a comorbid mental health diagnosis after COVID-19 lockdown (8%) as compared to pre-pandemic time-points (23%). 	<ul style="list-style-type: none"> 52% retention rate for the follow-up period after COVID-19 lockdowns. Description of missing data was lacking.

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
(Graell et al., 2020)	Long (retro)	Spain	Mar–May-20	Medical records of children and adolescents with ED seeking treatment before ($n = 22$) and during the confinement period ($n = 22$; 100% female). Race/ethnicity N/R	<ul style="list-style-type: none"> • During confinement period, 1818 outpatient contacts were carried out (73% by phone and 27% face-to-face). • 22 patients were newly admitted and 68 emergencies were treated. • 42% of patients reported a reactivation of symptoms due to COVID-19. • 68.2% of patients and their families identified the onset of confinement as a possible precipitating factor for admission. • On admission 45.5% of patients presented irritability and 22.7% presented mood disturbances due to confinement. • Higher rates of comorbidities, affective disorders and suicide risk were observed in the pandemic compared to pre-pandemic periods (number of admissions and source of referrals did not differ between the two periods). 	<ul style="list-style-type: none"> • Records presented from outpatient, day hospital and inpatient program of the Child & Adolescent Eating Disorders Unit of the hospital Infantil Universitario Niño Jesús in Madrid during the 8 weeks of confinement.
(Hansen et al., 2021)	Long (retro)	NZ	Pre-pandemic Jan–Dec-19 During pandemic 2020 period	236 electronic records of child, adolescent, and adult inpatient and outpatient admissions pre-pandemic postpandemic (95% female); 94% European; 6% Māori; 2% other	<ul style="list-style-type: none"> • 2020 monthly admission numbers were higher than in the corresponding month in 2019, with a noticeable rise in march–April (first lockdown). • Overall inpatient admissions doubled in 2020 compared to 2019 for adults but not for children. • Adults and children doubled in the proportion of first- 	<ul style="list-style-type: none"> • Clinical records were gathered from referrals for eating disorders in the Waikato District health board catchment.

(Continues)

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
					<ul style="list-style-type: none"> ever admissions during pandemic period (mainly in the second half of 2020). Child and adolescent outpatient services saw an average 60% increase in referrals per month following lockdown. 	
(Leenaerts, Vaessen, Ceccarini, & Vrieze, 2021)	Long (pros)	Belg	Unclear	15 adults with BN confirmed via interview (100% women); 87% European 13% Asian	<ul style="list-style-type: none"> During lockdown, patients reported higher levels of negative affect and lower levels of positive affect. Patients who experienced a higher binge eating frequency during the lockdown also experienced a stronger change in negative and positive affect. Time spent at home, and time spent with family, housemates, partner were unrelated to binge eating during lockdown periods. 	<ul style="list-style-type: none"> Subset of participants extracted from larger study; unclear why this sub-sample was used. Eight signals over nine days were sent to participants to respond to EMA items. Very small sample size.
(Levinson, Spoor, Keshishian, & Pruitt, 2021)	Long (pros)	US	Pre-pandemic Mar-2018/2020 During pandemic Mar-2020–Jan-2021	93 treatment-seeking adults confirmed via interview (86% women) who received either in-person or telemedicine treatment (43% AN; 10% BN; 34% OSFED; 9% BED; 2% ARFID); 95% white; 2% black; 1% Asian; 1% mixed race	<ul style="list-style-type: none"> Both groups (telemedicine & face-to-face) reported significant improvements in ED psychopathology (EDE-Q global), depressive symptoms and perfectionism scores, with no between-group differences noted. 	<ul style="list-style-type: none"> The two cohorts did not differ on clinical variables except parental criticisms; unclear whether the two cohorts were matched on demographic variables. The two treatment groups were identical in content. Missing data/attrition not mentioned.
(Lewis, Elran-Barak, Grundman-Shem Tov, & Zubery, 2021)	Cross	Israel	Apr–May-20	63 treatment-seeking individuals (90% women); 38% AN; 32% BN; 25% BED. race/ethnicity N/R	<ul style="list-style-type: none"> ~40% agreed that the transition to online treatment adversely affected the quality of care and the effectiveness of treatment. 9% would prefer to continue to use online treatment than face-to-face treatment. 	<ul style="list-style-type: none"> Diagnoses determined via clinical discussions. 80% survey completion rate (description of missing data was lacking) Items were self-created.

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
					<ul style="list-style-type: none"> The only correlate of positive perceptions of online treatment transition was a longer duration of illness. 	
(Lin et al., 2021)	Long (retro)	US	Pre-pandemic Jan-2018–Mar-2020 During pandemic Apr-2020–Feb-2021	Service utilization data were analyzed (no participant information provided)	<ul style="list-style-type: none"> At the onset of the pandemic, there was no immediate shift in number of inpatient medical admissions and inpatient bed-days; however, at post-pandemic periods, number of admissions per month increased over time. Completed new outpatient assessments began increasing over time as the pandemic continued. Pre-pandemic patient inquiries were stable over time, while post-pandemic inquiries increased. 	<ul style="list-style-type: none"> ED program is within a tertiary care children's hospital in Boston caring for patients approximately 8–26 years old with any ED diagnosis.
(Machado et al., 2020)	Long (retro)	Port	Pre-pandemic unclear During pandemic Apr–May-20	43 adults (95% women) patients (46% AN; 32% BN; 5% BED; 16% OSFED). Race/ethnicity N/R	<ul style="list-style-type: none"> Level of ED psychopathology (EDE-Q global), impairment and emotion dysregulation did not change over time (pre to during pandemic). Coronavirus impact scale scores were significantly associated with each criterion variable 58% reported moderate/severe stress related to the pandemic, 16% reported family conflict related to the pandemic, 37% reported abrupt changes to mental health care access. 	<ul style="list-style-type: none"> Participants recruited from an ongoing naturalistic study (45% agreed to participate). Assessments were conducted via telephone. Not clear how ED diagnosis was confirmed or when the first assessment was conducted.
(Mansfield et al., 2021)	Long (retro)	UK	Pre-pandemic Jan-2017/2019	> 10 million electronic records of adult health care contacts	<ul style="list-style-type: none"> There was a reduction in general practitioner contact 	<ul style="list-style-type: none"> Records were based on anyone over age 11 years.

(Continues)

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
			During pandemic Aug-20	(50% women); 49% white; 5% south Asian; 3% black; 2% other; 1% mixed	behavior for EDs when comparing pre and during pandemic time periods.	
(Monteleone et al., 2021)	Cross	Italy	Jun-20	312 adults with ED confirmed via interview (96% women); 57% AN; 27% BN; 15% BED; 7% OSFED. race/ethnicity N/R	<ul style="list-style-type: none"> • Ineffectiveness, impulsivity, and self-induced vomiting were higher both during and after lockdown relative to pre-COVID-19 periods. • Social security, body dissatisfaction and binge eating scores were higher during lockdown compared to after lockdown periods. 	<ul style="list-style-type: none"> • Participants answered survey items in relation to three time-periods (prior, during, and after lockdowns). • Description of missing data was lacking. • Items were adapted from previously established surveys.
(Pensgaard, Oevreboe, & Ivarsson, 2021)	Long (pros)	Italy	T1 Mar-Apr-2020 T2 Jun-2020	40 treatment-seeking patients confirmed by interview (98% women); <i>n</i> = 22 AN; <i>n</i> = 22 BED; <i>n</i> = 15 BN. Race/ethnicity N/R	<ul style="list-style-type: none"> • Restrictive eating and depression, anxiety and stress scores did not change from pre to during lockdown periods among the clinical sample, but loss of control eating, body image concerns, and psychological wellbeing scores improved 	<ul style="list-style-type: none"> • Dropouts differed to completers only on a measure of food preoccupation.
(Plumley, Kristensen, & Jenkins, 2021)	Long (pros)	UK	Unclear	9 patients with AN undergoing day-patient treatment virtually (89% women); 77% white; other races/ethnicities N/R	<ul style="list-style-type: none"> • Patients transitioning to a day-patient program online (i.e., videoconferencing) experienced large improvements in core ED symptoms, and depression and anxiety symptoms. 	<ul style="list-style-type: none"> • Conclusions are difficult due to the very small sample size.
(Raykos, Erceg-Hurn, Hill, Campbell, & McEvoy, 2021)	Long (pros)	Aus	Mar-Apr-20	25 treatment-seeking patients (93% women) confirmed via interview; 48% AN; 20% BN; 28% OSFED; 4% UFED. 70% Anglo-European-Australian; other races/ethnicities N/R.	<ul style="list-style-type: none"> • Participants who were forced to transition to telehealth experienced large reductions in ED psychopathology, impairment, and mood states. • The level of change from telehealth was almost identical to historical benchmarks at the same clinic (face-to-face treatment). 	<ul style="list-style-type: none"> • Unclear whether historical benchmarks were matched on key demographics, although they did not differ on symptom severity. • Different treatment approaches were delivered based on the age and diagnosis of the patient.

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
(Richardson, Patton, Phillips, & Paslakis, 2020)	Long (retro)	Can	Pre-pandemic Mar–Apr-2018/2019 During pandemic Mar–Apr-20	All individuals (87% female) who contacted NEDIC through the helpline or instant chat function (demographic info N/R).	<ul style="list-style-type: none"> • 71% perceived telehealth to be as good as or better than face-to-face treatment. • The quality of the therapeutic relationship during telehealth sessions was rated as being “as good as usual” (88%). 	<ul style="list-style-type: none"> • NEDIC is a national non-profit organization (Canada) that uses free helpline and instant chat services to assist those affected by ED.
					<ul style="list-style-type: none"> • NEDIC was contacted 609 times (120 calls, 418 instant chats, 71 emails) during the pandemic period; most were for support (64%) or referral (20%), and 78% of help-seekers were women. • Number of NEDIC contacts was higher during the pandemic period than during a 2018 (but not 2019) period. • Most affect people using NEDIC services were women (86%), and the most prevalent diagnoses were AN (31%) and BED (41%). • Self-reported symptoms of dieting, over-exercising, perfectionism, purging, depression and anxiety were higher in the pandemic period compared to pre-pandemic periods (no differences in binge eating and weight preoccupation). • 73% of people who contacted NEDIC because of COVID-19 reported that their symptoms had gotten worse during isolation. 	

(Continues)

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
(Schlegl, Maier, et al., 2020)	Cross	Germ	May-20	159 former inpatients with AN (100% women). Race/ethnicity N/R	<ul style="list-style-type: none"> • 41% agreed/strongly agreed that their symptoms were worse during the pandemic; 20% agreed/strongly agreed that they developed new symptoms; 51% agreed/strongly agreed that their quality of life had worsened; 27% agreed/strongly agreed that their therapy was impaired. • The percentage stating that the following symptoms had worsened “much more” during the pandemic was: Drive for thinness (28%), fear of weight gain (36%), body dissatisfaction (35%), eating concerns (42%), shape and weight concerns (~30%), restrictive eating (14%), binge eating (4%), self-induced vomiting (6%), laxative and diuretic abuse (2%). • Feelings of sadness (30%), loss of pleasure (30%), interest (22%) and energy (28%), loneliness (41%), and symptoms of anxiety (>10%) had worsened during the pandemic. • 28% of the total sample agreed/strongly agreed that the pandemic had impacted their treatment experience. 	<ul style="list-style-type: none"> • Participation rate was 59% overall. • Items were self-created. • Description of missing data was lacking.
(Schlegl, Meule, et al., 2020)	Cross	Germ	May-20	55 former inpatients with BN confirmed via interview (100% female) Race/ethnicity = N/A	<ul style="list-style-type: none"> • 49% reported that their ED had worsened during the pandemic; 61% reported that their quality of life had 	<ul style="list-style-type: none"> • 25% survey completion rate among all participants invited. • Survey was self-created.

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
					<p>been negatively affected; 45% reported significant disruptions to their treatment; 40% reported that they had developed new symptoms; >75% reported more pronounced symptoms of depression and general psychopathology.</p> <ul style="list-style-type: none"> • >80% reported increases in eating, shape and weight concerns, fear of weight gain, and drive for thinness. • Binge eating increased in 47% of patients, self-induced vomiting in 36%, and laxative and diuretic abuse increased in 9% and 7% of patients, respectively. • Use of videoconference-based therapy increased from 3.6% to 21.8% and use of telephone contacts from 18.2% to 38.2%, whereas the use of additional online interventions decreased from 3.6% to 0%. • 45% of the total sample agreed/strongly agreed that the pandemic had impacted their treatment experience. 	<ul style="list-style-type: none"> • Description of missing data was lacking.
(Shaw et al., 2021)	Long (retro)	UK	Pre-pandemic Mar-Jul-19 During pandemic Mar-Jul-20	Service evaluation conducted at the eating disorder young person service (UK), including 12 adolescent patients with an ED, 19 parents/carers, and 12 staff members. Gender /race/ethnicity N/R	<ul style="list-style-type: none"> • Number of urgent referrals increased to 35% from March–July (2020) compared to 21% in the same period in 2019. • The number of appointments offered increased during the lockdown period ($M = 402.4$, 	<ul style="list-style-type: none"> • Authors created their own items for purpose of the study.

(Continues)

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
					<p>$SD = 37.9$) compared to the previous months prior ($M = 265$, $SD = 37.2$).</p> <ul style="list-style-type: none"> 92% of service staff disagreed that young patients were coping with COVID-19, while 26% of carers and 16% of patients disagreed that they were coping better. Patient satisfaction ratings slightly increased during COVID-19, but carers and staff ratings slightly decreased. 	
(Spettigue et al., 2021)	Long (retro)	Can	Pre-pandemic Apr–Oct-19 During pandemic Apr–Oct-20	91 adolescents (43 pre-pandemic and 48 during pandemic) with an ED (83% female); ~85% AN. Race/ethnicity N/R	<ul style="list-style-type: none"> 39% reported that their ED was triggered by the pandemic. Those who had their ED triggered had a lower BMI, were more medically unstable, and were more likely to be admitted four weeks after assessment than a 2019 cohort and those who were not triggered by COVID-19. The cohort exposed to the pandemic reported higher dietary restraint and impairment scores than a separate pre-pandemic cohort; no differences on other symptom measures were observed. 	<ul style="list-style-type: none"> The two cohorts differed on BMI but not on gender distribution or age. Extent and handling of missing data were not clear.
(Spigel et al., 2021)	Cross	US	Jul-20	73 treatment-seeking young people with self-reported ED (93% female); white = 79%; Asian = 7%; Hispanic = 6%; black = 1% mixed race = 6%; other = 1%.	<ul style="list-style-type: none"> 32% reported a disruption to treatment as a result of the pandemic. 67% with telehealth access found care to be better or as good as usual. 81% endorsed increased intrusive eating disorder thoughts and behaviors due to the pandemic. 	<ul style="list-style-type: none"> Authors created their own items for purpose of the study.

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
(Stewart et al., 2021)	Cross	UK	May–Jul-20	53 adolescents with an ED (AN/OSFED), 75 parents, and 23 clinicians. Gender /race/ethnicity N/R	<ul style="list-style-type: none"> Those who perceived treatment disruption and still had access to care had a higher odds of intrusive ED thoughts. Clinicians perceived the levels of engagement from their patient were not changed by the transition to online treatment. Young people and parent's indicated that their overall experience of online therapy was positive and that they felt understood, with a low level of impact of technology on their treatment experience. Both parents and young people indicated little impact on the therapeutic relationship when transitioning to online treatment. Parents were more likely to opt for online treatment preferences compared to the patients when restrictions ease (17% vs. 6%). 	<ul style="list-style-type: none"> All clinicians, patients and parents from Maudsley Centre for Child and Adolescent Eating Disorders were invited. Survey completion rate was 33% for young patients, 47% for parents, and 66% clinicians. Description of missing data was lacking. All responses were based on retrospective recall Items were self-created for the purpose of this study
(Taquet, Geddes, Luciano, & Harrison, 2021)	Long (retro)	US	Pre-pandemic 2017–2020 During pandemic 2020–2021	> 5 million electronic health records of adolescent patients (55% female; 8,471 diagnoses with an ED during the pandemic period).	<ul style="list-style-type: none"> During the pandemic, an increase of ED diagnoses of 15% was observed compared with the prior year, with significant excesses observed in each 2-month period during the pandemic period except for March–May 2020. Increased risk was observed for females, those aged 10–19 years, and mostly affected AN diagnoses. 	<ul style="list-style-type: none"> Records were drawn from a federated EHR network with anonymized data from 81 million patients (93% from the US) seeking hospital, primary care and specialist provider services

(Continues)

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
(Termorshuizen et al., 2020)	Cross	US	Apr-20	511 adults from the US (97% women) and 510 adults from Netherlands (99% women) who self-reported a current or lifetime ED. race/ethnicity N/R	<ul style="list-style-type: none"> Compared to those diagnosed with an ED in the past 3 years, those diagnosed during the pandemic were at higher risk of attempting suicide and having suicidal ideation (no differences in death rates). Between 3–53% of the total sample reported being “very concerned” about the impact of COVID-19 on their ED depending on the specific item asked. Most common reasons for concern levels were “lack of structure,” “triggering environment,” and “lack of social support.” Percentage of participants who reported engaging in specific ED behaviors daily due to the pandemic was: 5–6% for binge eating, 14–19% for restriction, 15% for compensatory behaviors, and 28% for exercise anxiety. >50% of the total sample reported that they were worried that COVID-19 was going to impact their mental health. 47% of patients in the US and 74% in Netherlands rated their treatment in the last 2 weeks as “somewhat” or “much worse” than usual 	<ul style="list-style-type: none"> Recruitment was aimed at social media or via emails to participants from other studies. Items were self-created. Description of missing data was lacking.
(Vitagliano et al., 2021)	Cross	US	Jun–Aug-20	89 younger individuals with a self-reported ED (89% women);	<ul style="list-style-type: none"> 73% reported an increase in depressive symptoms due to 	<ul style="list-style-type: none"> Items were self-created for the purpose of this study, but adapted

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
				78% white; other races/ethnicities N/R	<p>COVID-19, 77% reported an increase in anxiety, 80% reported an increase in isolation and 74% reported an increase in intrusive eating disorder thoughts.</p> <ul style="list-style-type: none"> • 29% reported a decrease in motivation to recover due to the pandemic. • Living in a triggering environment was correlated with intrusive ED thoughts, reported increases in depression/anxiety, and lower motivation to recover. 	<p>from previously published work.</p> <ul style="list-style-type: none"> • Participants were a sub-sample from a larger study (56% response rate). • Completers did not differ to dropouts on age at enrolment, race/ethnicity, or sex, but did differ in restrictive ED rates.
(Vuillier, May, Greville-Harris, Surman, & Moseley, 2021)	Cross	UK	Unclear	207 adults with a self-reported ED (64% women); 94% white; 5% Asian; 0.5% black; 0.5% Asian	<ul style="list-style-type: none"> • 83% reported that their ED symptoms had worsened as a result of the pandemic, with no differences between ED subtypes. • Changes to routine, changes to physical activity, and difficulties with emotion regulation were cited as the three most influential exacerbating factors. 	<ul style="list-style-type: none"> • Participants recruited through prolific website and social media. • Items were self-created. • Description of missing data was unclear.
(Yaffa et al., 2021)	Long (retro)	Israel	Pre-pandemic 2015–2019 During pandemic Jan–Oct-20	Service data at a pediatric ED treatment Centre in Israel. sample demographics N/R	<ul style="list-style-type: none"> • Compared to means reported for the period of 2015–2019, means reported for 2020 were higher for number of treatment sessions offered (5,926 vs. 4,001), and meetings with a psychiatrist (662 vs. 433), clinical nutritionist (1,722 vs. 750), and mental health professional (3,318 vs. 1,690). The mean number of existing (242 vs. 257) and new patients (127 vs. 	<ul style="list-style-type: none"> • The ED treatment Centre offers inpatient, day care, and ambulatory services for children and adolescents with EDs.

(Continues)

TABLE 2 (Continued)

Study	Design	Country	Date	Sample	Brief summary of relevant findings	Additional comments
					166) between the two periods were highly similar.	

Abbreviations: AN, anorexia nervosa; Aus, Australia; BED, binge-eating disorder; BN, bulimia nervosa; Braz, Brazil; Can, Canada; Cross, cross-sectional; Fran, France; Germ, Germany; Leb, Lebanon; long (pros), longitudinal prospective design; long (retro), longitudinal retrospective design; N/R, not reported or unclear; NZ, New Zealand; OSFED, other specified feeding or eating disorder; Port, Portugal; UK, United Kingdom; US, United States.

were conducted by researchers in the United States, Italy, United Kingdom, Australia, Germany, and Spain. Across studies, the vast majority of participants identified as female and White/Caucasian. However, reporting of specific racial and ethnic distributions was missing in nearly 75% of studies. Nearly one-third of included studies sampled individuals with an eating disorder; >50% of which were established via semistructured diagnostic interviews, while others were based off self-report or it was not made clear. Most of the studies of non-clinical populations sampled university students or adults/adolescents from the general population. These studies used samples of convenience by relying on social media advertisements or snowballing methods, and participants self-selecting into the study. We note, however, that detailed descriptions of the recruitment strategy were generally lacking across included studies. We refer readers to Tables 1 and 2 for a more detailed description of the samples, recruitment methods, designs, and key findings.

3.2 | Summary of findings

3.2.1 | Suspected eating disorder cases during COVID-19

The first theme identified was the prevalence of possible eating disorder cases among non-clinical samples during the pandemic. Eleven studies (participant $ns = 120-5,378$) investigated this theme by estimating the proportion of participants scoring above an established clinical cut-off on a self-report assessment (Alessi et al., 2020; Buckley et al., 2021; Cecchetto et al., 2021; Chan & Chiu, 2021; Christensen et al., 2021; Flaudias et al., 2020; Kohls et al., 2021; Racine et al., 2021; Thompson & Bardone-Cone, 2021; Troncone et al., 2020; Trott et al., 2021). None of the samples was representative of the wider population, nor were sampling weights applied in any study in attempts to generalize to the wider population. The convenience samples included university students, adults from the community, and individuals with Type 1 or 2 diabetes. Among the five studies using the *Eating Attitudes Test* (Garner & Garfinkel, 1979), the percentage scoring above clinical cut-off ranged from 8–75%, with the two studies with the largest sample size ($n = 306$ and 319) producing prevalence rates of 8 and 28% (Thompson & Bardone-Cone, 2021; Trott et al., 2021). These estimates were comparable to those reported in pre-pandemic studies using the EAT (Al-Adawi, Dorvlo, Burke, Moosa, & Al-Bahlani, 2002). Two studies used the SCOFF

(Morgan, Reid, & Lacey, 1999), one with a sample size of 5,738 (Flaudias et al., 2020) and another with a sample size of 316 (Chan & Chiu, 2021). The former reported a clinical cut-off prevalence of 38% and the latter 26%, which were noticeably higher than some pre-pandemic studies in non-clinical populations (e.g., <13%; Eisenberg, Nicklett, Roeder, & Kirz, 2011). Remaining studies each used a different self-report scale to determine clinical cut-offs, making between-study comparisons difficult.

3.2.2 | Perceived impact of COVID-19 on eating disorder symptoms

The second theme identified was an investigation of the perceived impact of the pandemic on eating disorder or mental health symptoms. Twenty-two studies examined this theme, with 16 studies sampling clinical populations (participant $ns = 12-1,021$; Akgül et al., 2021; Baenas et al., 2020; Branley-Bell & Talbot, 2020; Favreau et al., 2021; Graell et al., 2020; Machado et al., 2020; Quittkat et al., 2020; Richardson et al., 2020; Schlegl, Maier, Meule, & Voderholzer, 2020; Schlegl, Meule, Favreau, & Voderholzer, 2020; Shaw et al., 2021; Spettigue et al., 2021; Spigel et al., 2021; Termorshuizen et al., 2020; Vitagliano et al., 2021; Vuillier et al., 2021) and six studies sampling non-clinical populations (participant $ns = 90-5,469$; Athanasiadis et al., 2021; Buckley et al., 2021; Coimbra et al., 2021; Keel et al., 2020; Phillipou et al., 2020; Robertson et al., 2021). In all cases, the authors developed their own items assessing perceived impacts of COVID-19.

Clinical samples

Among those studies that sampled individuals with an eating disorder, 13 (81%) assessed the perceived impact of the pandemic on participants' eating disorder overall. The percentage of participants who reported a worsening of their eating disorder due to the pandemic ranged from 8 to 78%. The one study to investigate which aspects of the pandemic participants were most concerned about in relation to their eating disorder found that the lack of normal structure and increased time living in a triggering environment contributed to greatest concern levels (Termorshuizen et al., 2020). A second study found that among those who reported that their eating disorder had been negatively impacted by the pandemic, the three most important factors contributing to this were changes to routine, changes to physical activity, and difficulties in regulating emotions (Vuillier et al., 2021).

Seven of the studies with clinical samples (43%) also investigated the perceived impact of the pandemic on *specific* eating disorder symptoms. The percentage of participants who reported that the pandemic had worsened specific symptoms was as follows: binge eating (14–47%), dietary restriction (44–65%), driven exercise (42–50%), compensatory behaviors (7–36%), and body image concerns (29–80%). One study surveyed healthcare providers, asking them to retrospectively recall the perceived impact of the pandemic on their patients' symptoms (Colleluori et al., 2021). Healthcare providers reported that >30% of their patients had experienced an increase in binge eating and compensatory behaviors during this period.

Thirteen studies (81%) also assessed broader mental health impacts of the pandemic in clinical samples, all based on retrospective recall. Each of these studies found a significant percentage (37–80%) of participants with an eating disorder to report a worsening of their general mental health (e.g., symptoms of depression, anxiety, and stress) and wellbeing (e.g., quality of life) due to the pandemic.

Non-clinical samples

Each of the six studies on non-clinical samples (all based on retrospective recall) found a sizeable percentage of participants to report worsening of specific eating disorder symptoms due to the pandemic, including binge eating (20–34%), dietary restriction (25–27%), strict exercise (30%), and concerns with eating, shape and weight (35–61%; Athanasiadis et al., 2021; Buckley et al., 2021; Coimbra et al., 2021; Keel et al., 2020; Phillipou et al., 2020; Robertson et al., 2021).

3.2.3 | Symptom severity pre versus during COVID-19

The third theme identified was a comparison of symptom severity pre versus during the pandemic.

Comparison of different cohorts

Eight studies (participant n s = 48–8,613) assessed a cohort of participants during the pandemic and compared their symptom severity to a different cohort assessed prior to the pandemic (Calugi et al., 2021; Christensen et al., 2021; Kim et al., 2021; Koenig et al., 2021; Muzi et al., 2021; Richardson et al., 2020; Spettigue et al., 2021; Zhou & Wade, 2021). Only three of these studies (37%) reported no significant differences in certain demographic or clinical characteristics between the two cohorts (Calugi et al., 2021; Koenig et al., 2021; Zhou & Wade, 2021). Six of these eight studies (75%) sampled non-clinical populations. Overall, findings were mixed due to heterogeneous sample sizes, target populations, and constructs assessed. Three studies (50%) reported no significant cohort differences in binge eating severity (Calugi et al., 2021; Muzi et al., 2021; Richardson et al., 2020), while one study (16%) observed significantly higher rates of a probable binge-eating-type disorder in the pandemic cohort (14.4%) relative to the pre-pandemic cohort (10.6%) (Kim et al., 2021). One study (16%) found the pandemic cohort to report significantly

higher levels of eating disorder psychopathology (Zhou & Wade, 2021), but this was not replicated in a different study (Koenig et al., 2021). Two studies (33%) found the pandemic cohort to report significantly higher levels of dietary restriction than the pre-pandemic cohort (Richardson et al., 2020; Spettigue et al., 2021).

One noteworthy paper studied the electronic health records of 5.2 million people from the United States to compare the outcomes of eating disorders pre versus during the pandemic period (Taquet et al., 2021). The diagnostic incidence was 15% higher in 2020 compared to 2019, and the increased risk of eating disorders during the pandemic was limited to females, greatest for 10–19 year olds, and mostly affected anorexia nervosa diagnoses. Compared to those diagnosed with an eating disorder prior to the pandemic, those diagnosed during the pandemic were at a significantly higher risk of attempting suicide and having suicidal ideation (Taquet et al., 2021).

Comparisons within the same cohort

Seven longitudinal studies (participant n s = 42–319) investigated the trajectory of symptom change from before to during the pandemic (Baceviciene & Jankauskiene, 2021; Castellini et al., 2020; Giel et al., 2021; Machado et al., 2020; Martínez-de-Quel et al., 2021; Pensgaard et al., 2021; Trott et al., 2021). Four studies used a clinical sample and three used a non-clinical sample of convenience. Studies implemented two time-points, but the time-points from assessment one (ranging from May 2018 to April 2020) to two (ranging from May to October 2020) varied markedly, making between-study comparisons and conclusions difficult. Potential attrition biases were noted in all but one paper (Martínez-de-Quel et al., 2021).

Among the four studies of clinical samples, results were mixed. An increase in binge eating was reported in two studies (50%; Castellini et al., 2020; Giel et al., 2021), but a decrease was reported in one study (25%; Pensgaard et al., 2021). Two studies (50%) reported no change in the level of eating disorder psychopathology (Castellini et al., 2020; Machado et al., 2020), while one study (25%) reported significant increases pre versus during pandemic periods (Giel et al., 2021). Two studies (50%) reported significant improvements in general mental health and wellbeing (Giel et al., 2021; Pensgaard et al., 2021), but two different studies (50%) observed no change over time (Castellini et al., 2020; Machado et al., 2020). Of the three studies of non-clinical participants, only one (33%) reported a significant increase in eating disorder psychopathology during the pandemic period (Trott et al., 2021).

3.2.4 | Pandemic-related correlates of symptom severity

The fourth theme concerned pandemic-related correlates of symptom severity. Fifteen studies investigated this theme; 14 studies investigated cross-sectional relationships (n s = 43–5,738; Castellini et al., 2020; Christensen et al., 2021; Czepczor-Bernat et al., 2021; De Pasquale et al., 2021; Flaudias et al., 2020; Haddad et al., 2020; Jordan et al., 2021; Machado et al., 2020; Racine et al., 2021; Scharmer et al., 2020; Schlegl, Maier, et al., 2020; Schlegl, Meule,

et al., 2020; Simone et al., 2021; Thompson & Bardone-Cone, 2021) and one pilot study of 15 individuals with bulimia nervosa assessed prospective relationships using an experience sampling design (Leenaerts et al., 2021).

The 14 studies investigating cross-sectional correlates are difficult to synthesize and interpret for two main reasons. First, there was limited consistency with respect to the types of correlates and symptoms investigated, and the measures used to assess these. Second, several studies appeared to have omitted reporting non-significant relationships. Seven studies reported significant positive relationships between COVID-19-related fears, anxiety, and stress with various cognitive and behavioral symptoms of eating disorders (Castellini et al., 2020; Czepczor-Bernat et al., 2021; De Pasquale et al., 2021; Flaudias et al., 2020; Haddad et al., 2020; Machado et al., 2020; Scharmer et al., 2020). Two studies each found eating disorder symptoms to be significantly and positively correlated with food insecurity (Christensen et al., 2021; Simone et al., 2021) and financial difficulties (Haddad et al., 2020; Simone et al., 2021). No study explored complex, interactive effects of stressors on symptoms, nor the possibility that impacts of these stressors may be moderated by support structures available to participants. Two studies worth noting enquired about helpful coping strategies implemented during the pandemic among participants with anorexia nervosa (Schlegl, Maier, et al., 2020) and bulimia nervosa (Schlegl, Meule, et al., 2020), finding engagement of daily routines, day planning, participating in enjoyable activities, mild physical activity, and virtual social contact to be rated as most helpful.

3.2.5 | Impacts on carers/parents

The fifth theme concerns the impacts of COVID-19 on carers/parents of younger people with eating disorders. Seven papers reported data on this (Brothwood et al., 2021; Guo et al., 2020; Jordan et al., 2021; Lin et al., 2021; Shaw et al., 2021; Stewart et al., 2021; Zhang et al., 2021), with the stated impacts on carers/parents varying. Two papers (28%) found that carers of young people with an eating disorder reported poorer mental health problems than a matched sample of carers of healthy young people (Guo et al., 2020; Zhang et al., 2021). Furthermore, in one study (14%), 26% of parents disagreed that their child was coping during the pandemic (Shaw et al., 2021), and two studies (28%) reported parents to hold favorable attitudes toward the transition to online treatment for their child (Brothwood et al., 2021; Stewart et al., 2021). One study (14%) also found evidence that parent inquiries to a specialized eating disorder program increased during the pandemic period relative to pre-pandemic periods (Lin et al., 2021).

3.2.6 | Treatment experiences during the COVID-19 pandemic

The final theme synthesizes research related to treatment experiences during the pandemic, including patterns of specialist service usage, patient perceptions treatment, and the preliminary efficacy of virtual treatment.

Specialist service usage

To assess time trends in help-seeking, seven studies analyzed pre and during pandemic record data related to eating disorder services. The services varied in scope, with some being government-funded public health services, private hospitals, and call services. There was evidence for an increase in demand for eating disorder services during the pandemic. Compared to pre-pandemic periods, during pandemic periods were associated with a doubling of inpatient and first-ever eating disorder patient admissions in a New Zealand treatment service (Hansen et al., 2021), a 13% increase in the number of urgent referrals for a UK-based service (Shaw et al., 2021), more treatment sessions offered across centers in the UK and Israel (Shaw et al., 2021; Yaffa et al., 2021), and more US-based specialist service enquiries or contacts (Lin et al., 2021; Richardson et al., 2020). In contrast, one study (14%) found no differences in the number of admissions and referrals from 2019 to 2020 in a specialist service in Madrid (Graell et al., 2020), while another report (14%) of >10 million electronic records of general practitioner contacts found evidence of a reduction in contact behavior for eating disorders when comparing pre and during pandemic time periods (Mansfield et al., 2021).

Patient perceptions of treatment

Nine studies gathered data on patient perceptions of treatment during the pandemic period (Brothwood et al., 2021; Fernandez-Aranda et al., 2020; Lewis et al., 2021; Raykos et al., 2021; Schlegl, Maier, et al., 2020; Schlegl, Meule, et al., 2020; Spigel et al., 2021; Stewart et al., 2021; Termorshuizen et al., 2020). Five studies (55%) found that a sizeable percentage of participants (28–74%) reported that the pandemic had significantly disrupted or negatively impacted their treatment (Lewis et al., 2021; Schlegl, Maier, et al., 2020; Schlegl, Meule, et al., 2020; Spigel et al., 2021; Termorshuizen et al., 2020). A handful of small sample (participant $n_s = 14-73$) studies also gathered data on patient perceptions of transitioning to online treatment. While two studies (50%) found ~65% of patients to rate online treatment as good as face-to-face treatment (Raykos et al., 2021; Spigel et al., 2021), two other studies (50%) found fewer than 10% of patients wanting to remain in online treatment after the pandemic (Lewis et al., 2021; Stewart et al., 2021). None of these studies reported prior experience with, nor expectations of, digital or telehealth treatment options that might help contextualize these findings.

Clinical effects of online treatment

Three non-randomized pilot studies evaluated the preliminary effectiveness of treatment services delivered via digital means (i.e., telehealth, videoconferencing) due to social distancing policies (Levinson et al., 2021; Plumley et al., 2021; Raykos et al., 2021). Although sample sizes were small ($n_s = 9, 25, \text{ and } 93$), each study found the online service to be safe, tolerated, and effective for improving general mental health and eating disorder symptoms from pre- to posttest periods. In two studies (66%), the degree of symptom improvement experienced from the online treatment was highly comparable to historical benchmarks at the same clinic (Levinson et al., 2021; Raykos et al., 2021), highlighting the viability of digitally-delivered treatments during the pandemic.

4 | DISCUSSION

The urgent need to understand the impacts of the COVID-19 pandemic has resulted in a proliferation of research publications in the field of mental health (Akintunde et al., 2021). This rate of knowledge transmission proves challenging for all to quickly—yet reliably—obtain a nuanced understanding of COVID-19 impacts in order to facilitate timely prevention and intervention efforts to individuals or service sectors in greatest need. Here we present a scoping review of the literature on COVID-19 and eating disorders.

4.1 | Key findings

Several patterns were evident across the 70 studies. Despite variability in estimates across studies, eating disorders symptom severity and incidence of probable diagnoses appear to be elevated during COVID-19. These findings were observed whether symptom levels were assessed with or without reference to pre-COVID levels (e.g., Branley-Bell & Talbot, 2020; Phillipou et al., 2020), in comparison to pre-COVID cohorts (e.g., Kim et al., 2021; Taquet et al., 2021), and were also supported by data from healthcare providers (Colleluori et al., 2021). Individuals with an eating disorder also reported broader mental health concerns related to the pandemic (Akgül et al., 2021; Quittkat et al., 2020), suggesting that COVID-19 impacts in this population may not be localized to eating disorder psychopathology. Lack of structure and disrupted routines, greater exposure to environmental triggers, and difficulties regulating emotion were highlighted as possible precipitants for symptom deterioration (Termorshuizen et al., 2020; Vuillier et al., 2021). These findings accord with broader trends of worsening mental health in the community from both cross-sectional and longitudinal studies undertaken amidst COVID-19 (Samji et al. 2021; Vindegaard & Benros, 2020). While findings are also consistent with conclusion drawn from two earlier systematic reviews of COVID-19 impacts on eating disorders (Miniati et al., 2021; Sideli et al., 2021), the present, updated review identified nearly four times as many eligible studies and highlighted much broader impacts of the pandemic on eating disturbances.

Evidence was more limited with respect to COVID-19-related correlates of eating disorder symptoms and the experiences of treatment during the pandemic. In terms of studies investigating COVID-19-specific correlates of symptom severity, a diverse range of variables was assessed (e.g., COVID-related fear, anxiety, stress, etc.); however, there was little overlap of measures or constructs across these studies, as has been also reported in the mental health literature more generally (Ransing et al., 2021). The replicability of these findings therefore remains unclear. For studies assessing treatment experiences and outcomes, evidence was similarly limited, inconsistent, and based on small sample sizes. While studies showed that some patients were accepting of being transferred from face-to-face to telehealth treatment modalities (Raykos et al., 2021; Stewart et al., 2021), others showed that many patients reported dissatisfaction with

online treatment services and a desire to return to traditional delivery modes as soon as possible (Brothwood et al., 2021; Lewis et al., 2021). Despite this dissatisfaction, three uncontrolled pilot studies showed large symptom improvement following the forced transition to online treatment (Levinson et al., 2021; Plumley et al., 2021; Raykos et al., 2021). It is important to point out that expectations of and prior experience with online modes of treatment delivery were not assessed in any of these studies, nor was it clear whether COVID-19 had facilitated the decision to seek help in previously reluctant individuals. These are necessary avenues for future research.

4.2 | Methodological limitations of the existing literature

Present findings must be interpreted considering significant methodological constraints. Most studies were reliant upon participant self-report and employed cross-sectional designs. Comparison to pre-pandemic experiences typically involved retrospective recall or comparison to pre-pandemic cohorts without adequate control of differences between samples (Pierce et al., 2020). Moreover, most studies used online convenience sampling, snowballing, or social media recruitment methods that facilitate wide reach and rapid recruitment at the possible expense of representativeness (i.e., not everyone has access to the Internet, potentially leading to biases toward more affluent or urban populations; Pierce et al., 2020). Few studies utilized multiple recruitment strategies to mitigate these risks, and no study evaluated robustness of findings if survey weights were applied to correct for non-representativeness.

In addition, none of the longitudinal studies explored for effects of attrition bias on observed results. The high—and highly variable—rates of probable eating disorder cases and elevated symptom severity should be interpreted with a high degree of caution, as they are likely overestimated. It is cold comfort that the eating disorder field is not alone in these methodological challenges with extant COVID-19 research (Bramstedt, 2020; Jung et al., 2021). However, we also share optimism expressed by others (e.g., Jung et al., 2021) that higher quality research—which typically takes longer to produce—is likely to become available in the coming months to balance concerns with methodological difficulties of early COVID-19 research. In future reviews, stratifying findings by publication quality and conducting cumulative meta-analyses (Wetterslev, Thorlund, Brok, & Gluud, 2008) may improve our understanding of COVID-19 impacts on eating disorders as new data emerge.

4.3 | Gaps and recommendations for future work

An important theme to emerge from this review was that COVID-19 has exacerbated existing disparities in research on eating disorders. Almost all studies identified in our review derived from countries that are already overrepresented in the field, and so pandemic impacts on eating disorders in developing nations are unclear. Similarly, as most samples primarily comprised Caucasian women, pandemic impacts on minority groups or male populations are also poorly understood. Since

demographic influences on treatment seeking, vaccine uptake, and perceived seriousness of COVID-19 have already been documented (Duan et al., 2020; Özdin & Bayrak Özdin, 2020; Ruiz & Bell, 2021), it is essential that future studies sample diverse population groups to broaden our understanding of COVID-19 impacts on eating disorders.

We observed a clear disconnect between recent priority setting articles in the eating disorder field (e.g., Cooper et al., 2020; Fernández-Aranda et al., 2020; Hart & Wade, 2020) and the largely descriptive COVID-19-related studies conducted to date. Difficulties engaging individuals with eating disorders in treatment, existing strains on healthcare system delivery, and patients' reported challenges navigating treatment pathways are likely exacerbated by COVID-19, yet few studies have investigated these issues. It remains unclear whether increased caseloads resulting from the pandemic reflect an increase in help-seeking, continued low levels of help-seeking but higher incidence of symptomatic individuals, or greater recognition of the problem from the families' perspective due to more time spent in the same household together. Likewise, it is unknown what initiatives have been attempted in healthcare settings to handle possible increases in caseloads, and what insights may be gained from these efforts for enhancing efficiency in healthcare delivery. Artificial intelligence solutions for identifying patterns in case notes and healthcare usage data have been applied in other medical fields (Rajkomar et al., 2018), and could provide insights for eating disorder services. Task shifting to digital health and peer mentoring-based solutions seem obvious solutions but need coordination with traditional treatment services to be realized (Linardon, Cuijpers, Carlbring, Messer, & Fuller-Tyszkiewicz, 2019; Torous et al., 2021). Nascent data in the field of COVID-19 and eating disorders suggests continued resistance to non-traditional delivery modes (Brothwood et al., 2021). Recent efforts to understand who prefers and is most likely to benefit from digital health (Linardon, Messer, Lee, & Rosato, 2020; Linardon, Shatte, Tepper, & Fuller-Tyszkiewicz, 2020) provide necessary data to facilitate online triage systems to safely divert some individuals from face-to-face to online services. However, infrastructure gaps and the lack of centralized, consolidated systems to help individuals navigate through different treatment options and routinely monitor progress remain a glaring need in this field.

The uneven distribution of studies across themes in the present review highlights duplication of research efforts where a field-wide, coordinated approach could yield better data and broader insights. Established principles of open science (Nosek et al., 2015; Open Science Collaboration, 2015) may provide useful here, and, encouragingly, are starting to be adopted in the field of the eating disorders (Burke et al., 2021). For example, preregistration of study protocols with material sharing would help address the issue of the plethora of self-created measurement tools assessing COVID-19 impacts on symptoms, thereby allowing for more accurate and simpler between-study comparisons. Furthermore, there is a role for eating disorder journals and organizations to marshal expert stakeholder representation to facilitate rapid priority-setting exercises and updatable evidence gap maps to better catalyze research efforts based on need. Enhancing

collaboration and coordination of the eating disorder research community will be beneficial both during and beyond the pandemic period.

Finally, the breadth and rapid expansion of eating disorder research identified during COVID-19 increases the difficulty in providing timely, accurate, and comprehensive coverage of the literature. Machine learning-based approaches to accelerate research synthesis and to enable living systematic reviews are emerging and should be adopted (Elliott et al., 2017; Thomas et al., 2017). We should also prioritize recent innovations in effective communication of research findings to stakeholders (e.g., researchers, clinicians, patients and their families, and policy-makers). Data visualization, evidence gap maps, and open access lay summaries of content exemplify recent efforts in other disciplines to reduce research waste, prioritize attention to research gaps, and reduce knowledge-to-translation gaps (Li et al., 2021; Liu et al., 2020).

4.4 | Limitations and conclusion

The present study includes some important limitations. First, this area of research is a very rapidly evolving one, and even though the last search was conducted in August, additional work may now be available. Second, although no limitations were imposed on the search, it is possible that findings were restricted to mostly English speaking or high-income countries, due to the effects of language barriers on the speed of publication.

To conclude, our study highlights the breadth of empirical research that has rapidly accumulated examining the impacts of the COVID-19 pandemic and accompanying disruptions on eating disorders. Together, existing data suggest that eating disorder rates, severity, and comorbidity have increased. However, understanding of potential mechanisms accounting for this is limited by this extant literature being participant self-report or retrospective recall, cross-sectional and descriptive studies, and samples of convenience. Strategic, cohesive, and collaborative efforts to move toward more rigorously designed studies with the capacity to elucidate these pathways are needed. Such efforts may be supported by emerging technology but are also the responsibility of researchers and other stakeholders to implement.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

There are no data associated with this research.

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