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Child and adolescent mental health disorders in the GCC: A systematic review and meta-analysis



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ABSTRACT

Background: The Gulf Cooperation Council (GCC), with a predominant 'youth bulge' among its 54 million people, has witnessed an exponential increase in research pertinent to child and adolescent mental health (CAMH). Aside from a few narrative reviews, to date, no critical appraisal examining the magnitude of CAMH has emerged from this region.

Aims: This study aimed to report the prevalence rates of CAMH disorders in the GCC through a systematic review of the existing literature followed by a meta-analysis.

Methods: A systematic review of the literature from the six GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) was conducted. The databases used included Scopus, Pro-Quest, Pubmed, and a final check was performed on Google Scholar to account for any remaining studies that may have still been under review. Meta analytic techniques were then used to estimate prevalence rates of each specific mental disorder, i.e. ADHD, depression, anxiety, stress, eating disorders, and tobacco use disorder.

Results: A total of 33 studies from the six countries were included. The pooled prevalence of ADHD as per the Vanderbilt ADHD Diagnostic Rating Scale (VADHDRS), clinical judgments, *Attention Deficit Disorders Evaluation Scale* (ADDES), and the *Strengths and Difficulties Questionnaire* (SDQ) was found to be 13.125%, 13.38%, 26.135%, and 12.83%, respectively. The pooled prevalence of depressive symptoms solicited by the Patient Health Questionnaire (PHQ-9), *Depression, Anxiety, and Stress Scale* (DASS), and Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI Kid) was 44.684%, 45.09%, and 26.12%, respectively. The pooled prevalence of anxiety according to the DASS and the MINI Kid was 57.04% and 17.27%, respectively, while the pooled prevalence of stress as per the DASS was found to be 43.15%. The pooled prevalence of disordered eating solicited by the Eating Attitudes Test (EAT-26) was 31.55%. Lastly, the pooled prevalence of tobacco use disorder per the Global Youth Tobacco Survey was 19.39%.

Discussion: To date, this is the first systematic review and meta-analysis of its kind from the GCC. The prevalence rate of CAMH disorders appears to be in the upper range of international trends. The higher rates could be attributed to the existing studies using suboptimal methodological approaches and instruments to solicit the presence of CAMH.

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1. Introduction

Neurodevelopmental behavioral and cognitive disorders and the variant spectrums categorized under the umbrella of child and adolescent mental health (CAMH) disorders have increasingly been recognized worldwide [1]. Empirical studies have indicated that most of the social deficits and dependence in adulthood begin

during the childhood and adolescent periods [2]. In this regard, the presence of CAMH disorders often impedes children and adolescents from developing meaningful existence and good quality of life. There is also an added disadvantage of living with the stigma of a culturally devalued mental condition. CAMH disorders have been reported to occur among one out of six children in the industrialized countries of Western Europe, North America, and the Pacific Rim [3]. It is unclear whether the rising tide of such disorders reflects the new approaches to screening, identification, and case ascertainment, or the ever-expanding ‘youth bulge’ whereby an increase in the pediatric population in society has invariably caused an increase in the number of those diagnosed with CAMH disorders. Both epigenetic and nongenetic factors have been implicated in the identification of these disorders [4]. As CAMH disorders seem to be increasing in prevalence, nongenetic origins are also likely to be intertwined in shaping their expression, although this is yet to be well-established [4]. The high variability of incidence found across varied populations suggests that socio-cultural or ecological factors are likely to play a substantial role in the trajectory of the aforementioned set of disorders. Globally, the rate of CAMH disorders among children and adolescents have been reported to vary from 7.2% to 13.4% [5–8].

Despite the phenomenon of the ‘youth bulge’ and the fact that 80% of the population resides in non-industrialized countries, not much has been documented on the magnitude of CAMH disorders in such non-industrialized countries, sometimes known as emerging economies or societies in transition. The six Arabian Gulf countries forming the Gulf Cooperation Council (GCC) (the United Arab Emirates, Saudi Arabia, Qatar, Oman, Kuwait, and Bahrain) appear to exhibit a preponderance of this aforementioned ‘youth bulge’. Demographically, the GCC is characterized by the ‘second phase of demography in transition’ [9]. Accordingly, this phase is often characterized by high fertility rates and the resultant birth rate, and the preponderance of a pyramid-like population structure [10].

In this context, systematic clinical observations suggest a high concentration of differently-abled children in the GCC [11]. This may stem from the high “prevalence of consanguinity among married couples and polygamous marriages particularly among older males, in addition to the high fertility rates and frequent births” (p.10). Furthermore, most GCC countries are yet to develop policies in support of the children and youth with special needs [12,13]. However, noteworthy is the fact that the phenomenon of a ‘stolen childhood’ appears to feature less in the GCC [14]. The GCC, in general, seems to form a part of those emerging economies where environment-related and infectious diseases appear to be diminishing, whereas the emergence of noncommunicable diseases including life-limiting diseases are increasingly being recognized [15]. Therefore, the quantification of the currently prevailing magnitude of CAMH disorders in the GCC is warranted in order to lay the groundwork for informed policies and allocation of resources and possible evidence-based prevention and intervention.

Though still in its nascent stage, literature documenting the magnitude of CAMH disorders has emerged in the GCC [16,17]. However, much of this literature has been limited to certain specific CAMH problems or narrative reviews [12,18–22]. To fill this gap in the literature, this study aimed to critically review the literature on the prevalence rates of CAMH disorders in the GCC. A glimpse into the literature shows that disorders such as anxiety, depression, stress, attention deficit hyperactivity disorder (ADHD), eating disorders (ED), and substance use disorder have received substantial attention in this region. Therefore, this appraisal would lay the groundwork for further investigations aiming to improve the identification of CAMH disorders. This, in turn, would contribute to

the development of mechanisms for mitigation and safeguarding the wellbeing of both children and adolescents.

2. Methods

This systematic review was carried out following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Fig. 1) [23]. The study includes articles up to the year 2020, using keywords such as ‘mental disorders’, ‘prevalence’, and individual GCC country names (the United Arab Emirates, Saudi Arabia, Qatar, Oman, Kuwait, and Bahrain). The search results were screened to determine the eligibility criteria.

2.1. Data retrieval strategies

Articles were obtained by searching various databases such as PsychINFO, Scopus, PubMed/Medline, ProQuest for English articles, and Al-Manhal for Arabic articles. The keywords used for English articles were divided into four levels as follows: Level 1 – mental disorders, psychiatric disorders, mental illnesses (other specific individual mental disorders such as ADHD, anxiety disorders, eating disorders, and PTSD); Level 2 – epidemiology, prevalence, survey; Level 3 – child, adolescent, preschool, toddler, youth, and “children with special needs”; and Level 4 – individual country name (GCC). For Arabic articles, keywords such as ‘الاضطرابات النفسية’, ‘الانفسيّة’, and ‘البلد’ were used. The following search methodology was not limited to a certain timeframe.

2.2. Inclusion and exclusion criteria

This article included studies that: (1) looked into mental disorders; (2) used validated questionnaires; (3) reported prevalence and sample size; and (4) were either in English or Arabic. Non-original studies such as reviews, duplicates, studies that did not report the prevalence, or studies that scored less than 90% on the Joanna Briggs Institute (JBI) evaluations were excluded. In addition, studies were excluded if they did not use a validated tool to measure the prevalence of a mental disorder or if the mental disorder was not classified by the Diagnostic and Statistical Manual of Mental Disorders or International Classification of Diseases [24–26].

2.3. Quality assessment

Based on the questions in the JBI guidelines [27], the three reviewers screened the title, abstract, results, discussion, and if included, other sections of each study. The scores of the JBI items ranged from 0 to 8. The inter rater reliability of the three reviewers was acceptable with an intraclass correlation coefficient (ICC) of 0.891.

The quality of the articles was assessed by answering 8 questions with answers given as Yes/No/Unclear/Not Applicable, from the JBI checklist which are: “Were the criteria for inclusion in the sample clearly defined?”, “Were the study subjects and the setting described in detail?”, “Was the exposure measured validly and reliably?”, “Were objective, standard criteria used for the measurement of the condition?”, “Were confounding factors identified?”, “Were there strategies to deal with confounding factors?”, “Were the outcomes measured validly and reliably?”, and “Was an appropriate statistical analysis used?”. The authors used a score of 7 or 8 “Yes’s” as the cut-off to determine good quality articles.

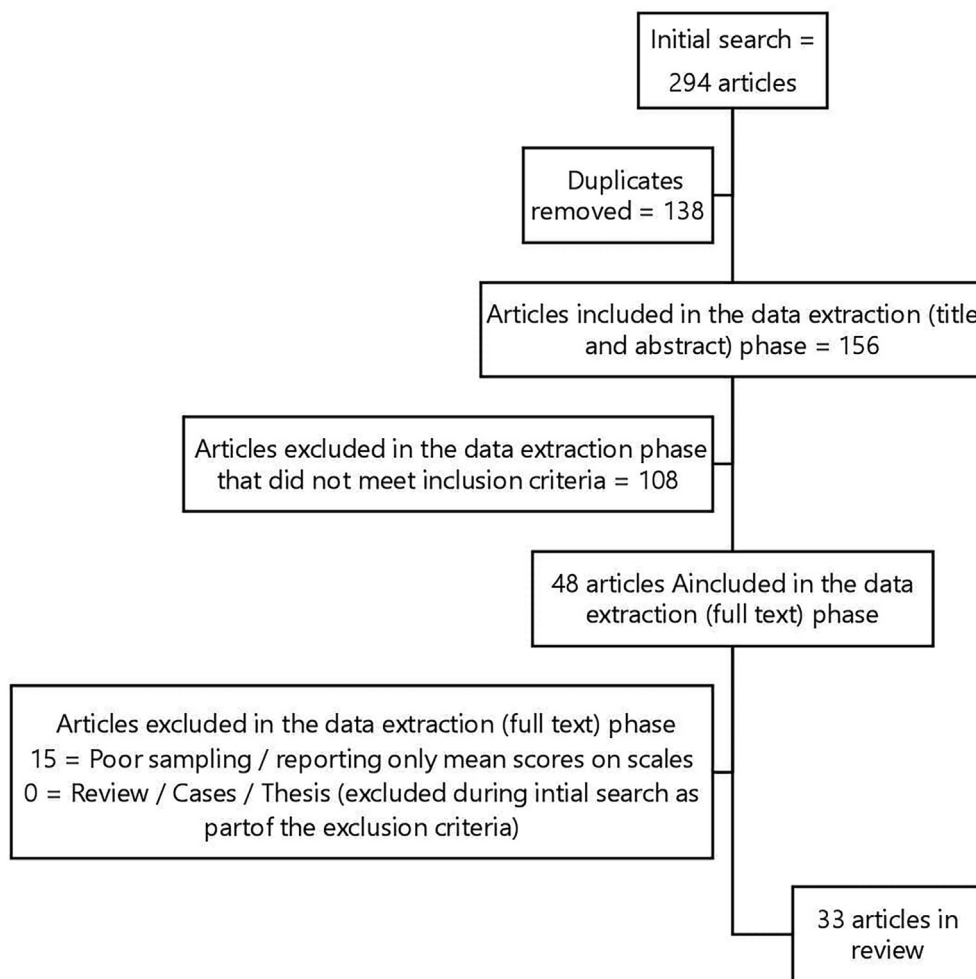


Fig. 1. The PRISMA flow diagram describing the systematic review process.

2.4. Statistical analysis

The acquired data were analyzed by using the MedCalc 12 statistical Software. I^2 and Q statistics were used to assess heterogeneity across studies [28]. The data were considered homogeneous when I^2 was less than 50% and the Q statistic had a p -value greater than 10%, in which case a fixed effect model was used to produce pooled estimates; else, the random-effect model was used to interpret the results (i.e., the data were heterogeneous) [29].

3. Results

The initial search yielded 294 useful studies. Three independent authors (MA, RA, and SM) excluded non-relevant and duplicate articles, which left a total of 156 articles for the full review. All 156 articles were scanned using the JBI appraisal checklist of scientific research articles [27]. The authors went through the reference list of all articles considered for the full review to properly check for any relevant studies that may have been missed out in the initial search. The other co-authors were consulted for input in case the three authors (MA, RA, and SM) were in disagreement.

3.1. Quality assessment

The following information was collected independently by the

three reviewers (MA, RA, and SM): author names, date of publication, country, year of publication, year of study, sampling methods, age range, sample characteristics, sample size, the gender distribution of the sample, the measurement tool used, tool reliability, case diagnosis, the sum of diagnosed cases, and the prevalence percentages of each disorder.

Since none of the Arabic articles adhered to JBI guidelines, a total of 33 articles were included in the systematic review, of which 21 were used for the meta-analysis.

3.2. Prevalence of attention deficit hyperactivity disorder (ADHD) assessed by the Vanderbilt ADHD diagnostic rating scale (VADHDRS)

The estimated prevalence of ADHD assessed by the VADHDRS for 6 studies is demonstrated in Fig. 2. The pooled prevalence of ADHD in the total sample of 5499 was 11,506% (95% CI = 6.034–18.449%) based on the random effects model ($I^2 = 97.74%$, $Q = 221.39$, $P < .001$).

3.3. Prevalence of attention deficit hyperactivity disorder (ADHD) assessed using clinical judgment

The estimated prevalence of ADHD assessed using clinical judgment for 2 studies is demonstrated in Fig. 3. The pooled

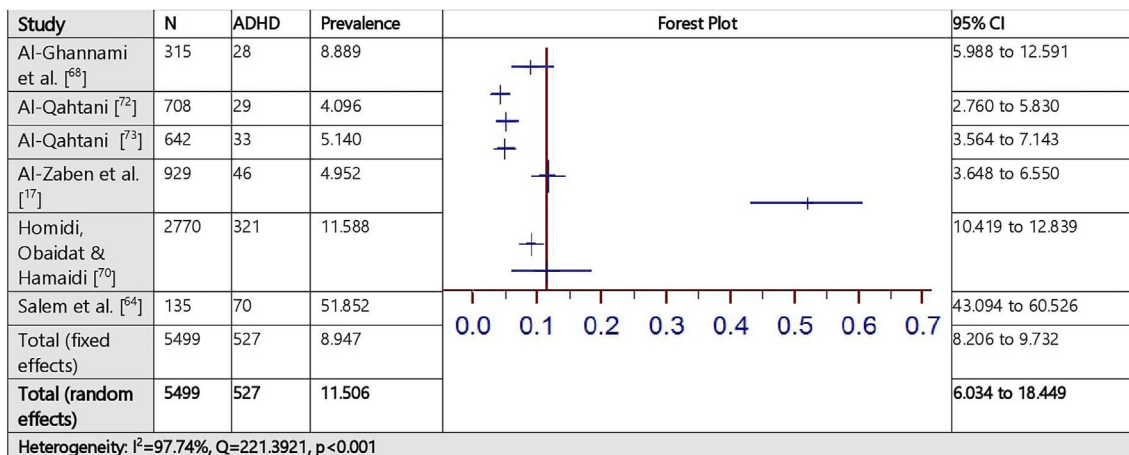


Fig. 2. Prevalence estimates of attention deficit hyperactivity (ADHD) assessed by the Vanderbilt ADHD Diagnostic Scale.

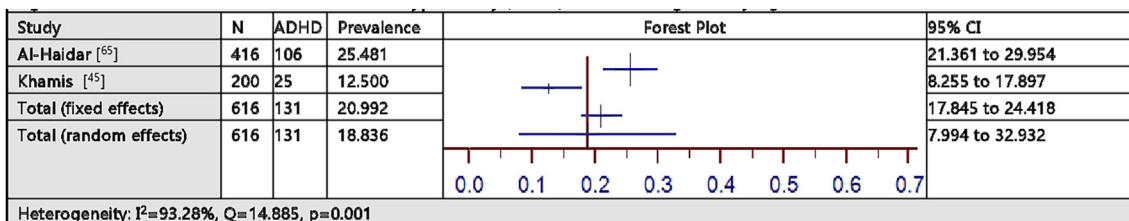


Fig. 3. Prevalence estimates of attention deficit hyperactivity (ADHD) assessed using clinical judgment.

prevalence of ADHD in the total sample of 616 was 18.836% (95% CI = 7.994–32.932%) based on the random effects model ($I^2 = 93.28\%$, $Q = 14.885$, $P = .001$).

3.4. Prevalence of attention deficit hyperactivity disorder (ADHD) assessed by the Attention Deficit Disorders Evaluation Scale (ADDES)

The estimated prevalence of ADHD assessed by the ADDES for 2 studies is illustrated in Fig. 4. The pooled prevalence of ADHD in the total sample of 2235 was 26.135% (95% CI = 2.471–62.852%) based on the random effects model ($I^2 = 99.69\%$, $Q = 326.50$, $P < .001$).

3.5. Prevalence of attention deficit hyperactivity disorder (ADHD) assessed by the Strengths and Difficulties Questionnaire (SDQ)

The estimated prevalence of ADHD assessed by the SDQ for 2 studies is illustrated in Fig. 5. The pooled prevalence of ADHD in the

total sample of 918 was 12.830% (95% CI = 6.570–20.788%) based on the random effects model ($I^2 = 87.81\%$, $Q = 8.20$, $P = .0042$).

3.6. Prevalence of depression assessed by the Patient Health Questionnaire-9 (PHQ-9)

The estimated prevalence of depression assessed by the PHQ-9 for 2 studies is demonstrated in Fig. 6. The pooled prevalence of depression in the total sample of 2651 was 44.684% (95% CI = 2.219–93.567%) based on the random effects model ($I^2 = 99.89\%$, $Q = 880.90$, $P < .001$).

3.7. Prevalence of depression, anxiety, and stress assessed by the Depression, Anxiety, and Stress Scale (DASS)

The estimated prevalence of depression, anxiety, and stress assessed by the DASS for 3 studies is demonstrated in Fig. 7. The

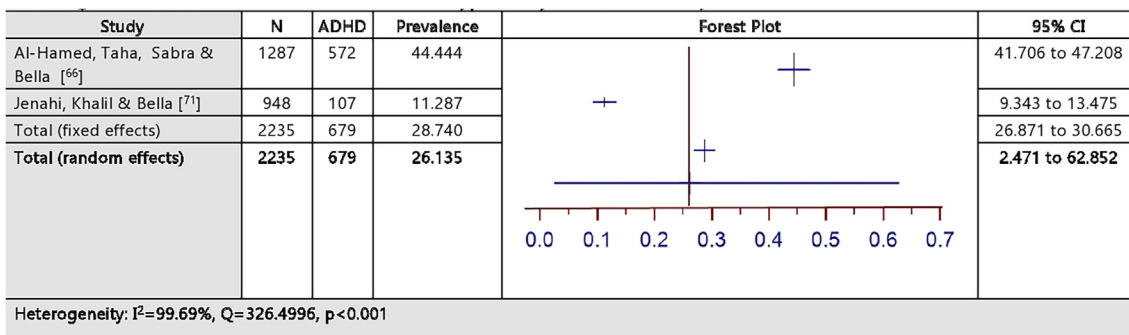


Fig. 4. Prevalence estimates of attention deficit hyperactivity (ADHD) assessed by the Attention Deficit Disorders Evaluation Scale.

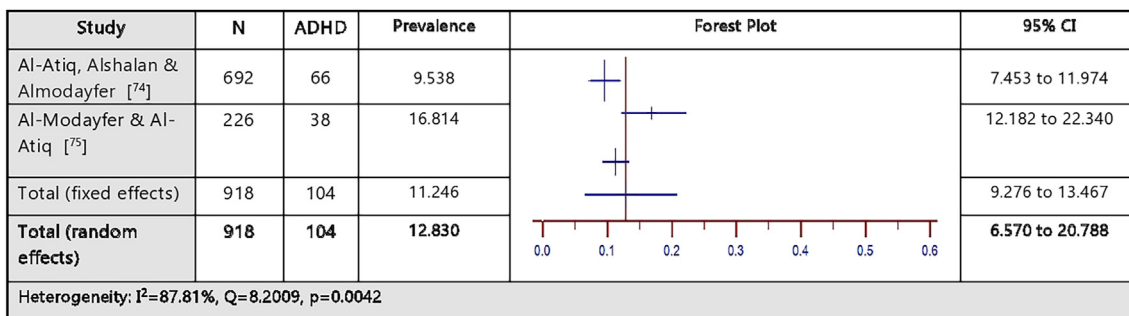


Fig. 5. Prevalence estimates of attention deficit hyperactivity (ADHD) assessed by the Strengths and Difficulties Questionnaire.

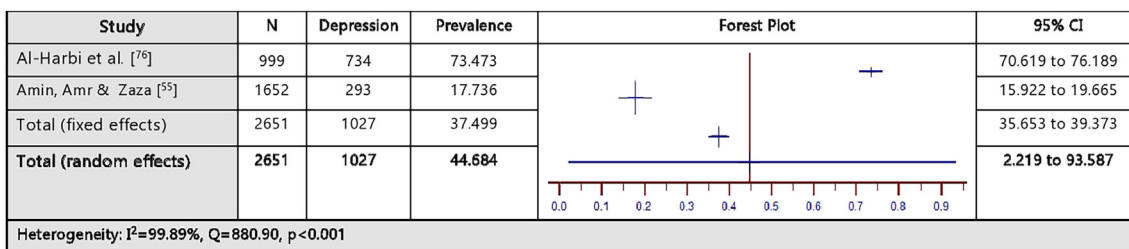


Fig. 6. Prevalence estimates of depression assessed by the Patient Health Questionnaire-9 (PHQ-9).

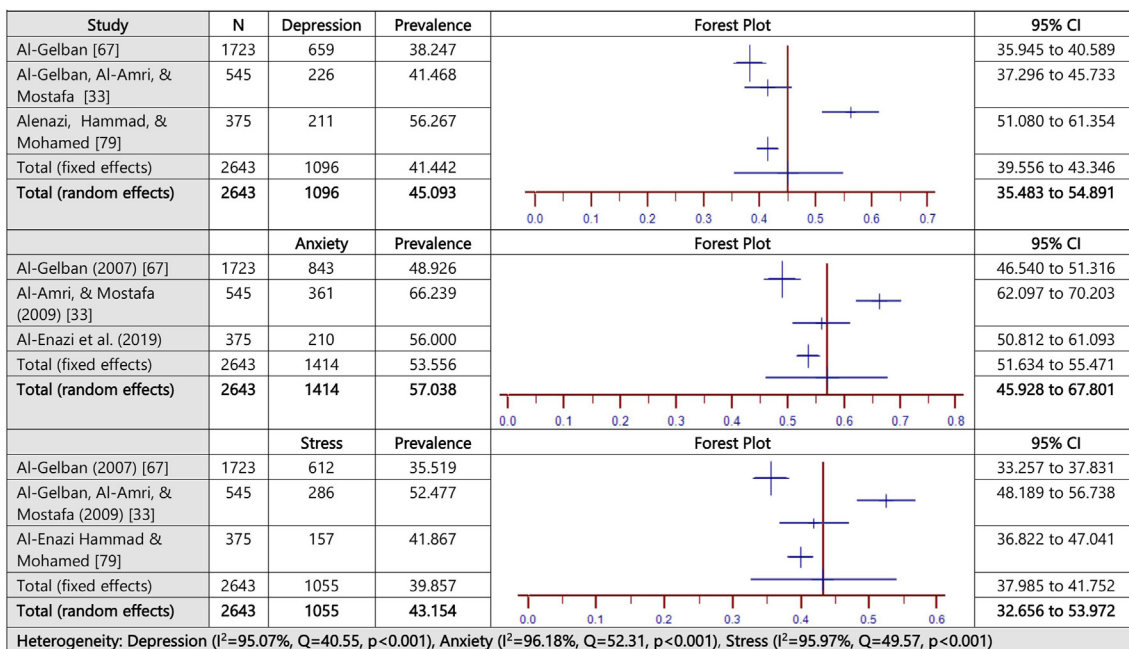


Fig. 7. Prevalence estimates of depression, anxiety, and stress assessed by the DASS.

pooled prevalence of depression in the total sample of 2643 was 45.09% (95% CI = 35.48–54.89%) based on the random effects model ($I^2 = 95.07\%$, $Q = 40.55$, $P < .001$). The pooled prevalence of anxiety was 57.04% (95% CI = 45.93–67.801%) based on the random effects model ($I^2 = 96.18\%$, $Q = 52.31$, $P < .001$). The pooled prevalence of stress was 43.15% (95% CI = 32.66–53.97%) based on the random effects model ($I^2 = 95.97\%$, $Q = 49.57$, $P < .001$).

3.8. Prevalence of depression and anxiety assessed by the Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI kid)

The estimated prevalence of depression and anxiety assessed by the MINI-kid for 2 studies is illustrated in Fig. 8. The pooled prevalence of depression and anxiety in the total sample of 918 was

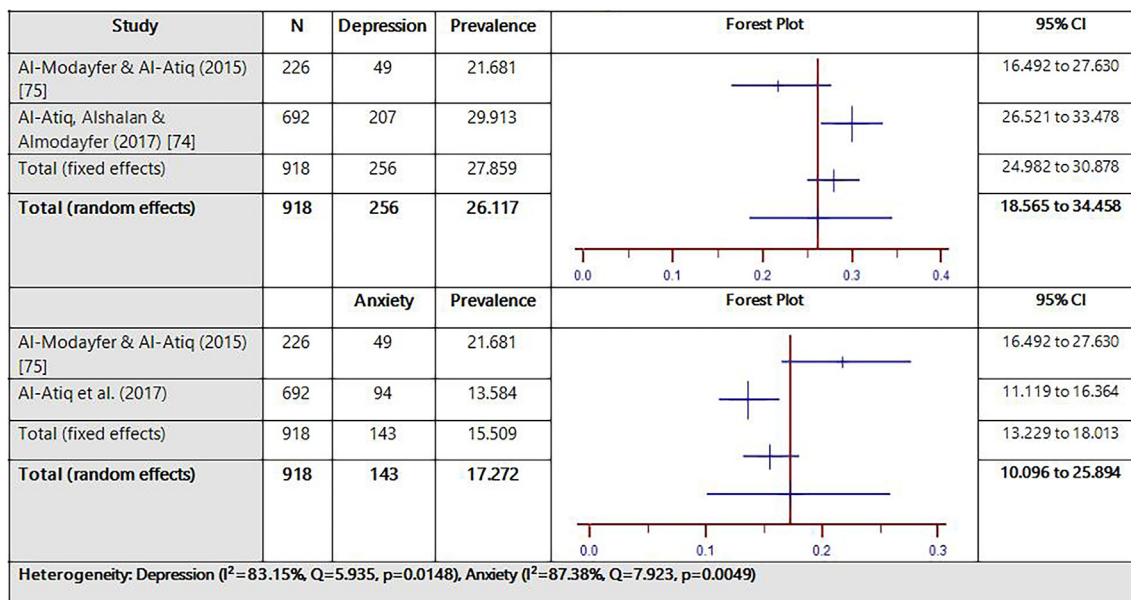


Fig. 8. Prevalence estimates of depression and anxiety assessed by the Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI Kid).

26.12% (95% CI = 18.57–34.46%) and 17.27% (95% CI = 10.10–25.89%), respectively, based on the random effects model (depression: $I^2 = 83.15\%$, $Q = 5.935$, $p = .0148$; anxiety: $I^2 = 87.38\%$, $Q = 7.923$, $P = .0049$).

3.9. Prevalence of disordered eating assessed by the Eating Attitudes Test (EAT-26)

The estimated prevalence of disordered eating (DE) assessed by the EAT-26 for 3 studies is illustrated in Fig. 9. The pooled prevalence of disordered eating in the total sample of 885 was 31.55% (95% CI = 20.21–44.13%) based on the random effects model ($I^2 = 93.25\%$, $Q = 29.62$, $P < .001$).

3.10. Prevalence of smoking assessed by the Global Youth Tobacco Survey (GYTS)

The estimated prevalence of smoking assessed by the GYTS for 2 studies is demonstrated in Fig. 10. The pooled prevalence of smoking in the total sample of 5575 was 19.39% (95% CI = 15.30–23.84%) based on the random effects model ($I^2 = 92.96\%$, $Q = 14.20$, $P = .0002$).

3.11. Excluded studies

The current systematic review included 33 studies (Table 1) [30–40,45,55,56,64–74,77–80].

However, noteworthy is the fact that the final meta-analysis includes only 21 of them (Table 2) [17,33,45,55,56,64–79]. The reason for the exclusion of these 12 studies is that, unlike the rest, it was not possible to group them into any of the tool-based categories since each study covered a unique disorder by itself including child abuse, language disorders, and autism spectrum disorders. Additionally, studies were also excluded if they measured the five disorders included in the current meta-analysis, but used a unique tool that was not used by at least one other study. In this regard, studies covering mental health symptoms, in general, were also excluded.

Bener et al. investigated 1703 school children aged between 6 and 18 years for phobias [30]. The authors found that although the overall prevalence of phobias was found to be 19.7%, social phobia, agoraphobia, specific phobia, and medical phobia were 12.7%, 8.6%, 7.5%, and 7% respectively. Bradshaw and Kamal [31] examined the prevalence of ADHD among 2195 school students (6 to 19-year-olds) to find an 8.3% prevalence rate. In investigating the prevalence of autism spectrum disorder among 5 to 12-year-olds, Alshaban et al. [32] reported a 0.79% prevalence rate. In 2009, Al-Gelban, Al-Amri, and Mostafa [33] examined the prevalence of various general mental health symptoms among 545 secondary school girls aged 14–19 years. In this study, the authors reported the prevalence of depression (13.9%), anxiety (14.3%), phobic anxiety (16.5%), psychoticism (14.7%), somatization (14.1%), interpersonal sensitivity (13.8%), paranoid ideation (13.8%), hostility (12.8%), and obsessive-compulsive behavior (12.3%).

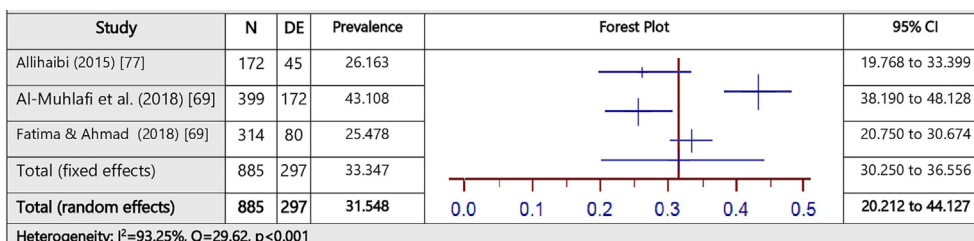


Fig. 9. Prevalence estimates of disordered eating (DE) assessed by the Eating Attitudes Test (EAT-26).

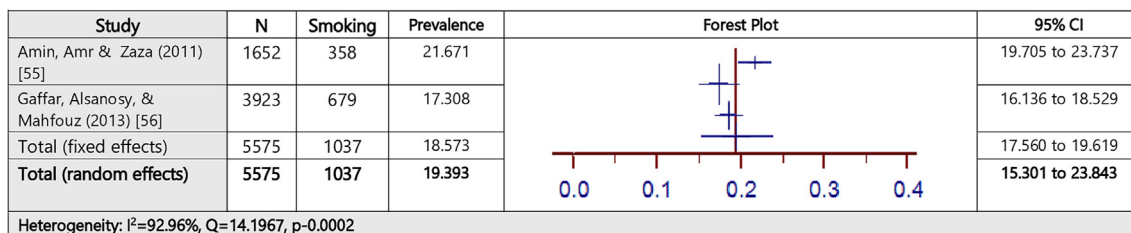


Fig. 10. Prevalence estimates of smoking assessed by the Global Youth Tobacco Survey.

Al-Qahtani and Al-Harbi investigated 347 female students for anxiety [34]. Overall, anxiety was found to be prevalent in 64.3% of the samples with 39% of them having high non-morbid anxiety and 25% with high morbid anxiety. In a study conducted by Al-Sughayr and Ferwana, 216 females and 138 males aged 17 years and above were examined [35]. A prevalence of 48% was found in the total sample. Furthermore, when dividing the sample into specific age groups such as “below 18 years”, a prevalence of 46.5% was reported. Albuhairan et al. studied 4300 female and 4773 male students for bullying, physical violence, anxiety, and sadness [36]. Their results demonstrate a prevalence of 33.3% and 21.2% for physical violence and bullying, respectively. Almuneef examined 4865 females and 5291 males for child sexual abuse and found that 2112 participants experienced lifetime contact forms of sexual abuse in which 1016 of them experienced penetrating sexual abuse [37].

Elarousy and Al-Jadaani examined emotional abuse in 23 females and 37 males aged between 12 and 18 years [38]. The study reported the prevalence of emotional abuse in three aspects: rejecting emotional abuse (90%), ignoring emotional abuse (61.7%), and terrorizing emotional abuse = 61.7%. Fatima and Ahmed (2018) investigated disordered eating in a sample of 314 females, aged 15–19 years old. The overall prevalence rate based on the EAT-26) was found to be 25.4%. Another study conducted by Al-Yateem et al. looked into the prevalence rate of anxiety in 331 females and 637 males, aged between 13 and 18 years old [39]. The anxiety rate was found to be 28%. Finally, Afifi examined 240 females and 260 males students for depression. A prevalence rate of 18.3% was found in the overall sample [40].

4. Discussion

The current study examined the prevalence rates of child and adolescent mental health (CAMH) disorders in the GCC, also known as the emerging economy or society in transition with the bulk of its population being under the age of 20 years [10]. Research on CAMH has significantly increased in the past decade in the GCC, and therefore, the time is ripe to critically appraise the existing literature so that informed policies could be contemplated to safeguard the wellbeing of the youth [41]. Although mental health disorders viewed from biomedical perspectives are generally highly stigmatized in traditional societies and often a pejorative of traditional healing systems, community surveys have suggested that there is a rising tide of CAMH disorders amid the lack of dedicated services and suboptimal health utilization of biomedical health services [42,43].

The findings of the present study suggest that CAMH disorders are increasingly recognized. In this study, the prevalence of attention deficit hyperactive disorder (ADHD) ranged from 12.83% to 26.14%, depressive symptoms ranged 6.12%–45.09%, anxiety ranged from 17.27% to 57.04%, disordered eating was 31.55%, while tobacco use disorder was 19.39%. In the section below, each disorder will be recapitulated within the background literature.

In the GCC, the present appraisal suggests that the prevalence rate of ADHD ranged from 12.83% to 26.14%. The present ranges appeared to be less extreme from previous studies compared with Yemen and UAE which ranged from 1.3% to 34.5%, respectively [44,45]. In comparison with international trends, ADHD appears to range from 6–7% when DSM-IV criteria are employed, whereas they plummet down to 1–2% when using the ICD-10 among children and adolescents. Polanczyk, de Lima, Horta, Biederman, and Rohde have suggested that this discrepancy stemmed from differing modes of case ascertainment, diagnosis, and catchment area [46]. In addition to clinical judgments, most of the quantification of ADHD in the GCC was conducted by using structured questionnaires (*Vanderbilt ADHD Diagnostic Rating Scale*, *Attention Deficit Disorders Evaluation Scale*, and the *Strengths and Difficulties Questionnaire*). This may explain the higher rate compared to the global trend.

Depression-like symptoms have been documented in various parts of the world among children and adolescents [7]. The rate of depressive symptoms appears to increase over time among children and adolescents. For example, in China, Li et al. conducted a systematic review and meta analysis and reported that the prevalence of depressive symptoms was 18.4% in 2000, but the rate increased to 26.3% after 2016 [47]. Lopez et al. have projected that depressive symptoms will be the leading cause of disability and dependency by 2030 [48]. Depression in children and adolescents not only impedes educational attainment, but it also acts as a strong risk factor for poor physical health outcomes and dented subsequent quality of life and meaningful existence [49]. Polanczyk et al. have reported a meta-analysis of the worldwide prevalence of mental disorders in children and adolescents including depressive symptoms [7]. The study accrued 41 articles that fulfilled the study criteria from 27 countries around the world. The worldwide prevalence of any depressive disorder was 2.6%. In the present study, depressive symptoms ranged from 6.12% to 45.09% which were solicited using checklists such as the *Patient Health Questionnaire*, *Depression, Anxiety and Stress Scale*, and *Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI Kid)*. Overall, the upper range from the GCC appears to exceed the global rate. This issue warrants further scrutiny since the previously held view that depressive symptoms unless presented as a ‘somatic metaphor’ is likely to be rare in those societies where the individual is ushered into the collective mindset [50]. There are some suggestions that cultural patterning in traditional societies as those in the GCC tend to abhor the expression of emotion, since this is deemed to be disruptive to social equilibrium in collective societies [51]. In contrast to such sociological perspectives, children and adolescents in the GCC appear to have a high rate of depressive symptoms, and the rates seemingly exceed the global rate

In contrast to depressive illness which often appears as being cognitive, somatic or a combination of these, anxiety is mainly of somatic nature (e.g., palpitation) and is likely to be endorsed even in those societies where those with psychological symptoms are ostracized. This appraisal suggests that anxiety in children and

Table 1
 Characteristics of studies included in Systematic Review [30–40,45,55,56,64–74,77–80].

No.	Author (year)	Country	Sample size (N)	Age range (years)	Study setting	Screening tool	Disorder screened	Positive cases (%)
1	Salem et al. (2014) [64]	Kuwait	135	6–15	Hospital	VADHDDRS-PRS (Arabic)/SSPI/WIS/ MINI-KID	ADHD	ADHD = 70 (51.9%)
2	Bener et al. (2011) [30]	Qatar	1703	6–18	School	Clinical Impression	Phobias	Overall Phobias = 335 (19.7%)
3	Bradshaw & Kamal (2017) [31]	Qatar	4489	6–19	School	SNAP-IV RS	ADHD	ADHD = 373 (8.3%)
4	Alshaban et al. (2019) [32]	Qatar	8676	5–12	Schools and medical centers	SCQ/QSS-PTI/ADI-R/ ADOS-2	ASD	ASD = 1398 (0.79%)
5	Al-Gelban, Al-Amri, & Mostafa (2009) [33]	Saudi Arabia	545	14–19	School	SCL 90-R (Arabic)	Mental health symptoms	Depression = 76 (13.9%); Anxiety = 78 (14.3%)
6	Al-Haidar (2003) [65]	Saudi Arabia	416	0–18	Hospital	DSM III-R/DSM IV	ADHD	ADHD = 106 (25.5%)
7	Al Hamed, Taha, Sabra & Bella al. (2008) [66]	Saudi Arabia	1287	6–13	School	ADDES	ADHD	ADHD = 572 (45.11)
8	Al Gelban (2007) [67]	Saudi Arabia	1723	15–19	School	DASS	Depression, anxiety and stress	Depression = 659 (38.2%) Anxiety = 843 (48.9%) Stress = 612 (35.5%)
9	Al-Gelban, Al-Amri, & Mostafa (2009) [33]	Saudi Arabia	545	14–20	School	DASS	Depression, anxiety and stress	Depression = 226 (41.5%) Anxiety = 361 (66.2%) Stress = 286 (52.5%)
10	Al-Modayfer & Alatiq (2017) [75]	Saudi Arabia	226	0–17	Community	SDQ/MINI-KID	Psychiatric disorders	ADHD = 38 (17.0%) Any affective (depression) or anxiety disorder = 49 (21.7%)
11	Al-Qahtani and Al-Harbi (2017) [34]	Saudi Arabia	347	17–19	School	Taif Hospital Scales Series: Anxiety scale	Anxiety	Anxiety = 223 (64.3%)
12	Al-Sughayr and Ferwana (2012) [35]	Saudi Arabia	354	17–20	School	GHQ-28	Psychiatric morbidity	Psychiatric morbidity = 170 (48%)
13	Alatiq, Alshalan, and Almodayfer (2010) [74]	Saudi Arabia	692	Mean = 16.9 SD = .02	School	SDQ/MINI-KID	Psychiatric disorders	ADHD = 66 (9.5%); Generalized Anxiety Disorder = 94 (13.64%) Conduct Disorder = 39 (5.66%) Dysthymia = 30 (4.37%) Anorexia Nervosa = 4 (0.58%) Bulimia Nervosa = 23 (3.34%) Substance Dependence/Abuse = 1 (0.14%) PV = 3021 (33.3%) Victims & perpetrator of PV = 1116 (12.3%) Victim (bullied) = 1923 (21.2%) Bullying & PV = 1043 (11.5%)
14	Albuhairan et al. (2017) [36]	Saudi Arabia	9073	Mean = 15.8 SD = 1.84	School	Global school-based student health survey	Bullying, physical violence (PV), anxiety, and sadness	Depression = 211 (56.3%) Anxiety = 210 (56.0%) Stress = 157 (41.9%) Depression = 734 (73.5%) Anxiety = 620 (62.1%) DEA = 45 (26.2%)
15	Alenazi, Hammad & Mohamed (2019) [79]	Saudi Arabia	375	16–19	School	DASS-42	Depression/anxiety/ stress	Depression = 211 (56.3%) Anxiety = 210 (56.0%) Stress = 157 (41.9%)
16	Alharbi et al. (2019) [77]	Saudi Arabia	1245	13–19	School	PHQ-9/GAD-7	Depression/anxiety	Depression = 734 (73.5%) Anxiety = 620 (62.1%) DEA = 45 (26.2%)
17	Allihaibi (2015) [78]	Saudi Arabia	172	15–19	School	EAT-26	Disordered eating attitudes	DEA = 45 (26.2%)
18	Almuhlafi, Jamilah, Almutairi & Salam (2018) [69]	Saudi Arabia	399	Mean = 16.8 SD = 0.9	School	EAT-26	Disordered eating	Binge eating = 123 (30.8%) Purging = 28 (7.0%) Laxative usage = 21 (5.3%)
19	Almuneef (2019) [37]	Saudi Arabia	10,156	Mean = 34.3 SD = 11	Community	ACEIQ	Child sexual abuse (CSA)	Lifetime CSA (contact form) = 2112 (20.8%); Experienced Penetrating Sexual Abuse = 1016 (10%); Experienced non-penetrating sexual abuse = 1137 (11.2%) ADHD = 29 (4.1%)
20	Alqahtani (2012) [72]	Saudi Arabia	708	7–9	School	VADHDDRS	ADHD	ADHD = 29 (4.1%)
21	Alqahtani (2010) [73]	Saudi Arabia	642	7–9	School	DSM-IV-TR	ADHD	ADHD = 33 (5.0%) [DSM-IV-TR]
22	Alzaben et al. (2018) [17]	Saudi Arabia	929	6–12	School	VADHDDRS	ADHD	ADHD = 46 (11.6%)
23	Amin, Amr & Zaza (2011) [55]	Saudi Arabia	1652	15–19	School	GYTS/FT/PHQ-9/NCS	Tobacco use disorder	Smoking = 358 (21.7%) Cigarettes only = 165 (46.1%), Shisha = (WP or Maasel) = 134 (37.4%) Cigarettes and Shisha = 59 (16.5%) Rejecting = 54 (90.0%) Ignoring = 37 (61.7%) Terrorizing = 37 (61.7%)
24	Elarousy, & Al-Jadaani (2013) [38]	Saudi Arabia	60	12–18	Community	Specially designed, self-administered questionnaire	Emotional abuse	Rejecting = 54 (90.0%) Ignoring = 37 (61.7%) Terrorizing = 37 (61.7%)
25	Fatima & Ahmad (2018) [69]	Saudi Arabia	314	15–19	School	EAT-26	Disordered Eating	Disordered Eating = 80 (25.4%)
26	Gaffar, Alsanosy & Mahfouz (2013) [56]	Saudi Arabia	3923	12–21	School	GYTSQ	Tobacco Use Disorder	Smoking = 679 (17.3%)
27	Homidi, Obaidat & Hamaidi (2018) [70]	Saudi Arabia	2770	6–12	School	ADHDS	ADHD	ADHD = 321 (11.6%)

(continued on next page)

Table 1 (continued)

No. Author (year)	Country	Sample size (N)	Age range (years)	Study setting	Screening tool	Disorder screened	Positive cases (%)
28 Jenahi, Khalil, & Bella (2013) [71]	Saudi Arabia	1009	6–15	School	ADDES	ADHD	ADHD = 107 (11.3%)
29 Raheel (2015) [80]	Saudi Arabia	1028	15–19	School	BDI	Depression	Depression = 308 (30.0%)
30 Al-Yateem et al. (2020) [39]	UAE	968	13–18	School	SCARED	Anxiety	Anxiety = 271 (28.0%)
31 Khamis (2011) [45]	UAE	200	11–14	School	DSM-IV	ADHD	ADHD = 25 (12.5%)
32 Al-Ghannami et al. (2018) [68]	Oman	328	9–10	School	VADHDDRS-TAS	ADHD	ADHD = 28 (8.8%)
33 Afifi (2006) [40]	Oman	500	Mean = 16.99 SD = 0.99	School	CDIS	Depression	Depression = 91 (18.3%)

ADHD = Attention deficit hyperactivity disorder; **VADHDDRS**=Vanderbilt ADHD diagnostic rating scale; **TDR** = Tool developed by the researchers; **SNAP – IV RS** = The Swanson, Nolan and Pelham Teacher and Parent Rating Scale; **SCQ**=Social Communication Questionnaire; **QSS-PTI** = Qatar School Survey Patient Telephone Interview; **ASD** = Autism Spectrum Disorders; **ADI-R** = Autism Diagnostic Interview-Revised; **ADOS-2** = Autism Diagnostic Observation Schedule, Second Edition; **SCL 90-R** = Symptom-revised Checklist 90; **DSM – III R** = Diagnostic Statistical Manual, Third Edition, Revised; **DSM – IV** = Diagnostic Statistical Manual, Fourth Edition; **ADDES** = Attention Deficit Disorders Evaluation Scale; **DASS** = Depression, Anxiety and Stress Scale; **SDQ**=Strengths and difficulties Questionnaire; **MINI-KID**=The Mini-International Neuropsychiatric Interview for Children and Adolescents; **GHQ-28** = General Health Questionnaire; **PHQ-9** = Patient Health Questionnaire-9; **GAD-7** = General Anxiety Disorder-7; **EAT-26** = Eating Attitude Test-26; **ACEIQ** = Adverse Childhood Experience International Questionnaire; **ODD** = Occupational Defiant Disorder; **CD** = Conduct Disorder; **GYTS** = Global Youth Tobacco Survey; **ADHDS** = Attention Deficit Hyperactivity Disorder Scale; **ADHD IA** = ADHD/inattentive type; **ADHD HI** = ADHD/hyperactivity type; **ADHD C** = ADHD/combined type; **BDI**=Beck depression inventory; **SCARED**=Screen for Child Anxiety Related Disorders Scale; **VADHDDRS-PRS**=Vanderbilt ADHD Diagnostic Parent Rating Scale (VADPRS); **CDIS**=Children’s Depression Inventory scale; **FT**=Fagerstrom Test (nicotine dependence); **NCS**=National comorbidity survey; **DEA** = Disordered eating attitudes; **VADHDDRS-TAS**, National Initiative for Children’s Health Quality Vanderbilt Assessment Scales-Teacher Assessment Scale; **WIS**=Wechsler Intelligence Scale for Children II; **SSPI**=Semi-structured psychiatric interview.

Table 2 Evaluation of the qualifying papers using the JBI guidelines [17,33,45,55,56,64–79].

No.	Criteria	Q ^a	Q ^b	Q ^c	Q ^d	Q ^e	Q ^f	Q ^g	Q ^h
1	Salem et al. [64]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Al-Haidar [65]	Yes	Yes	Yes	Yes	No	No	Yes	Yes
3	Al Hamed, Taha, Sabra & Bella [66]	Yes	Yes	Yes	Yes	No	No	Yes	Yes
4	Al Gelban [67]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
5	Al-Gelban, Al-Amri, & Mostafa [33]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
6	Al-Ghannami et al. [68]	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
7	Khamis [45]	Unclear	Yes	Yes	Yes	Yes	Yes	Unclear	Yes
8	Almuhlafl, Jamilah, Almutairi & Salam [69]	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
9	Fatima & Ahmad [70]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
10	Gaffar, Alsanosy, & Mahfouz [56]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Homidi, Obaidat & Hamaidi [71]	Yes	Yes	Yes	Yes	No	No	Yes	Yes
12	Jenahi, Khalil, and Bella [72]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
13	Al Qahtani [73]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	AlZaben et al. [17]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
15	Al Qahtani [74]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
16	Alatiq, Alshalan, and Almodayfer [75]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17	Almodayfer and Alatiq [76]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
18	AlHarbi et al. [77]	Yes	Yes	Yes	Yes	No	No	Yes	Yes
19	Amin, Amr & Zaza [55]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
20	Allihaibi [78]	No	Yes	Yes	Yes	Yes	No	Yes	Yes
21	Alenazi, Hammad, and Mohamed [79]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes

^a Were The Criteria For Inclusion In The Sample Clearly Defined?
^b Were The Study Subjects And The Setting Described In Detail?
^c Was The Exposure Measured In A Valid And Reliable Way?
^d Were Objective, Standard Criteria Used For Measurement Of The Condition?
^e Were Confounding Factors Identified?
^f Were Strategies To Deal With Confounding Factors Stated?
^g Were The Outcomes Measured In A Valid And Reliable Way?
^h Was Appropriate Statistical Analysis Used?

adolescents in the GCC range from 17.27% to 57.04%. Two instruments – *Depression, Anxiety and Stress Scale*, and *Mini-International Mini-International Neuropsychiatric Interview for Children and Adolescents (MINI Kid)*—fulfilled the study criteria. The global prevalence of any anxiety disorder has been reported to range from 0.9% to 28.3%, even if it is quantified using structured interviews compared to semi-structured interviews which often result in more conservative estimates [7,52]. Again, the rate in the GCC appears to exceed those from other parts of the world. Studies are, therefore, warranted to examine whether the observed rate represents

genuine trends on the ground or are intimately tied to the socio-cultural artifact of quantifying psychological symptoms. These artifacts often lack the central features and thus are prone to ‘false-positives’ which, in turn, trigger inflation of the rate of psychological symptoms.

Disordered eating and disturbed body image, which sometimes manifest as full-fledged eating disorders, had initially been conceptualized as a ‘culture-bound’ syndrome of the industrialized countries of North America and Western Europe owing to the alleged social pressure dispensed by the media which ‘glorifies’ a

body image favoring thinness in women [43]. However, more recently, eating disorders have been documented to be common in non-western countries [53]. The scrutinized studies appear to be limited to disordered eating rather than full-blown eating disorders as featured in the international psychiatric nosology such as ICD and DSM. The present pooled prevalence of disordered eating in the GCC, tapped by the *Eating Attitudes Test* (EAT-26), is found to be 31.55%. Globally, disordered eating was found to be 22.07%, whereas eating disorders have been reported to be 1.01% [47]. This suggests that the pooled prevalence of disordered eating in the GCC also appears to be in the upper range of the global trend.

Besides being viewed as alien in conservative or sometimes puritanical societies, evidence suggests that substance use disorders are increasingly coming to the fore in the GCC [54]. Most of the substances that have been reported to be used in other parts of the world are now being reported in the GCC as well. The GCC is steadily becoming the hub for international transshipment and tourism. With the bulk of the population below the age of 20 years, it should therefore be expected that 'adolescent turmoil' often observed in other societies is also likely to exist in the GCC. In the present data, two studies ($n = 5575$) filled the inclusion criterion which only focused on tobacco use disorder [55,56]. The pooled prevalence was 19.39%. Tobacco use disorder has been reported using various methods of quantification and the present rate is reported using data from the study using the Global Youth Tobacco Survey. Jawad, Lee, and Millett have scrutinized the prevalence of tobacco consumption using the Global Adult Tobacco Survey among South-East Asian countries [57]. The prevalence rate appeared to range from 5.9% to 56.5%. Jawad, Khader, and Millett have reported the prevalence estimates for current tobacco smoking by logistics laid out by Global Adult Tobacco Survey in the Fertile Crescent region (Jordan, Syria, Lebanon, and Palestine) [58]. The prevalence rate varied from 23.2% to 39.5%. Baška et al. have reported the prevalence rate of 22% and 18% for males and females 13–15 years old, respectively, among 25 European countries [59]. Therefore, the present pooled prevalence of 19.39% appears to be in the lower range compared with other regions of the world.

4.1. Limitations

Some of the obvious limitations that go beyond the meta-analysis and systematic review are highlighted below. Firstly, existing literature on child and adolescent mental health (CAMH) in the GCC has not been explicit in terms of the specific age group of the study population. Therefore, it was not feasible to split the sample using conventional demarcations such as preschooler, grade-schooler, and teen. Such an undertaking could have simplified and provided a clearer understanding of the developmental trends. Second, there are concerns regarding the validity and utility of the currently employed diagnostic approaches. Three studies used clinical judgments based on DSM criteria. A study has indicated that clinical judgment tends to be less reliable and may lead to biased assessment [60]. The rest of the assessments were performed through standardized psychiatric interviews. It has been well-established that structured questionnaires or symptom checklists are likely to give spurious results [61]. The advantage of the gold-standard interview is that it has the potential to identify the presence of disorders that are not otherwise specified (for example, EDNOS) which are likely to be rife in cross-cultural populations such as those in the GCC [62]. Related to this, most of the information was solicited from the accompanying caregiver and it is unclear who constitutes a caregiver. Third, though standard tools used to assess CAMH are essential for international comparison, most of them emanate from Euro-American nosographic perspectives. Little effort was taken to subject tools to cross-cultural

validation so their utility could resonate with local symptoms of distress. It has been widely established that psychiatric distress tends to manifest as per the local idiom of distress [63]. Therefore, studies aiming to develop culturally sensitive diagnostic tools are needed in order to ensure that culture-specific idioms of distress are taken into account. Related to this, some studies have examined the concept of stress in the GCC. However, stress is yet to be a featured diagnostic criterion in the international nomenclature. Four, for proper epidemiological studies, community surveys are optimal compared to clinical settings. In the present review, a significant number of studies constituted a self-selective cohort where most participants were recruited from schools or clinical settings. Community surveys with a national catchment are therefore warranted. Five, outcome measures and what constitutes CAMH disorders were not completely homogeneous across accrued articles. Finally, studies in the GCC appear to be skewed towards a particular subtype of child and adolescent disorders. It remains unclear whether the GCC does indeed have a high concentration of such clinical populations, or if this rate of prevalence is simply due to a lack of diagnostic expertise wherein other common childhood disorders such as language and scholastic disorders are overlooked.

5. Conclusion

Despite the aforementioned limitations, countries in the GCC have recently witnessed an increase in research pertinent to CAMH. This indeed corroborates the existing trend of this region being in its second stage of demographic transition characterized by a high fertility rate and a predominance of the pediatric population in its pyramid-like population structure. The present appraisal indicates that the most common CAMH disorders are increasingly being reported in the GCC. The global rate of CAMH disorders varies from 12.83% to 57.04%, with ADHD at 12.83%–26.135%, depressive symptoms at 26.12%–45.09%, anxiety at 17.27%–57.04%, disordered eating at 31.55%, and tobacco use disorder at 19.39%. It should be noted that modeling the quantification of CAMH disorders using local tools is likely to limit their international comparability. Moreover, adhering purely to international screening tools has the potential to give rise to spurious figures owing to the lack of cultural adaptability of these measures. In the future, the quantification of CAMH disorders in the GCC should reflect two contesting backgrounds: the relevance of integrating global or international trends and the paramount importance of viewing CAMH through a more socio-culturally sensitive lens.

Ethics and consent approval

NA.

Consent for publication

NA.

Availability of data and materials

This is a research article and all data generated or analyzed during this study are included in this published article.

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Authors' contributions

MA, MC, RB, MF, SM, and SA had full access to all of the data in the study and take responsibility for the integrity and the accuracy of the data analysis as they were involved in the analysis and interpretation of the data. MC contributed to technical and statistical analysis. MA, MC, RB, MF, SM, and SA were involved in the drafting of the manuscript. All the authors were involved in the critical revision of different drafts of the manuscript.

Declaration of competing interest

None. The authors declare that there are no conflicts of/or competing interests.

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