COVID-19 Pandemic's Effects on Eating Disorders: A Systematic Review

Kesan Covid 19-Pandemik terhadap Gangguan Pemakanan: Kajian Sistematik

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Abstract

The rapid surge of COVID-19 cases has prompted the implementation of lockdowns and travel restrictions, necessitating individuals to maintain strict physical distancing measures for transmission prevention. However, numerous studies have found that these preventive measures have inadvertently elevated stress levels among individuals, which in turn worsens eating disorder symptoms. Notably, some studies suggested that individuals with eating disorders benefited from the pandemic. Therefore, the current study aims to identify the factors influencing the exacerbation and alleviation of eating disorder symptoms during the COVID-19 pandemic. The studies were conducted through systematic literature review using electronic databases. 104 studies with a total sample size of approximately 35,000 individuals that met the inclusion criteria have been involved in this study. The current findings found both positive and negative impacts of the COVID-19 pandemic on eating disorders symptoms. The themes that have been identified include fear of contagion, changes in social support and interaction, changes in routine, changes in access to treatment, the role of social media, changes in the relationship with food, and improvements in self-care. This study provides a comprehensive understanding of these dynamics, highlighting the complexities of the connection between the COVID-19 pandemic and eating disorder symptoms. Tailored intervention strategies and targeted support programs are essential to address the diverse impacts identified in this study. Future research is needed to focus on the Asian context, older age groups and the paediatric population while also examining specific eating disorders for a more multifaceted understanding of the pandemic's effects.

Keywords: COVID-19, pandemic, lockdown, social distancing, eating disorder symptoms

INTRODUCTION

The Coronavirus disease 2019 (COVID-19) is a highly contagious respiratory illness caused by the severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) (World Health Organization [WHO], 2023). It was first reported in Wuhan, China in late December 2019 and rapidly evolved into a global pandemic as declared by the WHO on 11 March 2020 (WHO, 2020). The symptoms of COVID-19 range from mild respiratory issues to severe pneumonia has generated widespread concern. Crucially, the rapid surge in confirmed cases and mortality rates has necessitated the implementation of robust public health measures to stop the spread of COVID-19 (Gao et al., 2022). These preventive measures primarily centered on reducing person-to-person contact and limiting exposure to the virus to curb its transmission. As COVID-19 spreads through respiratory droplets, measures such as lockdowns, travel

restrictions, and quarantine have been enacted to restrict movement and mitigate the airborne transmission of the virus within the communities, both nationally and globally (Bou-Karroum et al., 2021; Burns et al., 2020; Güner et al., 2020). Additionally, individuals are advised to maintain physical proximity and keep a safe distance from others to minimize the risk of close contact and potential exposure to infected persons (Chu et al., 2020; Girum et al., 2021; Yadegaridehkordi et al., 2023).

In addition to its impact on physical health, the pandemic has had far-reaching effects on mental health, overall well-being and the quality of life on a global scale. Fear of contagion, social isolation, uncertainty about the future, economic pressure and disruptions to daily life have led to an increase in stress, anxiety and depression among the general population (Aksoy et al., 2021; Bellapigna et al., 2023; Birgegård et al., 2021; Branley-Bell & Talbot. 2020; Brown et al., 2021; Clark Bryan et al., 2020; Cooper et al., 2020; Devoe et al., 2023; Feldman et al., 2022; Gao et al., 2022; Lu & Lin, 2021; McCombie et al., 2020; Özenoğlu et al., 2021; Rodgers et al., 2020; Sideli et al., 2021; Spettigue et al., 2021; Vuillier et al., 2021; Zhang, 2021). Notably, individuals with pre-existing mental health issues including eating disorders, are particularly susceptible to these adverse effects (Devoe et al., 2023; Gao et al., 2022; Sideli et al., 2021). In other words, the pandemic has introduced additional challenges for those who have already been diagnosed with conditions like anorexia nervosa, bulimia nervosa or binge eating disorder.

Eating disorders are severe and often life-threatening mental health conditions that involve disordered eating behaviors, an intense preoccupation with food, body weight and body image, as well as significant distress or impairment in daily functioning (Barakat et al., 2023). There are several types of eating disorders listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) but the primary types include anorexia nervosa, bulimia nervosa and binge eating disorder (Qian et al., 2021). Anorexia nervosa is characterized by extreme dietary restriction, an intense fear of gaining weight and a distorted body image (Walsh et al., 2023). Bulimia nervosa involves cycles of binge eating followed by compensatory behaviors such as vomiting or excessive exercise to prevent weight gain (Mohajan & Mohajan, 2023). Binge eating disorder is marked by recurrent episodes of eating large quantities of food, which is usually rapid and uncomfortable, accompanied by a sense of loss of control and distress (Giel et al., 2022). The symptoms of eating disorders can vary widely among individuals, but generally include behaviors such as restrictive eating, binge eating, purging, negative body image, frequent weight changes, excessive exercise as well as excessive thoughts about body image, weight, and food (Haghshomar et al., 2022). Most importantly, these symptoms are often accompanied by psychological issues such as anxiety, depression and low self-esteem (Haghshomar et al., 2022).

The COVID-19 pandemic has created an environment that exacerbates these symptoms. Specifically, lockdowns and social distancing have not only altered individual's daily routines but have also limited their ability to engage in social interactions and attend in-person therapy sessions (Clark Bryan et al., 2020; Birgegård et al., 2021; Branley-Bell & Talbot. 2020; Brown et al., 2021; Feldman et al., 2022; Vuillier et al., 2021). This, in turn, has the potential to diminish their access to crucial support networks (McCombie et al., 2020; Rodgers et al., 2020; Spettigue et al., 2021). Moreover, due to the constraints imposed by lockdown restrictions, most people spend more time on social media as alternative activities are limited (Özenoğlu et al., 2021; Zhang, 2021). This increased exposure to virtual platforms may significantly influence an individual's body image perceptions, fuelling concerns about weight and appearance (Cooper et al., 2020). Most importantly, the societal emphasis on preventing weight gain and the promotion of unrealistic body standards through social media may further intensify the struggles faced by those dealing with eating disorders (Bellapigna et al., 2023). Furthermore, the pandemic outbreak has led to financial challenges and food insecurity, prompting a shift in individuals' relationships with food and influencing their eating behavior (Lu & Lin, 2021). As a result, all of these factors collectively contribute to the exacerbation of eating disorder symptoms, posing challenges to recovery and potentially fostering the development of new cases (Devoe et al., 2023; Gao et al., 2022; Sideli et al., 2021).

While COVID-19 has contributed to an increase in eating disorders, stemming from the challenges posed by lockdowns and social distancing measures, it is crucial to acknowledge the emergence of positive effects. These include a heightened focus on self-care practices, the convenience afforded by online therapy and increased accessibility to online support resources (Chuang & Liao, 2022; Hunter & Gibson, 2021; Marzouki et al., 2021; McCombie et al., 2020; Rodríguez et al., 2023; Shaw et al., 2021; Termorshuizen et al., 2020; Weissman et al., 2020). The recognition of both negative and positive impacts emphasizes the significance of addressing the unique needs of individuals with eating disorders in the ongoing challenges of the pandemic, particularly with regard to mental health (Devoe et al., 2023; Gao et al., 2022; Sideli et al., 2021). Therefore, understanding the complex interactions between COVID-19 and unhealthy eating patterns is essential for developing targeted interventions and support strategies. However, to our knowledge, the existing systematic reviews have predominantly concentrated on the adverse effects of COVID-19 on eating disorder symptoms. Thus, the current study aims to comprehensively review both the negative and positive effects of the COVID-19 pandemic on eating disorder symptoms. The specific objectives of the current study are:

1. To identify potential factors influencing the exacerbation or improvements of eating disorder symptoms during the COVID-19 pandemic.
2. To provide valuable insights for the development of targeted interventions and better preparation in the face of future outbreaks or global health crises.

MATERIALS AND METHODS

The studies were conducted through systematic literature review using electronic databases such as SCOPUS and USMLibrary (university e-library). The main inclusion criteria of the studies are the publication date should fall between January 2020 and January 2024 that specifically examined the footprint of the COVID-19 pandemic on the manifestation of symptoms related to eating disorders. The search for relevant studies was conducted using the following keywords: "COVID-19", "coronavirus", "mental health", "pandemic", "lockdown", "social distancing", "quarantine", "isolation", "eating disorders", "symptoms", "unhealthy eating behaviours", "anorexia nervosa". "bulimia nervosa", "binge-eating disorder", "restrictive eating", "symptom exacerbation", "symptom alleviation", "treatment access", "social media", "body image", "daily routines", "dietary habits", "exercise patterns", "social support", "self-care", "coping strategies", "food insecurity", "financial impact" and "economic stress". Initial search yielded 150 relevant studies and after screening titles, abstracts and the contents, 104 studies were selected for further analysis.

In addition, the group of researchers extracted data from each selected study, to assess eating disorders symptoms and key findings pertaining to the COVID-19 pandemic effects, regardless of it being positive or negative effects. Data extraction was carried out collaboratively by all three reviewers and any discrepancies were resolved through virtual and physical discussion. The software Microsoft Excel was utilized to collect the gathered information and details of the selected studies. The table generated using Microsoft Excel was used to help ensure the data extraction was consistent with the research objectives.

To ensure the reliability of the research synthesis, the researchers employed a comprehensive set of criteria to assess the quality of each study. These criteria encompassed various aspects of study design, methodology and reporting. The methodological quality of each study was examined, considering aspects such as the clarity of research objectives, appropriateness of study design, rigor in data collection and analysis and adherence to ethical guidelines. The researchers examined whether the studies adhered to ethical standards and checked if the studies disclosed potential conflicts of interest.

The researchers conducted a quantitative analysis to identify changes in the eating disorders symptoms during the pandemic. Later, qualitative analysis was performed to examine the contextual factors and psychosocial impacts contributing to observed changes in eating disorder symptoms.

There are notable potential biases in the selected studies, such as overrepresentation of certain age groups or geographical regions such as western countries of Europe and United States. It is important to acknowledge that in certain studies within our selection, the methods used for sampling may not have been completely randomized. The limitations in the generalizability of findings were acknowledged due to the diversity of study designs and populations.

Throughout the reviews, the researchers identified three major themes across the reviewed studies: (1) increased prevalence of eating disorders towards vulnerable individuals during lockdowns, (2) COVID-19 pandemic induced factors have collectively intensified eating disorder symptoms (3) some individuals dealing with eating disorders have discovered unexpected advantages or positive aspects. The conclusion drawn was that the COVID-19 pandemic had a substantial and multifaceted influence on eating disorders symptoms, highlighting the importance of mental health support and intervention during public health crises.

The researchers adhered to the chosen academic citation style APA 7th Edition (2020) to ensure the accurate and proper citation of all 104 selected studies. All citations are accurately referenced and references are cross-checked by all three researchers to ensure completeness.

RESULTS

The systematic search initially yielded a total of 150 studies. Following the application of inclusion and exclusion criteria based on titles and abstracts, this number was reduced to 110. Subsequently, after a full-text review, 6 studies were excluded due to reasons such as lack of relevant data on COVID-19, eating disorders symptoms or data being outdated. This resulted in a final total of 104 studies being included in the analysis, refer Table 1.

The 104 included studies varied in design, consisting of 68 cross-sectional studies, 4 longitudinal studies, and 32 literature reviews. These studies were predominantly published between the years 2020 and 2024, after the COVID-19 outbreak. Geographically, the studies were diverse, including data from America, Europe, Asia and other global studies. The primary outcomes measured in these studies were the incidence of eating disorders and the alteration in eating disorder symptoms in connection with the pandemic.

The participant demographics were diverse. The age range of participants varied widely from children as young as 10 years old to elderly up to approximately 77 years old, involving a combination of both male and female participants across most studies. The total sample size across all studies summed up to approximately 35000 participants. While the majority of the studies focused on the general population, several specifically included participants previously diagnosed with eating disorders. The settings of these studies included clinical environments, online communities, targeted population and general population surveys.

Table 1 Descriptions of Studies Reviewed

Author	Year	Country	Types of ED included	N	Age	Gender	Technique(s) used
Aksoy, N., Kabadayi, E., & Alan, A.	2021	-	Healthy eating behaviors	n=688	mean range: 26 - 39	468F, 220M	Quantitative
Alamrawy, R. G., Fadl, N., & Khaled, A.	2021	Egypt	Unhealthy eating behaviors in youth	n = 447	Mean = 20.72 (14-24 years)	70.2% female, 29.8 % male	Quantitative (Online survey)
Al-dmour, H., Masa'deh, R., Salman, A., Abuhashesh, M., & Al-Dmour, R.	2020	Jordan	NA	n=2555	18 and above	1283F, 1272M	Quantitative (online survey)
Ammar, A., Brach, M., Trabelsi, K., Chtourou, H., Boukhris, O., Masmoudi, L., ... & ECLB-COVID19 Consortium.	2020	Asia, Africa, Europe	Unhealthy eating behaviors	n = 1047	-	484 male, 563 female	Quantitative (Online Survey)
Antonova, E., Schlosser, K., Pandey, R., & Kumari, V.	2021	-	Eating disorder symptoms	-	-	-	Literature Review
Bala, R., Srivastava, A., Ningthoujam, G., Potsangbam, T., Oinam, A., & Anal, C.	2020	India	NA	n=767	mean: 45	433F, 334M	Cross-sectional observational study
Bellapigna, C., & Kalibatseva, Z.	2023	United States	Eating Disorders	n=239	mean 24.74	189F, 47M, 3 Others	Quantitative (survey)
Birgegård, A., Abbaspour, A., Borg, S., Clinton, D., Mantilla, E. F., Savva, A., Termorshuizen, J. D., & Bulik, C. M.	2021	Sweeden	AN, BN, BED, OSFED	Wave 1 (n = 982); Wave 2 (n = 646)	Mean = 32.1 (18–77 years old)	2%M, 97%F, 1% non-binary or other	Longitudinal (quantitative + qualitative free-text responses)
Blay-Palmer, A., Carey, R., Valette, E., & Sanderson, M.	2020	-	NA	-	-	-	Literature Review
Bozkurt, F., Yousef, A., Abdeljawad, T., Kalinli, A., & Mdallal, Q.	2021	-	Not specified	-	-	-	Literature Review
Branley-Bell, D., & Talbot, C. V.	2020	UK	Not specified	n = 129	M = 29.27 (16-65 years old)	7M, 121F, 1 (preffered not to disclose)	Cross sectional (Qualitative + quantitative)

continued

Brenner, M., & Bhugra, D.	2020	38 industrialize d countries	NA	-	-	-	Literature Review
Brown, S., Opitz, M. C., Peebles, A. I., Sharpe, H., Duffy, F., & Newman, E.	2021	UK	AN, BED, OSFED	n = 10	Mean = 29.6 (24-38 years)	9 female, 1 identified as non-binary	Qualitative (Interview)
Brown, S., Opitz, M., Peebles, A. I., Sharpe, H., Duffy, F., & Newman, E.	2021	UK	AN, BN, Eating Disorders Not Otherwise Specified	n = 10	Mean = 29.6 (24-38 years old)	9F, 1 non-binary	Cross sectional (Qualitative)
Burtscher, J., Burtscher, M., & Millet, G.	2020	-	Not specified	-	-	-	Literature Review
Caroppo, E., Mazza, M., Sannella, A., Marano, G., Avallone, C., Claro, A. E., ... & Sani, G.	2021	-	Mix	-	-	-	Systematic Reviews
Cecchetto, C., Aiello, M., Gentili, C., Ionta, S., & Osimo, S. A.	2021	Italy	BED	n=365	Mean = 35.09 (18–74 years)	267 women (73.1%)	Quantitative (online survey)
Chan, C. Y., & Chiu, C. Y.	2022	Hong Kong	Unhealthy eating behaviors in general	n = 316	Mean = 25.05	70.9% female, 29.1% male	Quantitative
Chee, M. J., Koziel Ly, N. K., Anisman, H., & Matheson, K.	2020	Canada & US	Unhealthy eating behaviors in general	n = 680	Mean = 36.9	510 females, 155 males, 15 as other	Quantitative (Online survey)
Chuang, H., & Liao, Y.	2022	China	NA	n=340	NA	168F, 172M	Quantitive (snowball, online survey)
Clark Bryan, D., Macdonald, P., Ambwani, S., Cardi, V., Rowlands, K., Willmott, D., & Treasure, J.	2020	UK	AN	n = 49 (patients with AN = 21; carers = 28)	Mean = patients: 25.5 ; carer: 54	8M, 41F	Cross sectional (Qualitative: semi-structured interviews)
Clark Bryan, D., Macdonald, P., Ambwani, S., Cardi, V., Rowlands, K., Willmott, D., & Treasure, J	2020	UK	AN	n = 21 patients with AN, 28 carer	Patients Mean = 25.5 Carers Mean = 54	Patients = 18 female (85.7%) Carers = 23 female (82.1%)	Qualitative (Telephone Interview)
Clay, L., & Rogus, S.	2021	United States	Eating Behaviors	n=525	18 and above	346F, 203M, 5 Others	Quantitative (survey)
Cooper, M., Reilly, E. E., Siegel, J. A., Coniglio, K.,	2020	-	Not Specified	-	-	-	Literature review

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Sadeh-Sharvit, S., Pisetsky, E. M., & Anderson, L. M.							
Cooper, M., Reilly, E., Siegel, J., Coniglio, K., Sadeh-Sharvit, S., Pisetsky, E., & Anderson, L.	2020	-	AN, BN, BED	-	-	-	Literature Review
Cummings, J. R., Ackerman, J. M., Wolfson, J. A., & Gearhardt, A. N. (	2021	US	Unhealthy eating behaviors in general	n = 868 (during COVID-19)	Mean = 39.32	408 men, 449 women, 3 transgender, 5 as fluid	Quantitative
Dąbkowska-Mika, A.	2021	-	AN, BN, BED	-	-	-	Literature Review
Erokhin, V., & Gao, T.	2020	45 Countries	Eating disorder symptoms	-	-	-	Literature Review
Fang, D., Thomsen, M., & Nayga, R.	2021	United States	Eating disorder symptoms	n=2714	18 and older	NA	Quantitative (online survey)
Feldman, M. A., King, C. K., Vitale, S., Denhardt, B., Stroup, S., Reese, J., & Stromberg, S.	2022	United States	AN, AN Atypical	n = 31	Mean = 14.6 (10-21 years old)	4M, 27F	Cross sectional (Retrospective chart review)
Fiorillo, L., Cervino, G., Matarese, M., D'Amico, C., Surace, G., Paduano, V., Fiorillo, M., Moschella, A., Bruna, A., Romano, G., Laudicella, R., Baldari, S., & Cicciu', M.	2020	-	Not specified	-	-	-	Literature Review
Frayn, M., Fojtu, C., & Juarascio, A.	2021	Northeastern United States	BED, BN, OSFED	n = 11	Mean = 42.8	3M, 7F, 1 transgender M	Cross sectional (Qualitative: interview)
Freizinger, M., Jhe, G. B., Dahlberg, S. E., Pluhar, E., Raffoul, A., Slater, W., & Shrier, L. A.	2022	England	BED	n = 39	Mean = 19.3	31 female, 6 male, 1 non-binary, 1 prefer to self- describe	Quantitative (Online Survey)
Gao, Y., Ao, H., Hu, X., Wang, X., Huang, D., Huang, W., Han, Y., Zhou, C., He, L., Lei, X., & Gao, X.	2021	China	Eating disorder symptoms	n=912	mean: 24.34	723F, 189M	Quantitative (survey)

continued

Garcês, C. P., Nunes, S. M., Puga, G. M., & Cheik, N. C.	2023	Brazil	BED	n = 150	Median = 28 (18-60 years)	100% female	Quantitative (Online Survey)
Garcês, C. P., Oliveira e Silva, L., Nunes, S. M., & Cheik, N. C.	2022	-	BED vs general population	n = 323 (194 normal weight; 129 overweight /obese)	Normal weight (Mean = 28.4); Overweight/obese (Mean = 33)	Normal weight = 73.2% female, 26.8% male; Overweight = 58.9% female, 41.1% male	Quantitative
Gómez-Corona, C., Rakotosamimanana, V., Sáenz-Navajas, M., Rodrigues, H., Franco- Luesma, E., Saldaña, E., & Valentin, D.	2021	Mexico, Spain, Peru	Eating disorder symptoms	n=180	mean: 34.5	90F, 90M	Quantitive (snowball, online survey)
Goode, R. W., Malian, H., Samuel-Hodge, C., Noem, T., Coan, D., Takgbajouah, M., Bahena, L., & Bulik, C. M.	2022	Southeastern United States	BED	n = 20	Mean = 43.05	20 F	Cross sectional (Qualitative)
Gordon, C. M., & Katzman, D. K	2020	Singapore	Not Specified	-	-	-	Literature review
Graell, M., Morón-Nozaleda, M. G., Camarneiro, R., Villaseñor, Á., Yáñez, S., Muñoz, R., ... & Faya, M.	2020	Spain	ARFID, AN, BN	Day hospital (n = 27) Outpatient clinic (n = 338)	Mean = 13.18 (Day hospital) Mean = 14.74 (Outpatient clinic)	Day hospital = 92.9% female; Outpatient clinic = 87.3% female	Qualitative
Hu, Y., Ye, B., & Tan, J.	2021	China	NA	n=1334	mean: 20.02	997F, 337M	Quantitative (survey)
Hunter, R., & Gibson, C	2021	UK, Greece and United States of America	AN	n = 12	Mean = 31.8 (21-63 years old)	1M, 11F	Cross sectional (Qualitative: audio-recorded semi-structured interview)
Immordino, G., Jappelli, T., Oliviero, T., & Zazzaro, A.	2021	Italy	NA	-	-	-	Quantitative (survey)
Ioannidis, K., Hook, R. W., Wiedemann, A., Bhatti, J., Czabanowska, K., Roman-	2022	UK	Unhealthy eating behaviors	n = 489	Mean = 23.46	159 male, 330 female	Quantitative (Longitudinal online survey)

continued

Urrestarazu, A., ... & Chamberlain, S. R.							
Jafri, A., Mathe, N., Aglago, E., Konyole, S., Ouédraogo, M., Audain, K., Zongo, U., Laar, A., Johnson, J., & Sanou, D.	2021	82 countries	Eating disorder symptoms	n=1029	median: 35	544F, 462M, 23 Undisclosed	Quantitative (online survey)
Khan, A., Patel, A., & Noorbhai, H.	2023	South Africa	Eating Behaviors	n = 105	18-55 years	Both female and male included but did not specify the exact number	Quantitative
Kim, A. C. H., Du, J., & Andrew, D. P.	2022	US	-	n = 695	Mean = 45.85	60% male, 40% female	Quantitative
Kucharczuk, A., & Oliver, T.	2022	United States	Eating Behaviors	n=14	NA	10F, 4M	Qualitative (Group-interview)
Laborde, D., Martin, W., Swinnen, J., & Vos, R.	2020	-	NA	-	-	-	Literature Review
Latoo, J., Haddad, P., Mistry, M., Wadoo, O., Islam, S., Jan, F., Iqbal, Y., Howseman, T., Riley, D., & Alabdulla, M.	2021	-	NA	-	-	-	Literature Review
Leenaerts, N., Vaessen, T., Ceccarini, J., & Vrieze, E.	2021	Belgium	BN	n=17 (patients with BN)	Mean = 23	100% female	Quantitative
Li, X., & Liu, Q.	2020	China	NA	n=802	mean: 32.65	386F, 416M	Quantitative (online survey)
Lordan, R., Rando, H., Dattol, V., & Greene, C.	2021	-	NA	-	-	-	Literature Review
Lu, X., & Lin, Z.	2021	-	Eating Behaviors	-	-	-	Literature Review
Machado, P. P., Pinto-Bastos, A., Ramos, R., Rodrigues, T. F., Louro, E., Gonçalves, S., Brandão, I., & Vaz, A	2020	Portuguese	AN, BN, BED, others	n = 43	Mean = 27.6 (18-55 years old)	2M, 41F	Cross sectional (Qualitative + quantitative)
Machado, P. P., Pinto-Bastos, A., Ramos, R., Rodrigues, T. F., Louro, E., Gonçalves, S., Brandão, I., & Vaz, A.	2020	Portuguese	AN, BN, BED, other specified	n=43	Mean = 27.60 (18 to 55 years)	95.3 % women	Qualitative + Quantitative

continued

Mannino, G., Salerno, L., Bonfanti, R., Albano, G., & Coco, G.	2021	Italy	Eating disorder symptoms	n=181	mean: 28.69	166F, 15M	Quantitative (online survey)
Marzouki, Y., Aldossari, F., & Veltri, G.	2021	Qatar	NA	n=1279	NA	NA	Quantitive (snowball, online survey)
Mason, T. B., Barrington-Trimis, J., & Leventhal, A. M.	2021	Southern California	Unhealthy eating behaviors in youth	n = 1820	Mean = 19.72	62% women	Quantitative (Online survey)
McMahon, G., Douglas, A., Casey, K., & Ahern, E.	2022	Ireland	-	n = 496	Mean = 28.73 (18 - 73 years)	123 males, 372 females, 1 identified as 'other'	Quantitative (Online survey)
Monteleone, P.	2021	-	Mix	-	-	-	Systematic Reviews
Morres, I. D., Galanis, E., Hatzigeorgiadis, A., Androutsos, O., & Theodorakis, Y.	2021	Greece	Unhealthy eating behaviors	n = 950	Mean = 14.41 (12-17 years)	518 male, 432 female	Quantitative (Online Survey)
Mumtaz, S., Farhat, S., Saeed, R., Younis, S., & Ali, M.	2022	-	BED, eating disorder symptoms	-	-	-	Literature Review
Mumtaz, S., Saeed, R., & Younis, S.	2020	-	Eating disorder symptoms	-	-	-	Literature Review
Muzi, S., Sansò, A., & Pace, C.	2021	Italy	BED, eating disorder symptoms	n=62	mean: 15.43	39F, 23M	Quantitative (survey)
Nagata, J., Ganson, K., Whittle, H., Chu, J., Harris, O., Tsai, A., & Weiser, S.	2021	United States	NA	n=63,674 (U.S. Census Household Pulse Survey)	-	-	Literature Review
Nutley, S. K., Falise, A. M., Henderson, R., Apostolou, V., Mathews, C. A., & Striley, C. W.	2021	worldwide	Eating disorder symptoms	n = 305 posts	-	-	Qualitative (Online discussion through social media platform - Reddit)
Otto, A. K., Jary, J. M., Sturza, J., Miller, C. A., Prohaska, N., Bravender, T., & Van Huysse, J.	2021	US	restrictive EDs: AN, atypical anorexia nervosa, avoidant or restrictive food intake disorder, other specified and unspecified feeding	n = 102 (during pandemic)	Mean = 15.2 (10 - 23 years)	8 males, 92 females, 2 non- binary	Quantitative

continued

			or EDs marked by restriction				
Özenoğlu, A., Çevik, E., Çolak, H., Altıntaş, T., & Alakuş, K.	2021	Turkey	Eating disorder symptoms	n=432	mean: 32.82	312F, 120M	Quantitative (online survey)
Panão, I., & Carraça, E. V.	2020	-	Eating Behaviors	n = 26 research	-	-	Qualitative (Systematic Review)
Parra, M., Castro, L., & Favela, J.	2021	Mexico	Eating disorder symptoms	n=14	mean: 26.6	5F, 9M	Qualitative (interview)
Paslakis, G., Dimitropoulos, G., & Katzman, D.	2020	United States	Eating disorder symptoms	-	-	-	Literature Review
Pasquale, C., Sciacca, F., Conti, D., Pistorio, M., Hichy, Z., Cardullo, R., & Nuovo, S.	2021	Italy	Eating Disorders, BED	n=469	mean: 22.47	248F, 221M	Quantitative (online survey)
Pereira, M., & Oliveira, A.	2020	-	NA	-	-	-	Literature Review
Phillipou, A., Meyer, D., Neill, E., Tan, E. J., Toh, W. L., Van Rheenen, T. E., & Rossell, S. L.	2020	Australia	Mix: included both eating disorders group and general population	n = 5469 (180 of them were diagnosed with ED)	Mean = 30.47	95.6% females, 1.7% male, 2.8% preferred to self-describe	Quantitative (Online survey)
Puccinelli, P. J., da Costa, T. S., Seffrin, A., de Lira, C. A. B., Vancini, R. L., Nikolaidis, P. T., ... & Andrade, M. S.	2021	Brazil	-	n = 1853	Mean = 38.6	1110 female, 743 male	Quantitative
Richardson, C., Patton, M., Phillips, S., & Paslakis, G.	2020	-	AN, BED	n = 609 (individual s affected by EDS = 439; caregivers = 124; profression als = 33; educators, students, or media requests = 13)	Individuals afected by EDS = 26+	Among affected individuals (n = 439): 353F, 32M, 8 transgender, 46 preferred not to disclose	Cross sectional (Qualitative + quantitative)

continued

Robinson, E., Boyland, E., Chisholm, A., Harrold, J., Maloney, N. G., Marty, L., ... & Hardman, C. A.	2021	UK	Unhealthy eating behaviors	n = 2002	Mean = 34.74	61.7% female, 38.3% male	Quantitative
Rodgers, R. F., Lombardo, C., Cerolini, S., Franko, D. L., Omori, M., Fuller-Tyszkiewicz, M., Linardon, J., Courtet, P., & Guillaume, S.	2020	-	Not Specified	-	-	-	Literature review
Rodgers, R. F., Lombardo, C., Cerolini, S., Franko, D. L., Omori, M., Fuller- Tyszkiewicz, M., ... & Guillaume, S.	2020	-	Eating disorder symptoms	-	-	-	Qualitative
Rodgers, R. F., Lombardo, C., Cerolini, S., Franko, D. L., Omori, M., Fuller- Tyszkiewicz, M., Linardon, J., Courtet, P., & Guillaume, S.	2020	-	AN, BN, BED	-	-	-	Literature Review
Rodríguez Guarin, M., Gempeler Rueda, J., Castro, S. M., Ospina, M. M., Villanueva Betancourth, C., Amórtegui, J. P., & Vázquez, L.	2023	Columbia	AN, BN	n = 32 (patients = 14; family members = 10; therapists = 8)	-	-	Cross-sectional (descriptive observational study: survey, semi structured question)
Schlegl, S., Maier, J., Meule, A., & Voderholzer, U.	2020	Germany	AN	n = 159	Mean = 22.42 (14-62 years)	100% female	Quantitative (Online survey)
Shaw, H., Robertson, S., & Ranceva, N.	2021	-	AN, BN, BED	n = 43 (patients = 12; parents/car ers = 19; staff members = 12)	Patients = under the age of 18	-	Cross sectional (Qualitative + quantitative)
Simone, M., Emery, R. L., Hazzard, V. M., Eisenberg, M.	2021	Minnesota, United States	Not specified	n=720	Mean = 24.7	477F, 263M, 10 others	quantitative and qualitative

continued

E., Larson, N., & Neumark-Sztainer, D.							
Skrajnowska, D., Brumer, M., Kankowska, S., Matysek, M., Miazio, N., & Bobrowska-Korczak, B.	2021	-	Not specified	-	-	-	Literature Review
Spettigue, W., Obeid, N., Erbach, M., Feder, S., Finner, N., Harrison, M. E., Isserlin, L., Robinson, A., & Norris, M. L.	2021	Canada	AN, ARFID, AN Atypical, BN, UFED	n = 48	Mean = 14.6	5M, 40F, 1 Trans F, 2 Trans M	Longitudinal
Termorshuizen, J. D., Sun, Q., Borg, S., Mantilla, E. F., Goode, R. W., Peat, C. M., Thornton, L. M., Watson, H., Van Furth, E. F., Birgegård, A., & Bulik, C. M.	2022	United States, Netherlands, and Sweden	AN, BN, BED	n = 1053 (US = 132; NL = 219; SE =702)	Mean = (US = 32.1; NL = NA; SE = 32.3)	US = 2M, 130F; NL = 6M, 213F; SE = 12M, 685F	Longitudinal (Survey)
Termorshuizen, J. D., Watson, H. J., Thornton, L. M., Borg, S., Flatt, R. E., MacDermod, C. M., Harper, L. E., Van Furth, E. F., Peat, C. M., & Bulik, C. M.	2020	United States, Netherlands	AN, BN, BED, AN Atypical, OSFED/EDNOS, Purging disorder, ARFID, Night-eating syndrome	n = 1021 (US = 511; NL = 510)	Mean = young adult (16-over 60 yeards old)	US = 14M, 495F, 2 Intersex; NL = 4M, 506F	Cross sectional (Quantitative measures and free-text responses)
Thompson, K. A., Hedlund, E. L., Sun, Q., Peat, C. M., Goode, R. W., Termorshuizen, J. D., Thornton, L. M., Borg, S., van Furth, E. F., Birgegård, A., Bulik, C. M., & Watson, H. J.	2022	United States, Netherlands, and Sweden	AN, BN, BED	n = 2002 (US = 510; SE = 982; NL = 510)	Mean = (US = 30.7; SE = 32.1; NL = 25% were 6–21, 43% were 22–29, 32% were 30–69, and 1% were 70+ years)	-	Longitudinal (Survey)
Thornton, T., Decker, S., & Roe, E.	2021	United States, Michigan	NA	n=76	Early to mid 20s	Primarily female	Qualitative
Touyz, S., Lacey, H., & Hay, P.	2020	-	Not Specified	-	-	-	Review
Venturo-Conerly, K. E., Wasil, A. R., Dreier, M. J.,	2020	-	AN, BN, OSFED	n = 13	Mean = 32.23	100% female	Qualitative (Interview)

continued

Lipson, S. M., Shingleton, R. M., & Weisz, J. R.							
Vitagliano, J. A., Jhe, G., Milliren, C. E., Lin, J. A., Spigel, R., Freizinger, M., ... & Richmond, T. K.	2021	US	Mix	n = 89	Mean = 18.9	89 % female, 11 % male	Quantitative
Vuillier, L., May, L., Greville-Harris, M., Surman, R., & Moseley, R. L.	2021	UK	AN, BN, BED, or OSFED	n = 207	Mean = 30.0	131F, 76M	Cross sectional (Quantitative + qualitative)
Wang, S. D., Devjani, S., Chillakanti, M., Dunton, G. F., & Mason, T. B.	2021	US	Unhealthy eating behaviors in mothers	n = 197	Mean = 37.6	100% female	Quantitative (Online survey)
Weissman, R. S., Bauer, S., & Thomas, J. J.	2020	-	Not Specified	-	-	-	Literature review
White, H. J., Sharpe, H., & Plateau, C. R.	2023	-	Unhealthy eating behaviors	n = 233	Mean = 20.45 (18-25 years)	100% female	Quantitative
Wolfson, J., & Leung, C.	2020	United States	NA	n=1478	18 and above	745F, 733M	Quantitative (online survey)
Yu, B., Yu, L., & Klionsky, D.	2021	-	Restrictive Eating	-	-	-	Literature Review
Yu, S., Abbas, J., Draghici, A., Negulescu, O., & Ain, N.	2022	Pakistan	NA	n=348	NA	139F, 209M	Quantitative (survey)
Zhang, Y.	2021	China	AN, BN, BED	-	-	-	Literature Review

FINDINGS

Fear of Contagion

The COVID-19 pandemic has brought about unclear information on the virus's persistence in the environment, causing insecurity and fear among people (Fiorillo et al., 2020). Multiple studies showed that the pandemic induced fear in relation to changes in eating behaviors (Aksoy et al., 2021; Bozkurt et al., 2021; Burtscher et al., 2020; Gomez-Corona et al., 2021; Immordino et al., 2021; Lordan et al., 2021; Pasquale et al., 2021; Rodgers et al., 2020; Skrajnowska et al., 2021; Thornton et al., 2021; Yu et al., 2021). The studies examined the influence of the fear of illness and contagion on dietary habits, emphasizing the adoption of restrictive diets for immunity boosting and concerns about food safety.

The onset of the pandemic heightened public fear of contracting the virus, profoundly influencing dietary choices in terms of nutritional intake. A study observed sales of dietary supplements and pharmaceuticals have risen during the pandemic because they are perceived as having "immune-boosting" effects (Lordan et al., 2021). Included were vitamin C, vitamin D and zinc, which are seen as beneficial for respiratory infections and immune health. However, the study stated that there is limited information available regarding the effectiveness of these supplements against the novel coronavirus.

Concerns about the virus's transmission leading to reduction in purchasing and consuming behaviors. Limiting food intake during COVID-19 might accelerate patient recovery, yet rigorous clinical trials are required to validate its advantages (Yu et al., 2021). Gómez-Corona et al. (2021) highlighted a preference for food and beverage was modified after the COVID-19 outbreak. The study also stated that fear can be separated into nine dimensions: government, food supply, basic needs, emotional, overeating, food-delivery, immunity, family conflicts and social (Gómez-Corona et al., 2021). It was positively predicted that these fears are the cause towards modifications in consumers' food choices during the quarantine of the pandemic.

Diet has a notable impact on the progression of COVID-19, as the microbiome and dietary elements contribute to bolstering the immune system, aiding in disease prevention (Skrajnowska et al., 2021). These behavioral changes also had psychological justifications. The research conducted by Pasquale et al. (2021) suggested that the pandemic-induced fear of contagion contributed to the development of restrictive eating behaviors, mirroring patterns seen in certain eating disorders. Tension and anxiety were found to be significantly associated with bulimic behavior. In contrast, depression was linked to interoceptive awareness, impulsivity, and binge eating behaviors, with no variations based on gender (Pasquale et al., 2021). This is further supported by Immordino et al. (2021), who observed a correlation between health-related anxieties and irregular eating patterns throughout the pandemic.

The long-term implications of these changes are significant. The association of certain foods with health and safety, as discussed in Thornton et al., (2021) comprehensive review, might lead to lasting shifts in dietary preferences. The given example was during COVID-19, nursing students encountered fear, anxiety and stress. This led to the nursing community taking a more careful approach towards their dietary intake and might affect them as long as they are working in this industry. Moreover, the potential for increased disordered eating patterns, rooted in health-related anxieties, raises crucial questions about the wider influence of the pandemic on eating behaviors and mental health.

Overall, the pandemic's influence on eating behaviors, driven by the fear of illness and contagion, has both immediate and long-term implications. The shift towards immunity-focused diets and heightened concerns over food safety reflect a broader psychological response to the health crisis. This phenomenon underscores the importance of further research. As indicated by the referenced studies, it is essential to comprehensively grasp the extent of the pandemic's influence on dietary habits and mental health.

Changes in Social Support and Interaction

Another common theme related to the COVID-19 pandemic's effect on eating disorder symptoms, as discovered by seventeen studies, is changes in social support and interaction in response to social isolation and loneliness (Birgegård et al., 2021; Branley-Bell & Talbot. 2020; Brown et al., 2021; Cooper et al., 2020; Frayn et al., 2021; Goode et al., 2022; Gordon & Katzman, 2020; Hunter & Gibson et al., 2021; Machado et al., 2020; McCombie et al., 2020; Richardson et al., 2020; Rodgers et al., 2020; Spettigue et al., 2021; Termorshuizen et al., 2020; Thompson et al., 2022; Touyz et al., 2020; Vuillier et al., 2021).

Studies have found that lockdowns due to the pandemic may force individuals to live alone, limiting access to their support systems and reducing interaction with others (Birgegård et al., 2021; Branley-Bell & Talbot. 2020; Cooper et al., 2020; McCombie et al., 2020; Rodgers et al., 2020; Spettigue et al., 2021). It's not just the absence of social support; even the fear of its absence can worsen the symptoms of eating disorder (Termorshuizen et al., 2020; Thompson et al., 2022).

In contrast, a positive impact of the COVID-19 pandemic on improving eating disorder symptoms is the increased engagement with the individual's support network during the imposed lockdowns together with loved ones, allowing them to allocate more time to their close relationships and boosting motivation to recover (Goode et al., 2022; Termorshuizen et al., 2020; Vuillier et al., 2021). Besides that, a study by Machado et al. (2020) highlighted that, due to the easy accessibility to technology, individuals with eating disorder symptoms can seek support from significant others and support groups through online platforms, which proves beneficial in improving their eating disorder symptoms.

An interesting discovery by Hunter & Gibson (2021) suggests that an increase in social support does not consistently correlate with a decrease in eating disorder symptoms. Individuals with eating disorder symptoms may feel guilty about receiving support, perceiving that seeking safe foods puts loved ones at risk. This guilt may be associated with a perceived need for food, ultimately leading to restricted food intake (Hunter & Gibson, 2021).

Other than that, several studies have indicated that being in quarantine or social isolation might elicit emotions of alone and boredom, hence worsening symptoms of eating disorder (Frayn et al., 2021; Goode et al., 2022; Gordon & Katzman, 2020; Richardson et al., 2020; Rodgers et al., 2020; Touyz et al., 2020). Furthermore, isolation was additionally associated with an inclination to become more preoccupied with food and engage in disordered behavior, increasing the individual's struggle with eating disorder symptoms (Brown et al., 2021). Nevertheless, social isolation and loneliness do not always result in negative effects on eating disorder symptoms. Social isolation and loneliness have been found to have several beneficial implications on reducing symptoms of eating disorders, including individuals often feeling more at ease and free from criticism in relation to their eating habits and less social pressure (Branley-Bell & Talbot. 2020; Goode et al., 2022; McCombie et al., 2020).

Changes in Routine

Thirty-six studies consistently highlighted the changes to routine as a pervasive theme, revealing the negative impact of enforced lockdowns and quarantine on both general populations and individuals with eating disorders throughout the pandemic (Alamrawy et al., 2021; Ammar et al., 2020; Branley-Bell & Talbot, 2020; Brown et al., 2021; Caroppo et al., 2021; Cecchetto et al., 2021; Chan & Chiu, 2022; Chee et al., 2020; Clark et al., 2020; Cummings et al., 2021; Freizinger et al., 2022; Garcês et al., 2022; Garcês et al., 2023; Graell et al., 2020; Ioannidis et al., 2022; Khan et al., 2023; Kim et al., 2022; Leenaerts et al., 2021; Machado et al., 2020; Mason et al., 2021; McMahon et al., 2022; Monteleone, 2021; Morres et al., 2021; Nutley et al., 2021; Otto et al., 2021; Panão & Carraça, 2020; Phillipou et al., 2020; Puccinelli et al., 2021; Robinson et al., 2021; Rodgers et al., 2020; Schlegl et al., 2020; Venturo-Conerly et al., 2020; Vitagliano et al., 2021; Vuillier et al., 2021; Wang et al., 2021; White et al., 2023).

Specifically, lockdowns disrupt the established routines, leading to a loss of structure and predictability in an individual's daily life (Clark Bryan et al., 2020; Vuillier et al., 2021). Numerous research has indicated that individuals who encountered major changes in lifestyle were more susceptible to adverse effects of the pandemic, such as a heightened frequency of binge eating or a more restrictive eating behavior (Phillipou et al., 2020; Cecchetto et al., 2021; Leenaerts et al., 2021; Otto et al., 2021). Therefore, unexpected changes to regular routine (e.g. attending work or school) can be challenging for some individuals and contribute to increased stress and anxiety levels among them (Caroppo et al., 2021; Monteleone, 2021; McMahon et al., 2022). This increased stress prompted by the uncertainties brought on by the pandemic has unfortunately become a trigger for disordered eating behaviors as a coping mechanism (Chee et al., 2020; Cummings et al., 2021; Mason et al., 2021; Wang et al., 2021). As a result, individuals undergo exacerbated eating disorder symptoms due to the alterations in their dietary habits and irregular eating schedules stemming from the disruption of their regular routines (Alamrawy et al, 2021; Chan & Chiu, 2022; Machado et al., 2020; Phillipou et al., 2020; Cecchetto et al., 2021; Leenaerts et al., 2021; Otto et al., 2021).

Moreover, changes in lifestyle patterns and living environments have introduced additional layers of complexity due to mandated lockdowns that necessitate individuals to stay with partners or return to their childhood home after being used to living independently (e.g. young adults) (Vitagliano et al., 2021). While some individuals perceive this change in environment as supportive, others experience distress and find the large amount of time spent at home triggering (Venturo-Conerly et al., 2020; Brown et al., 2021). The study by Vitagliano and her colleagues (2021) revealed a significant correlation between individuals reporting living in a triggering environment and a higher risk of experiencing exacerbated eating disorder symptoms compared to those without concerns about such an environment. Specifically, individuals expressing worries about their eating disorders worsening due to prolonged exposure to a triggering environment exhibited increased intrusive thoughts related to eating disorders and a diminished motivation to pursue recovery (Vitagliano et al., 2021). In addition, some studies found that increased time at home as a result of the pandemic leads to increased family conflict (Graell et al., 2020; Schlegl et al., 2020; Ioannidis et al., 2022). Notably, White and her colleagues (2023) found a significant association between excessive concern from family members regarding an individual's weight and the manifestation of disordered eating behaviors during the pandemic. Specifically, prolonged stress and criticism from family members regarding their weight or shape may lead to the adoption of restrictive eating behaviors (Nutley et al., 2021).

Besides that, the disruption of physical activities due to lockdowns and gym closures adds to the overall changes in routine (Morres et al., 2021; McMahon et al., 2022). Across both the general population and individuals with eating disorders, several studies have reported a significant decrease in physical activity levels and an increase in sedentary behaviors, such as prolonged sitting, during lockdowns (Ammar et al., 2020; Morres et al., 2021; Robinson et al., 2021; Garcês et al., 2022). Notably, the observed decline in the level of physical activity has been found to be associated with a higher degree of psychological distress (Puccinelli et al., 2021; Kim et al., 2022). This impact is particularly pronounced and primarily affects those individuals who typically rely on exercise as a means of stress relief or to address their body dissatisfaction (Panão & Carraça, 2020; Rodgers et al., 2020; Khan et al., 2023). Consequently, individuals facing this disruption might resort to coping mechanisms such as overeating to manage stress or, conversely, adopt restrictive eating habits in an attempt to maintain what they perceive as ideal body weight (Branley-Bell & Talbot, 2020; Phillipou et al., 2020; Freizinger et al., 2022; Garcês et al., 2023). Therefore, the absence of regular exercise opportunities intensifies negative body image perceptions, further exacerbating the eating disorder symptoms.

Changes in Access to Treatment

Seventeen studies have addressed the effect of the COVID-19 pandemic on eating disorder symptoms with reference to the issue of changes in access to treatment (Branley-Bell & Talbot. 2020; Brown et al., 2021; Clark et al., 2020; Cooper et al., 2020; Feldman et al., 2022; Hunter & Gibson et al., 2021; Machado et al., 2020; Richardson et al., 2020; Rodgers et al., 2020; Rodríguez et al., 2023; Shaw et al.,

2021; Spettigue et al., 2021; Termorshuizen et al., 2020; Termorshuizen et al, 2022; Thompson et al., 2022; Vuillier et al., 2021; Weissman et al., 2020). Most of the studies highlighted the negative impact of the COVID-19 pandemic in worsening and exacerbating the eating disorder symptoms, in which the studies mentioned that the access and quality of treatment have a significant decline since the beginning of the pandemic due to the lockdowns (Branley-Bell & Talbot. 2020; Brown et al., 2021; Feldman et al., 2022; Hunter & Gibson et al., 2021; Machado et al., 2020; Richardson et al., 2020; Rodgers et al., 2020; Spettigue et al., 2021; Termorshuizen et al., 2020; Termorshuizen et al, 2022; Vuillier et al., 2021).

With the advancement of technology, a number of healthcare providers have made efforts to ensure that individuals who have eating disorder symptoms can access treatment and care during the pandemic by providing online treatment or telehealth services (Clark et al., 2020; Cooper et al., 2020; Shaw et al., 2021; Weissman et al., 2020). However, the effectiveness of online treatment or telehealth services varies from individual to individual. A study by Cooper et al. (2020) claimed that telehealth services are limited in terms of physical evaluation, such as monitoring changes in weight, which is crucial for individuals who have eating disorder symptoms. In addition, Clark et al. (2020) and Hunter & Gibson et al. (2021) have also pointed out that, even if online treatment or telehealth services are available during the pandemic, the delivery of the treatment is not satisfying and ineffective, eventually resulting in the worsened of the eating disorder symptoms. On the other hand, three studies have stressed the positive impact of telehealth services in enhancing the availability of care for individuals with eating disorder symptoms (Rodríguez et al., 2023; Shaw et al., 2021; Weissman et al., 2020). These studies underscored benefits such as enhanced accessibility, improved comfort during online treatment, and cost reduction.

Notably, one of the interesting findings related to the theme of changes in access to treatment is the impact on treatment cost. Two studies have emphasized the individual's worry about the expenses associated with treatment because of the loss of income due to the pandemic (Termorshuizen et al., 2020; Thompson et al., 2022). Moreover, another noteworthy discovery from the studies is that some individuals may feel guilty for receiving treatment during the pandemic, as they believe they have diverted healthcare resources from more critical cases (Brown et al., 2021; Vuillier et al., 2021).

Role of Social Media

The COVID-19 pandemic, with its accompanying lockdowns and social distancing measures, has led to a significant increase in social media consumption (Özenoğlu et al., 2021; Zhang, 2021). This surge has had a dual impact on individuals' perceptions of body image and eating behaviors with both positive and negative implications.

During the pandemic, the increased exposure to social media platforms has heightened individuals' exposure to unrealistic body standards and ideals. The proliferation of images and content promoting certain body types can contribute to negative self-perception and body dissatisfaction (Cooper et al., 2020). Negative concerns about body image and the usage of social media exhibited a notable connection with the occurrence of disordered eating symptoms (Bellapigna et al., 2023). This dissatisfaction can be a precursor to disordered eating behaviors, as individuals strive to meet these unattainable standards.

Moreover, adolescents reported reduced internalizing symptoms, but they showed elevated instances of other issues and problematic engagement with social media (Kucharczuk & Oliver, 2022; Muzi et al., 2021). Dysfunctional social media usage upon the COVID-19 lockdown also heightened disordered eating thoughts in those with self-reported eating issues (Bala et al., 2020; Mannino et al. 2021). A study in China stated that extensive social media exposure during lockdowns induced emotional overeating due to anxiety, with neuroticism moderating this relationship (Gao et al., 2021). Another study showed that the COVID-19 pandemic led to a rise in eating disorder behavior, symptoms and relapse, which were associated with heightened negative mood and increased social media utilization (Zhang, 2021).

Conversely, social media has also played a positive role by providing platforms for support and community building. For many, social media has been a space to share experiences and struggles with eating disorders anonymously, without the fear of stigma or judgment. The study done by Marzouki et al. (2021) supported the statement above as social media usage amidst COVID-19 pandemic has fostered a positive outlook toward stressors, serving as a protective factor for collective resilience. Proper utilization of social media during the pandemic has the potential to enhance users' health beliefs and subjective well-being, ultimately leading to improved knowledge acquisition and overall well-being. (Chuang & Liao, 2022).

These platforms have also facilitated access to a variety of support resources, not limited to traditional therapy. Social media platforms have a positive impact on public health efforts to combat COVID-19, with the promotion of awareness and behavioral changes playing a role as partial mediators (Al-dmour et al., 2020; Bala et al., 2020; Yu et al., 2022). This support throughout the online community can be particularly valuable when in-person therapy is inaccessible or when individuals are seeking additional sources of support. The frequency of social media use also significantly predicts COVID-19 preventive behaviors, with disease knowledge and eHealth literacy serving as significant factors in this association (Li & Liu, 2020). Despite the COVID-19 pandemic has caused shifts in eating habits, it has created potential opportunities for innovative information technologies to aid in fostering healthy eating habits and adapting to evolving circumstances (Parra et al., 2021).

Changes in Relationship with Food

The COVID-19 pandemic has not solely constituted a health crisis but has also been a catalyst for significant economic upheaval, leading to widespread food insecurity and drastic changes in individuals' relationships with food (Lu & Lin, 2021). The studies explore how economic challenges and disruptions in food supply chains during the pandemic have impacted mental health, contributing to increased eating disorder symptoms (Brenner & Bruggar, 2020; Clay & Rogus, 2021; Erokhin & Gao, 2020; Fang et al., 2021; Hu et al., 2021; Jafri et al., 2021; Laborde et al., 2020; Latoo et al., 2021; Nagata et al., 2021; Paslakis et al., 2020; Pereira & Oliveira, 2020; Wolfson & Leung, 2020).

Economic uncertainty, exacerbated by the pandemic, has significantly influenced access to food. The loss of income for many households resulted in a heightened sense of food insecurity (Laborde et al., 2020; Paslakis et al., 2020). Multiple studies have indicated that financial difficulties can severely restrict access to nutritious and preferred foods, leading to altered eating behaviors (Fang et al., 2021). Furthermore, disruptions in the food access due to lockdowns and restrictions have aggravated this issue, as discussed in a report by Clay & Rogus, (2021).

The relationship with food during the pandemic has been complex. On one end of the spectrum, shortages and the fear of not having enough to eat have led to increased levels of food-related anxiety and rumination. This fear, as outlined in research by Wolfson & Leung, (2020), often manifests as a preoccupation with the availability of food, exacerbating symptoms in individuals with predispositions to eating disorders. The scarcity of food has also led to development of mental health issues such as depression, anxiety and suicide rates (Brenner & Bruggar, 2020; Latoo et al., 2021).

On the other end, the phenomenon of stocking up on food during lockdowns created an environment where an excessive amount of food was available in households. This availability may have contributed to increased instances of binge eating (Dąbkowska-Mika, 2021; Mumtaz et al., 2020; Mumtaz et al., 2022). The presence of large quantities of food, often coupled with heightened stress and anxiety, created a scenario where overeating became a coping mechanism for some (Mumtaz et al., 2022). During COVID-19 quarantine, people also tend to eat more and gain weight, with obesity and overweight individuals being more vulnerable (Mumtaz et al., 2020). Lack of external distractions can also lead to unhealthy eating patterns during COVID-19 lockdown (Dąbkowska-Mika, 2021).

Moreover, the effect of pandemic on mental health cannot be overlooked in this context. The intertwining of food insecurity, economic stressors, and mental health challenges has created a complex web influencing eating behaviors. Mindfulness-based strategies have the potential to aid in the prevention and management of mental health challenges amidst the COVID-19 pandemic, fostering response adaptability to uncertainties related to dietary and food access (Antonova et al., 2021). On the positive side, there is potential for food systems to transition toward more sustainable, equitable, and resilient models, with various innovative responses to the crisis already coming to the forefront (Blay-Palmer et al., 2020). Those changes can further improve the public's relationships with food, but contingencies must be implemented in a careful manner to ensure the success.

In a nutshell, the COVID-19 pandemic has significantly altered individuals' relationships with food, influenced by economic uncertainty and food insecurity. The spectrum of changes ranges from increased fear, stress and anxiety associated with food scarcity to patterns of overeating in response to food abundance. These shifts underscore the need for a nuanced understanding of the pandemic's multifaceted influence on eating behaviors and mental health, urging further research and targeted interventions in this area.

Improve in Self-Care

Five studies have highlighted the positive consequences of the COVID-19 pandemic in improving eating disorder symptoms (Clark et al., 2020; Hunter & Gibson, 2021; McCombie et al., 2020; Termorshuizen et al., 2020; Vullier et al., 2021; Weissman et al., 2020). These studies have discovered that pandemic-related lockdowns have provided individuals with eating disorder symptoms with greater freedom, space, and time to focus on healing, self-care, and self-reflection (Hunter & Gibson, 2021; McCombie et al., 2020; Termorshuizen et al., 2020). This has resulted in increased efforts towards self-management and taking more responsibility in controlling their eating disorder symptoms (Clark et al., 2020; Vullier et al., 2021).

DISCUSSION

This study reveals a complex interaction of the factors that impact eating disorder symptoms during the COVID-19 pandemic. While most of the studies highlighted the negative influences of the pandemic on eating disorder symptims (Aksoy et al., 2021; Bellapigna et al., 2023; Bozkurt et al., 2021; Clark Bryan et al., 2020; Fang et al., 2021; Hu et al., 2021; Jafri et al., 2021; McCombie et al., 2020; Rodgers et al., 2020; Vuillier et al., 2021), some have reported positive outcomes that may mitigate the adverse effects (Clark et al., 2020; Goode et al., 2022; Hunter & Gibson, 2021; Marzouki et al., 2021; Rodríguez et al., 2023; Shaw et al., 2021; Termorshuizen et al., 2020; Weissman et al., 2020).

According to the findings from the current analysis, whether an individual experiences a lack of social support or connection, subsequently leading to the worsening of eating disorder symptoms, depends on whether they are in quarantine alone or with their loved ones. Individuals in solitary quarantine often report feelings of loneliness and insufficient social support (Cooper et al., 2020). This absence of social support can have a more significant impact on individuals with eating disorder symptoms, given their vulnerability to stressful situations, ultimately contributing to the maintenance and worsening of their symptoms, such as increased episodes of binge eating, purging, and heightened preoccupation with body image (Cooper et al., 2020; Rodgers et al., 2020). For those whose coping mechanisms include connectivity and gaining support from others, the restrictive measures due to the pandemic may serve as the biggest challenge for them in managing their symptoms (Vuillier et al., 2021). A study by Branley-Bell and Talbot (2020) revealed that dining out can serve as a significant coping method to promote an individual's food intake, especially for those who engage in restricted eating, but individuals under lockdown restrictions are unable to do so. Therefore, the lack of effective coping strategies due to the pandemic has triggered or exacerbated the eating disorder symptoms of the affected individuals, including increased restriction, binge eating episodes, and purging behaviors.

In addition, the observed disruptions to routine throughout the COVID-19 pandemic present significant implications for comprehending and tackling the complex relationship between lifestyle changes and the worsening of eating disorder symptoms. As supported by the current findings from existing literature, the loss of structure and predictability in daily life has been a consistent factor in contributing to heightened stress and anxiety levels among individuals with eating disorder symptoms (Caroppo et al., 2021; McMahon et al., 2022; Monteleone, 2021). Based on the qualitative study by Vullier et al. (2021), individuals with eating disorder symptoms acknowledged that the unstructured routine could adversely affect their psychological well-being and exacerbate their eating problems. Therefore, if individuals tend to rely on structured routines as their coping mechanisms to manage their symptoms, the disruption of these routines can leave them without established strategies to cope with stress, resulting in the intensification of their symptoms related to their eating issues. When the initial coping mechanisms are absent, affected individuals may turn to eating as one of their coping methods to alleviate stress and anxiety. This is evidenced by a qualitative investigation conducted by Simone et al. (2020), where participants disclosed engaging in stress eating when their regular routines were disrupted.

While navigating the COVID-19 pandemic's effects on eating disorder symptoms, a critical area of concern has been the changes in treatment accessibility. Branley-Bell & Talbot (2020), Brown et al. (2021) and Feldman et al. (2022) are among those who have reported a significant deterioration in the accessibility and effectiveness of treatment, particularly due to the restrictive measures such as lockdowns. Clark et al. (2020) asserted that not only outpatient services, but also inpatient services have experienced significant disruptions due to lockdown-related actions. Participants from the other studies have indicated that they experienced early discharge and suspension of treatment due to the closure of the services, placement on the treatment waiting list, and obtaining inadequate post-diagnostic care during the period of pandemic (Branley-Bell & Talbot, 2020; Richardson et al., 2020). The irresponsible actions taken by healthcare providers may exacerbate the symptoms of patients with eating disorders, thereby endangering their well-being. Furthermore, a significant aspect of treatment challenges involves the heightened vulneravilitty to engage in detrimental behaviors such as binge eating or extreme restriction due to the lack of consistent professional guidance (Brown et al., 2021). The transition to online and telehealth services, while beneficial in maintaining some level of care, often fall short in providing the necessary support for managing severe symptoms like purging and compulsive exercise.

However, a notable discrepancy arises when examining the studies that explore the transition to online and telehealth services. Several studies present a more optimistic perspective, highlighting efforts made by healthcare providers to ensure that individuals with eating disorder symptoms can still access treatment throughout the pandemic (Clark et al., 2020; Cooper et al., 2020; Shaw et al., 2021; Weissman et al., 2020). While online and telehealth services are regarded as the most suitable alternative when in-person therapy is not feasible, the transition from traditional physical treatment to virtual and telehealth services has challenges when it comes to the delivery and effectiveness of the treatment and services. Based on a qualitative study by Clark et al. (2020), the participants revealed unsatisfactory services received from the remote services due to the inconsistency in communication. Furthermore, a study has indicated that individuals with eating disorder symptoms may engage in deceptive behaviors during online sessions, potentially exacerbating their symptoms (Hunter & Gibson, 2021). This deceit can pose challenges for therapists, as the lack of accurate information hinders the provision of effective treatment. For instance, patients might underreport their symptoms, such as the frequency of binge eating or the extent of food restriction, which makes it difficult for therapist to adjust treatment plans effectively.

When examining the COVID-19 pandemic's effect on eating disorder symptoms, particularly in relation to social media's influence, it is critical to understand both the negative and positive sides of its influences. The increased exposure to unrealistic body standards portrayed on online platforms throughout the pandemic is linked to unfavourable perceptions of oneself and heightened dissatisfaction with one's appearance, particularly among individuals experiencing signs of eating disorders (Bellapigna et al., 2023; Cooper et al., 2020). These findings highlighted the importance of interventions, especially educational interventions that promote positive body image, to address these

adverse effects. This will not only bring benefits to individuals with eating disorder symptoms but is also crucial for the public. For example, individuals exposed to idealized body images might experience a worsening of symptoms such as increased body dissatisfaction and a heightened drive for thinness, which lead to more severe restrictive eating behaviors and purging. Despite these challenges, social media has demonstrated a positive role as a source of social support and community building. Individuals with eating disorder symptoms have found that social media is a safe space for them to share their feelings and experiences without concerning judgment from other people, ultimately improving their well-being and decreasing eating disorder symptoms (Chuang & Liao, 2022; Marzouki et al., 2021). Therefore, by recognizing the value of online support, it can help in promoting the resilience of the affected individuals when traditional therapy is not available during the pandemic.

The complex relationship between the COVID-19 pandemic and eating disorder symptoms can also be linked to the fear of contagion due to food insecurity and the changes in the relationship with food. Due to the disease outbreak, many individuals, especially those with eating disorder symptoms, have become particularly concerned about their diet, placing greater emphasis on their food choices and intake (Wolfson & Leung, 2020). The increased focus on food choices and intake may exacerbate existing eating disorder symptoms, especially in individuals who are already preoccupied with issues related to food and body image. For example, individuals might become more rigid in their eating patterns, avoiding certain foods out of fear of contamination, which can intensify restrictive eating behaviors. Furthermore, the fear of contagion might influence individuals to adopt restrictive eating behaviors, modify their food preferences, or even search for safe food or dietary supplements as a perceived means of protecting themselves from potential infection (Lordan et al., 2021; Pasquale et al., 2021; Thornton et al., 2021).

In addition, the complex interplay of food scarcity and excess availability presents a challenge in understanding the dynamics of eating disorder symptoms during the pandemic. While the study by Wolfson and Leung (2020) emphasized that the shortage of food could induce anxiety and fear in an individual, further intensifying restrictive eating behaviors, other studies by Dąbkowska-Mika (2021), Mumtaz et al. (2020), and Mumtaz et al. (2022) have suggested a contradictory finding in which the surplus availability of food due to stocking can also exert a detrimental influence on eating disorder symptoms. This adverse impact is particularly manifested through binge eating behaviors due to abundant food resources. Therefore, recognizing the importance of a balanced and stable food supply and environment is crucial to mitigate the adverse effects of eating disorders during times of crisis.

While focusing on individual impacts, the global impact, such as economic challenges throughout the COVID-19 pandemic on eating disorder symptoms, has also been highlighted in the current study. The loss of income due to lockdowns during the pandemic will not only interfere with one's ability to access treatment (Termorshuizen et al., 2020; Thompson et al., 2022), but also interrupt one's access to food, especially safe food or supplements, which eventually leads affected individuals to engage in restrictive behavior towards their food intake, resulting in worsening eating disorder symptoms (Fang et al., 2021; Laborde et al., 2020; Paslakis et al., 2020). A study by Weissman et al. (2020) found that the symptoms of eating disorders, such as overeating, are positively correlated with economic hardship caused by unemployment, job insecurity or financial instability. The economic challenges faced by families during the pandemic might contribute to food insecurity and increased stress, both of which can exacerbate symptoms like binge eating or restrictive eating patterns. Individuals facing economic hardship might resort to cheaper, less nutritious food options, which can worsen their relationship with food and trigger disordered eating behaviors. The multidimensional impact of economic challenges during the pandemic underscores the necessity for comprehensive interventions to not only address the psychological and behavioral consequences affecting individuals with eating disorder symptoms but also tackle the immediate financial burden caused by the loss of income during the pandemic.

In addition, the influence of the COVID-19 pandemic on eating disorder symptoms is especially prominent among adolescents. Considering the typical developmental stage of adolescence, during which they tend to prioritize relationships with peers above family, the consequences of pandemic-

related constraints, such as being isolated from friends, are expected to be intensified and particularly detrimental for those under this age category (Spettigue et al., 2021). Adolescents who experience a sense of isolation during the shutdown of their schools, social gatherings, and sports activities may face difficulties in their personal growth, which will potentially worsen their eating disorder symptoms. Additionally, the absence of peer interaction and the associated social pressures can lead to increased engagement in disordered eating behaviors, such as skipping meals, binge eating, and excessive exercise, to cope with feelings of loneliness and isolation (Gordan & Katzman, 2020; Spettigue et al., 2021). The disruption of school routines also eliminates the regularity and structure that can help manage eating patterns, contributing to irregular eating habits and the exacerbation of symptoms in adolescents with eating disorders.

While most of the studies discussed the negative impacts of the COVID-19 pandemic on individuals with eating disorder symptoms, one noteworthy positive impact is the opportunity for them to engage in self-care. The period of lockdowns has provided individuals with eating disorder symptoms time free from work and social activities, giving them a chance to do positive self-reflection towards their rehabilitation (Hunter & Gibson, 2021). Moreover, when in solitary quarantine, the absence of support from healthcare providers or family and friends will also give individuals a chance to take greater responsibility for themselves, particularly in managing their diet (Vuillier et al., 2021). Recognizing these opportunities for dedicated self-care in the face of challenges underscores the importance of personalized strategies that empower individuals to prioritize their well-being, contributing to a beneficial influence on their symptoms related to their eating disorders.

The current study contributes valuable knowledge and information regarding the COVID-19 pandemic's effect on eating disorder symptoms. Distinct patterns of worsening and improving become apparent, highlighting the need for a sophisticated comprehension of the multifaceted impact of the global health crisis on individuals with eating disorder symptoms. These findings provide a solid foundation for future research to gain insights into the complexity of these patterns and explore potential influencing factors, including demographic and cultural variables. In addition, this study also serves as crucial information and a resource for non-governmental organizations (NGOs) and mental health practitioners. The detailed examination of how the pandemic interacts with eating disorder symptoms can provide insights into the development of tailored interventions. NGOs and mental health practitioners can also utilize this knowledge to enhance support programs for affected individuals.

Limitations and Recommendations

Several limitations should be acknowledged in this study. Firstly, the majority of the research that was examined in the present study was conducted in Western countries, including the United States, Canada, Netherlands, and Sweden (Spettigue et al., 2021; Goode et al., 2022; Termorshuizen et al., 2020; Thompson et al., 2022). This geographic focus may limit the ability of the current study to generalize the findings into other cultural contexts, emphasizing the need for future research to specifically examine the influences of the COVID-19 pandemic on eating disorder symptoms within the Asian context. Additionally, most studies primarily targeted samples of adolescents, young adults, and adults (Clark et al., 2020; Gordan et al., 2022; Feldman et al., 2022; Thompson et al., 2022). The limited studies on older age groups and pediatric populations may limit the applicability of the current findings to generalize it across the lifespan. In future research, it would be beneficial to include a more diverse age range to understand the impact on different age groups comprehensively. Furthermore, the present investigation examined symptoms related to eating disorders in a broader context, without specifically identifying a particular eating disorder, such as anorexia nervosa or bulimia nervosa. Further investigations could mainly focus on one particular disorder to gain more insights into the underlying pathophysiological mechanisms of that disorder and its causes, as it can facilitate the development of focused interventions for preventing and managing individuals with that specific eating disorder (Caldiroli et al., 2023).

CONCLUSION

In conclusion, the multifaceted impact of the COVID-19 pandemic extends beyond the direct health implications of the virus, significantly affecting mental health and well-being within communities. While isolation stands as a necessary measure to protect public health, findings indicated that the implementation of lockdown measures and social distancing has created a challenging environment, particularly for individuals vulnerable to or already grappling with eating disorders. The fear of contagion, disruptions in social support and interaction, changes to routine, limited access to treatment, the pervasive role of social media, and altered relationships with food collectively contribute to the negative experiences of individuals navigating the pandemic. Consequently, these factors result in the exacerbation of eating disorder symptoms.

These symptoms, including restrictive eating, binge eating, purging, and excessive exercise, have been intensified by the pandemic. Social isolation has heightened feelings of loneliness and body dissatisfaction, while the disruption of daily routines has triggered unhealthy eating patterns. Moreover, financial stress and health-related anxieties have further contributed to the deterioration of mental health among individuals with eating disorders, thus resulting in more severe symptoms and challenges in managing their condition.

However, amidst these challenges, it is crucial to acknowledge that some individuals with eating disorders have found unexpected benefits during these unprecedented times. For instance, the heightened focus on self-care practices has provided an opportunity for individuals to explore alternative means of well-being. Additionally, the convenience offered by online therapy has facilitated continued access to crucial mental health support, overcoming barriers posed by lockdowns. The increased accessibility to online support resources has also further emerged as a positive outcome, fostering connections and community even in the face of physical distancing.

In contemplation of the diverse impacts of the pandemic, recognizing the adversities faced by general populations and individuals with eating disorders alongside the potential for positive transformations is imperative. This nuanced understanding will guide the development of targeted interventions, support strategies, and a resilient approach to future global health challenges, ensuring that the well-being of general populations and higher-risk groups remains a central focus in the evolving landscape of public health.

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