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REVIEW

Early detection of eating disorders: a scoping review

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Abstract

Purpose Early detection of eating disorders (EDs) could improve their prognosis, decrease morbidity and mortality, and prevent the risk of evolution towards a chronic form and somatic, psychiatric and psychosocial complications. The objective of this review was to examine the current scientific data concerning the early detection of EDs, which is one of the facets of secondary prevention.

Method A scoping literature review was carried out following the PRISMA-ScR criteria, including all articles on ED detection published up to 2021 on PUBMED and PSYCINFO.

Results 43 articles were included. Anorexia nervosa and bulimia nervosa were the most widely studied disorders. The articles focused on professionals from the medical field (GPs, psychiatrists, gynaecologists, gastroenterologists and residents), from the paramedical field, from education and sport, and from the general population. The assessments conducted with the professionals receiving interventions aiming to improve detection demonstrated their efficacy. Interventions for ED detection in the general population and at school seemed less efficacious.

Conclusion The results highlighted some lines of action to be implemented. They pointed towards improving initial and continuing education for professional carers; e-learning could be an interesting solution for continuing education. Improving training with specific instructors, school personnel and sports professionals is also one of the solutions for a better detection of EDs. Specific recommendations could be published for fitness centre professionals to help them to deal with clients suspected of having an ED. Among secondary school students and in the general population, a better dissemination of mental health literacy and the development of mental health first aid programs could help improve early detection.

Level of evidence Level I: Evidence obtained from systematic reviews.

Keywords Eating disorders · Anorexia nervosa · Bulimia nervosa · Secondary prevention · Early diagnosis

Introduction

Centres specialised in the treatment of people with eating disorders (EDs) have observed that appropriate treatment often occurs late, many months, or even years, after the appearance of the first symptoms [1]. Further to this, the longer the duration of anorexia nervosa (AN) with no treatment, the less efficacious is the treatment [2]. Indeed, it has been demonstrated that when AN is treated more than three years after the start of symptoms, the effects of the treatment are reduced [3]. A patient aged 19 or under at the time the eating disorder is detected is four times more likely to recover from AN, and eight times more likely to recover from bulimia nervosa (BN), compared to individuals detected after 20 years, probably because of the shorter duration of the evolution [4].

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Early detection could help to reduce the duration of an untreated eating disorder (DUED), i.e. the time between the appearance of the symptoms and the start of appropriate treatment, and could consequently reduce associated complications. This time lapse is estimated at over two years for AN (29.9 months on average), four years for BN (53.0 months on average) [5], and more than five years for binge-eating disorder (BED) (67.4 months on average)[1]. This time lapse increases with age at first treatment [5]. In addition, a study with 22 years' follow-up showed that people with long-standing ED symptoms were significantly more likely to have had a longer DUED compared to those in remission [6].

Furthermore, the longer the duration of the illness, the higher the mortality rate [7]. The risk of a suicide attempt increases with the duration of the illness, especially because of social isolation, which worsens over time [8]. A decrease in mortality among female patients hospitalised for AN in the 80 s was observed in Sweden. The mortality rate was reduced more than threefold in a decade; this improvement in prognosis could be linked to a better detection and to an earlier start of treatment, following the development of specialised teams. Furthermore, there is more and more information on this pathology, and hospitalisations thus tend to occur earlier [9].

From a neurobiological point of view, it can be hypothesised that a longer DUED increases the duration of malnutrition. Secondary nutritional factors have an impact on comorbidities, which can, in turn, maintain EDs and thus aggravate the risk of neuro-progression and lead to a more serious prognosis [10]. Associations have been found between the duration of AN and cognitive functions: the longer the duration of AN, the greater risk of grey matter atrophy in the cerebellum and the midbrain [11], and the greater the risk of a decrease in cognitive performance [12]. Correlations have also been evidenced between the duration of AN and emotional and social functioning: the longer the duration, the fewer the positive facial expressions observed [13], the more severe are the anomalies in social functioning [14], and the greater the exhaustion of family and friendly resources, progressively leading to a social network deficit [15]. Social withdrawal can also be found in BN and BED, connected to a feeling of shame caused by hyperphagia and purging behaviours and the negative representations of obesity [16, 17].

From an economic point of view, beyond the human cost, EDs lead to various types of cost [18]. Indeed, there are costs relating to health system expenditure, and costs resulting from losses in productivity for people with an ED. Furthermore, informal care provided by family members and others also has a value. Finally, we can add costs of government and non-government programs, assistance, transport and accommodation costs associated with receiving treatment, and funeral costs.

In 2012, the total costs generated by EDs were estimated at 34 billion euros in Australia [18]. In comparison, in the same country, anxiety and depression accounted for 26.8 billion euros, obesity for 34.4 billion euros and consequences of cigarette smoking for 183 billion euros.

An American report published in 2020 estimates at 64.7 billion dollars the yearly economic cost of EDs [19]. Similar results are found in the United Kingdom [20]. Thus, earlier care would enable greater efficacy in the treatment of EDs, which could reduce the number and the duration of hospitalisations and improve productivity at work. Alongside, at present only 30 to 50% of people with an ED seek treatment [21]; thus, early detection could lead to a short term increase in health costs but a decrease in health and social expenditure in the long-term [18].

EDs mainly begin during the adolescent years [22]; the population at risk is found in schools and sporting populations [23] and more widely in all fields of healthcare [24]

To summarise, earlier care enables an aggravation of the somatic, psychiatric and social aspects of EDs to be avoided. In the evolution of EDs, the early phase is defined as less than 3 years of evolution [2, 10]. The early detection approach is part of secondary prevention: secondary prevention in mental disorders targets individuals meeting diagnostic criteria in the early stages of the illness; the aims of prevention are early detection and intervention for these patients [25]. This review focuses on the first phase of secondary prevention (early detection) and does not cover the early treatment phase.

International guidelines [24, 26–28] have emphasised the importance of early detection of EDs. This review will focus on both EDs and disordered eating, as it is well known that in adolescence, disordered eating has a similar negative impact to that of established diagnosis of EDs among adults health [29–31]. The means to achieve early detection are not detailed in the guidelines. Although a recent review about primary prevention exists [32], there has so far not been any review collecting data on articles concerning early detection. The aim of this review comprising an inventory of all the research focused on early detection of EDs, is to detail the types of study that exist, on which populations, their limitations, and their results, to highlight which types of study still need to be developed. The authors chose to perform a scoping review rather than a more focused systematic review. In fact, this subject has generated very few methodologically sound studies, and it did not seem appropriate to narrow the

research field to a single question given that it is the first review on the subject.

Methodology

The literature review was carried out following the PRISMA-ScR method [33]. There is no review protocol already registered.

Eligibility criteria

The review concerned secondary prevention of EDs in terms of early detection.

The inclusion criteria were: articles in English or French published up to January 2021, concerning secondary prevention in terms of detection/screening, focusing on EDs, and published in peer-reviewed journals (see below for details). We included all types of study.

The exclusion criteria were: studies on primary prevention, on secondary prevention focusing on early intervention (and not detection) and on tertiary prevention.

Information sources and searches

This scoping review was conducted by two researchers, N.K. and N.G., working blind, on the PUBMED and PsycINFO databases including all dates up to January 2021. The search algorithm used in PUBMED was ("eating disorder*"[tiab] OR "anorexia nervosa"[Title/Abstract] OR "bulimia nervosa"[Title/Abstract] OR "binge eating disorder*"[Title/Abstract] OR "disordered eating"[Title/Abstract] OR "appetite disorder*"[tiab]) AND ("Secondary Prevention"[Mesh] OR "detect*"[Title/Abstract] OR "identification"[Title/Abstract] OR "recogni*"[Title/Abstract] OR "secondary prevention"[Title/Abstract] OR "diagnos*"[tiab] OR "mental health literacy"[tiab]) AND (english[Filter] OR french[Filter]). The same terms were used on PyscINFO. The screening and selection of articles is shown in Fig. 1. The decision to include or exclude studies was initially made on the basis of the article title, then its abstract, and finally the full text. The researchers then discussed their choices and came to an agreement. Duplicates were excluded. A manual search was also conducted on the reference lists when the titles appeared relevant.

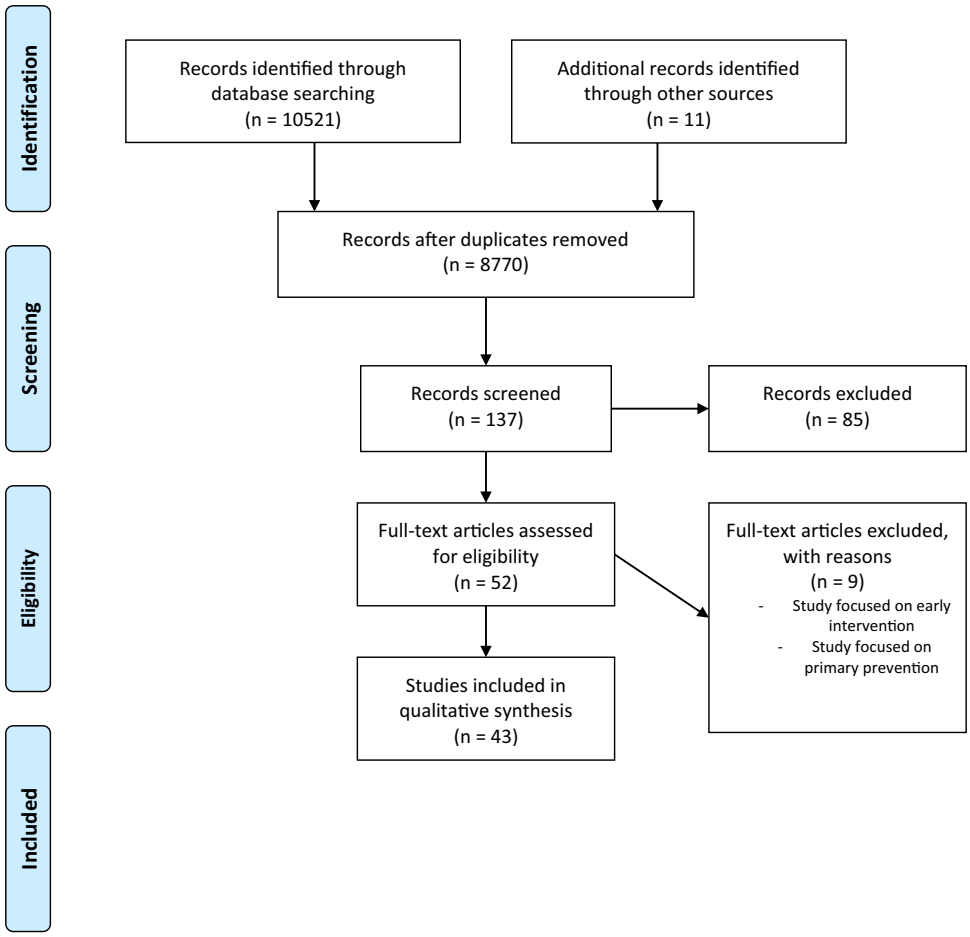

Fig. 1 Flow diagram of the scoping literature search

Data collection

The following information was extracted independently by NK and NG from each paper: study design and purpose of the study, type of population studied, type of eating disorder and how the diagnosis was made, age, number of results and response rate included in the results of the study, and main results. (detailed in Tables 1, 2, 3 and 4).

Risk of bias

The risk of bias in individual studies was assessed using a quality rating provided by the Kmet form developed for quantitative analysis [34]. This form assesses the quality of studies on 11 different criteria in relation to the study design, methods, reporting of results, and study conclusions. Each study was given a score from 0 to 2 for each criterion, with a maximum total score of 22. The scores are shown in Appendix 1 in ESM.

Synthesis of results

The results were grouped according to four main types of study population: general and school populations, sports professionals, general medical practice, and health professionals.

Results

In all, 43 studies were included. These studies show some heterogeneity for the type of population, the countries where they were conducted, and the type of ED.

Types of population studied (Tables 1, 2, 3 and 4)

Among the 43 studies, the most widely represented populations were from schools (11/43), general medical practice (9/43), and sports (7/43), followed by other healthcare professionals (10/43): dental care professionals (4/43), gynaecologists (2/43), psychiatrists (1/43), gastroenterologists (1/43), and health professionals more generally including dieticians, psychologists, GPs, social workers, etc. (1/43) and medical residents (1/43) (Table 4). Finally, six studies in the general population were found (6/43) (Table 1).

The studies focusing on school populations (Table 1), including studies involving school personnel (4/43) and pupils (7/43) were the most numerous. This was followed by primary care in general medical practice and then by sports professionals (Table 2). Among primary care populations, the focus was mainly on general practitioners (7/43), and then on patients visiting GPs (2/43) (Table 3).

Source of the studies

Almost all the studies on general populations were conducted in Australia (5/6). Among the other studies (38/43), most of them were conducted in the USA (13/38), and the United Kingdom (11/38); the remaining 14 came from European countries (7/38), Canada (3/38) and Australia (4/38).

Type of ED understudy

The most widely studied type of ED in this sample of articles was AN (26/43), and BN came second (23/43). BED was very seldom explored (9/43). Some articles focused on ED symptoms (11/43). Six articles mentioned EDs without specifying which specific disorders they referred to.

Results in each type of population

In school and general populations

School populations The approach to early detection were training staff about detection, and secondary prevention programmes directly applied to schools.

The first type of approach was to train school staff, and it seemed to enable EDs to be better recognised. One study presented ED training programmes for school staff and assessed a one-hour training programme delivered by an instructor who provided definitions, signs, and symptoms that were useful in identification, and talked about causes, effects and treatments. The staff was then asked to identify students they thought were at risk for an ED. The trained group identified significantly more students with an ED than the control group [37] (Table 1).

Two studies assessed school career orientation counsellors' knowledge, their abilities and their degree of implication in the identification of students with AN or BN [35, 41]. These two studies assessed subjects' knowledge via a questionnaire: over twenty years, the counsellors' knowledge improved for most items assessed in the questionnaire: recognition of symptoms of EDs, such as amenorrhea or binge episodes, had significantly improved [35]. The proportion of counsellors who thought they were able to identify an ED among students and help them if necessary did not however evolve over the 20 years (Table 1).

Finally, a study carried out on school staff more generally showed that the majority of staff felt helpless in the absence of a policy on EDs in their school; almost all of those who had not received any training thought that it would be useful for them [43] (Table 1).

The second type of approach was prevention programmes in schools. A study was conducted in 1997 in the United States in a university to assess a primary/secondary prevention programme: this programme involved an intervention

Table 1 Articles concerning the school and general populations

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
1990	Price et al. [35]	USA	Cross-sectional study. Aim is to examine school counselors' knowledge of adolescent EDs and self-evaluated competence to help them using a questionnaire	AN, BN	X	X	School counselors	337	67%	40% feel not very competent to help students with ED 72% had encountered students with AN or BN 35% were informed by another student
1997	Mann et al. [36]	USA	Interventional study. The aim is to evaluate effects of primary prevention in school on secondary prevention	ED symptoms	EDE Q MSEI Self esteem survey	17–20	Students	X	X	Ineffectiveness of combined primary + secondary prevention 54% of at-risk students vs 57% of the others took part in the intervention 3 "high risk" students out of 127 sought help after the intervention
1998	Chally [37]	USA	Pre-test post-test control group design. Evaluating a school personnel training program on EDs measuring the changes in knowledge and attitudes, and the number of students with EDs identified, compared with non-trained school personnel	ED (AN, BN and BED)	X	X	School personnel -with training -control group	93 61 32	72%	Significant difference in the number of students identified as at risk of ED by trained school personnel vs. control group (3.42 vs 2.6 $p=0.01$)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2004	D'Souza et al. [38]	USA	Post-screening evaluation	ED (AN, BN)	EAT-26 ≥ 20	14–19	Adolescent students	1027	77%	Of the 1027 students, 566 remembered their EAT-score
			Follow-up evaluation to assess the implementation and effectiveness of a screening program (NEDSP) 1 to 2 months after it was conducted in 4 high schools. Students were asked to fill in a self-administered 35-item questionnaire, including questions on demographics, stature, weight the score obtained on the EAT-26 during NEDSP, and on whether they had been advised to talk to someone				-Female	592		EAT-score ≥ 20 for respectively 22% and 2% of female and male adolescents
							-Male	435		Respectively 49% and 37% of the female and male adolescents had shared their EAT-score with someone, and 44 and 8 of them were advised to see someone for help. Of these 52 adolescents, 6 (11,5%) saw a health professional (1 girl and 5 boys)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2004	Becker et al [39]	. USA	Post-screening evaluation The aim of this study was to assess whether the NEDSP program had a positive impact on individuals found to have clinically significant disordered eating Follow-up contact was attempted by telephone 2 years after the implementation of the program	Potentially significant symptoms (e.g. purging or binging at least once a month or significant distress)	X	11–70	Students	289	41%	188 of the 289 students met a counselor 109 of them (58%) were advised to seek further evaluation for ED symptoms. Of these, 52 (47,7%) had at least a first appointment for further evaluation, and finally 43 of the 109 students (39,4%) reported seeking treatment

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2009	Noordenbos et al. [40]	Netherlands	Interventional study The aim is to evaluate the effect of lessons of 1 h administered by 24 ex-ED patients, to students in secondary education. They talked about risk factors, first symptoms of ED, characteristics and consequences, treatment and recovery. Measures where then implemented using questionnaires availability of school-based prevention programming	AN, BN, BED	DSM IV	11–17	Students	3879	x	After the intervention: -A mean of 17% recognized ED symptoms in others -A mean of 9% recognized symptoms in themselves. 41% of them wanted to talk about their ED problems with peers or friends. 39% preferred to talk with their parents, 27% with ex-patients, and 17% with professionals (school doctors, general practitioners or therapists). 33% did not want to talk about their ED symptoms at all

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2011	Harshbarger et al. [41]	USA	Survey of the school counselors to determine whether knowledge has increased over 20 years and determine the	AN, BN	X	20 -67	School counselors	109	75.2%	51.5% think they are "not very competent" to identify ED 55% feel that EDs are a problem at school 77% of the participants have good knowledge about AN and BN 58.8% thought their school would be receptive to an ED prevention program Compared to the Price study[35], a significant increase in the number of correct responses was seen for 6 of 15 items concerning AN and for 9 of 15 items for BN. For example the proportion of school counsellors recognising 3-month amenorrhoea as a symptom of AN had risen from 68 to 85.7% ($p < 0.001$); and 93.1% (versus 64% 2 years earlier) recognised an average of 2 binge-eating episodes a week for at least 3 months as a characteristic of BN

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2013	Gratwick et al. [42]	Australia	The goal of the study was to examine levels of and factors associated with self-recognition of ED behaviors among college women with bulimic-type ED symptoms. Participants were women recruited from four tertiary education campuses in Australia, by e-mail, advertisement or direct approach. They filled in questionnaires which measured ED psychopathology and they were presented with a case vignette of a woman, Naomi, with BN symptoms. Questions were asked about nature and treatment of Naomi's symptoms, and then about self-recognition of the same problems	BN, BED	x	Mean 27.2	-Female college students with high levels of bulimic-type ED symptoms -Without ED	94 662	x	-Of those presenting symptoms in questionnaires, $n=49$, 52.1% recognized a problem with their eating -Participants who recognized an eating problem were more likely to report self-induced vomiting (87.5% vs. 12.5%, $p < 0.01$) and extreme dietary restriction (66.7% vs. 33.3%, $p = .0.05$) than non-recognizers -35.1% of students with bulimic-type symptoms reported that they had at some time sought help from a health professional, such as a general practitioner, psychologist, or dietician/nutritionist, for a problem such as the one described

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
										-Of the 49 participants who recognized a problem with their eating, 24 had at some time sought such help, whereas 9 of the 45 participants who did not recognize a problem with their eating had sought help (49.0% vs 20.0%; χ^2 1 = 8.65, $p < .01$)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2014	Knightsmith [43]	UK	Anonymous online questionnaire aimed at school staff in UK schools: explored school staff experiences of ED, including access to training and support. It also asked for recommendations	ED	X	X	School staff:	826	66%	-41% of respondents' schools had no reference to ED in any policy. Only 5% of respondents' schools had implemented specific ED policies, although 61% of participants considered them to be effective
							-Teachers	286		
							-Middle leaders	196		
			About how they could best be supported in helping young people with ED				-Senior leaders	137		
							-Pastoral leaders	127		-Staff who had received training found it useful for: increased confidence in supporting ED (27%), a source of practical support and ideas (22%) and increased awareness of ED warning signs (11%)
							-Support staff	80		-91% of staff who had not received training said that they would find ED training useful or very useful

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2016	Gratwick-Sarll et al. [44]	Australia	The aim was to examine self-recognition of ED among secondary school adolescents with bulimic type ED. They completed a self-report questionnaire which included amongst other things measures of ED symptoms and height and weight to evaluate BMI. Probable bulimic-type ED students were identified from these questionnaires. These students were then presented a vignette of a fictional woman with symptoms of BN (Kelly), followed by a series of questions concerning the nature and treatment of the symptoms, and by a question assessing self-recognition. Participants were then divided into recognizers or non-recognizers, depending on their self-recognition	BN, BED	DSM 5	12–18	Secondary school students: female participants identified as probable cases of bulimic type ED	139	75.1%	-58 recognized a problem with their eating (42.3%) -Those who recognized an eating problem had more serious EDs -Participants who recognized a problem with their eating were more likely to have sought professional treatment for a problem like the one in the vignette (24.1% vs. 8.9%, $p=0.01$) and more likely to believe that they should seek such treatment (29.3% vs. 16.7%, $p=0.07$) -Participants who believed that they should seek professional treatment for problem like Kelly's were more likely to have sought such treatment than those who did not (36.7% vs. 9.3%, $p<0.01$)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
										-Only 30 participants (21.6%) believed that they should seek such treatment and only 21 participants (15.1%) had ever sought such treatment
2020	Fatt et al [45]	Australia	Online survey. The aim was to assess self-identification of having a body-image problem among school students, to study how this self-identification varies across sex, age, and type of ED, and to study how it is related to help-seeking in adolescents	ED: AN, BN, BED	DSM 5	Mean: 15.14	School students	1002	70%	-66.1% self-identified as having a current body image problem
				OSFED						-Adolescents reporting purging, binge eating, or non-purging eating behaviours, were significantly more likely to self-identify as having a current body image problem. ($p < 0.001$)
				UFED						- Girls were 3.24 times more likely to self-identify than boys, $p < 0.001$
										-After adjusting for other variables, adolescents who self-identified were 2.71 times more likely to seek help than the others ($p < 0.001$). (13.4% vs 3%)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2006	Mond et al. [46]	Australia	The aim of this study was to explore self-recognition of ED behavior in a community-based sample of individuals with bulimic-type ED. They were recruited on questionnaires which measured ED pathologies. Those who met the screening criteria where approached for an interview. They were presented a case vignette of a woman "Kelly" meeting criteria for BN. Participants answered questions about the diagnosis for Kelly, and the treatment, and they were asked if they thought they had a similar problem	BN, EDNOS, BED	DSM IV	18–40	Sample of individuals from general population with bulimic-type ED	159	76.6%	-51.9% of them reported that they might currently have a problem such as the one described -Compared with non-recognizers, they had higher level of ED psychopathology and psychological distress and tended to be heavier -Those who vomited significantly were more likely to recognise their symptoms (75%) than the others (46%) ($p = 0.003$) -Those who recognized their problem were more likely to have sought help from a health professional for eating or weight (62.8%) than the non-recognizers (45.8%) ($p < 0.05$)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2012	Hart et al. [47]	Australia	Interventional study. Non-controlled repeated measures with self-report questionnaires at 3 different times to examine whether mental health first aid training for EDs was effective in changing knowledge, attitudes and behaviors towards people in general population with ED. University students were trained in a single 4-h session with didactic teaching, learning activities and discussions	ED: AN, BN, BED	DSM IV TR	x	Undergraduate students from University of Melbourne:	90 73	69%	-Proportion of students recognizing the problem in a case vignette presenting a person with BN, increased significantly between time 1 and time 3 ($p < 0.001$)
							-At baseline (time 1)			-There is no significant difference in level of contact between study participants and people with potential ED between time 1 and 3
							-6-months follow up (time 3)			-Of the 20 students reporting having assisted someone with ED after the intervention, some thought that the program contributed very much (30%) or at least a little (60%) to the level of success. 55% thought that they changed their methods of assistance as a result of the program. 35% of the assisted people sought help in mental health care

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2012	Darby et al [48]	. Australia	Cross-sectional study After seeing a vignette case describing "Jenny", a 28-year-old woman suffering from AN, participants (sample from the general population) were asked to fill in a questionnaire. Items were about the diagnosis, treatment, healthcare providers	AN	x	Mean: 50.2	General population	983	63%	-32.5% thought Jenny's main problem was low self-esteem/lack of self-confidence -16.1% answered AN -16.7% answered BN -Females were more likely than males to believe that Jenny's main problem was BN (20.5% vs. 6.9%; $p < 0.001$)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2014	Gratwick-Sarll et al. [49]	Australia	Interventional study. Non-controlled repeated measures at 3 different times to evaluate effectiveness of a workshop aiming to improve mental health literacy among university students in psychology. The purpose was to improve knowledge (questionnaire), recognition of BN (vignette case of non-purging type BN), attitudes and behaviors towards people in general population presenting EDs	BN	DSM IV TR	x	Students in psychology	177	X	-Significant improvement in knowledge about BN $p < 0.001$ between time 1 (before intervention) and time 3 (3 months follow-up) -Significant improvement in the ability to recognize BN $p < 0.001$ between time 1 (18.6%) ant time 3 (37.8%) -At time 3, these students felt more likely to approach people with EDs (91.9%), to discuss their concerns (91.4%) and to suggest professional help (93.7%) -At time 3, 42% of them reported having encountered someone with mental health problem or with ED in the past 3 months, 85.5% were able to provide assistance (vs 16.1% before the workshop). 46% of people who were told to seek help by these students said they did so

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
2018	Melioli et al. [50]	France/Australia	Cross-sectional study. Guidelines for mental health assistance for EDs were disseminated on the Internet. College students were asked to fill in a questionnaire when they downloaded the guidelines, and were sent a second questionnaire 28 days later. The aims of this study were to disseminate a French-language version of the guideline among French college students and evaluate their uptake, and to evaluate the perceived usefulness of the guidelines among those who downloaded them	ED	x	Mean: 22	College students	50	4.3%	-Of those who answered the two questionnaires, 86% found the guidelines useful to very useful -10% sought professional support for themselves -24% of these college students tried to help someone: 36% of them reported that their intervention led to resort to professional help
2018	Gumz et al. [51]	Germany	Non-randomized pre–post-intervention study. It investigated the effect of a systemic public health intervention on the length of time between AN symptom onset and contact with the health care system and the initiation of treatment	AN	DSM IV	10–60	Intervention in general population and evaluation on clinical population; Patients	77 59 18	60.8% control group 50% post-intervention group	Duration of untreated AN before public health campaign = 36.5 months Duration of untreated AN after campaign = 40.1 months (adjusted mean difference = 0.07 months, 95% CIs − 0.18 to 0.32, $p = 0.58$)

Table 1 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size *N*	Response rate	Main results
							-AN			Duration until first contact with a health care professional (adjusted mean difference =0.08 months, 95% CI − 0.37 to 0.20, =0.57)*p*
							-Control group			

AN anorexia Nervosa, *BED* Binge Eating Disorder, *BMI* body mass index, *BN* bulimia nervosa, *EAT-26* Eating Attitude Test 26, *ED* eating disorders, *DE* disordered eating, *DSM* diagnostic and statistical manual of mental disorders, *OSFED* other specified feeding or eating disorder, *UFED* unspecified feeding or eating disorder, *UK* United Kingdom, *USA* United States of America, *X* unavailable data, *y* years old

by subjects having had EDs; the students filled in a self-assessment questionnaire three times over a duration of 12 weeks on their satisfaction or dissatisfaction with their current weight and their self-confidence. The researchers measured the impact of this primary prevention intervention on secondary prevention: 3 students with "a high risk of ED" out of 127, (corresponding to the first quartile of those who reported the most ED symptoms in the first survey), sought help after the programme had been completed. Proportionally, these students did not take part in this prevention programme any more than the others [36].

Some secondary prevention programmes have been implemented in American schools. Among them was the National Eating Disorder Screening Programme (NEDSP) [52]. It was initially implemented in 409 American universities in 1996. All the students were given an EAT-26 questionnaire to complete. 9069 students took part. Among them, 5787 saw a counsellor to talk about the results and particularly about the possible need for further exploration. These counsellors had been previously trained using slides and videos [53]. This programme was evaluated in universities. It was then implemented in high schools in 2000.

In universities, two years after the NEDSP, a sample of the students (see Table 1 for details) was randomly selected and interviewed on the phone. Only half of those who had been advised to see a doctor for a more in-depth examination had followed this advice by making a first appointment, and 39.4% stated they had sought care after the NEDSP. The authors concluded that school screening and educational programmes were good secondary prevention tools to identify and promote treatment for those presenting clinical symptoms [39]. Following the success of the NEDSP in universities, the experience was reproduced in 152 high schools in 34 American federal states in the early 2000s [54]. In four of these high schools, the assessment of this screening programme was conducted via a self-administered questionnaire two months after the programme implementation. Questionnaires from 1027 students were included in the analysis. More than half of them remembered their EAT-26 score. In all, 1/4 of the female adolescents interviewed and 1/5 of the male adolescents reported having shared their result with an adult. Of those who were advised to see someone, 11.5% reported they had been assessed by a health professional since they had been given their score. About 75% of the students interviewed recommended this screening programme to other schools. The members of the educational team who were interviewed thought that these explorations were important and they were willing to be involved [38].

Another intervention was run in the Netherlands in secondary schools: ex-patients who had had EDs came to take part in a one-hour session about EDs and how to identify them early. One-tenth of the students recognized ED symptoms in themselves and about a fifth recognized symptoms

Table 2 Articles concerning sports professionals

Year	Authors	Country	Purpose and study design	Psychiatric disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2004	Vaughan et al. [55]	USA	The aim is to explore college athletic trainers' confidence in helping female athletes who have EDs, using a questionnaire based on Bandura's self-efficacy model, to explore athletic trainers' efficacy, expectations, outcome expectations, and outcome values relating to female athletes with eating disorders	AN, BN, ED NOS	APA	X	Athletic trainers	171	77%	27% of athletic trainers believed they could identify an athlete with an ED Athletic trainers who worked in institutions with an ED policy were significantly more likely than the others to feel confident identifying an athlete with an ED ($p=0.002$), talking to an athlete with an ED ($p=0.036$), asking an athlete whether she has an ED ($p=0.034$), effectively offering support ($p=0.018$), and referring an athlete for professional help ($p=0.003$) 78% of the athletic trainers felt it was their role to identify athletes with EDs

Table 2 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2005	Sherman et al. [56]	USA	The purpose is to survey college coaches with respect to how female athletes with disordered eating or EDs are identified, how coaches are involved, and the identification criteria used. Questionnaires were distributed to coaches of women athletes in NCAA institutions	ED and disordered eating	X	X	College coaches	2894	31.8%	37% of coaches viewed amenorrhea among athletes as always "normal" 35.3% of coaches had already referred an athlete with amenorrhea to a doctor 18.3% had never identified any symptomatic athlete They had identified on average 2.89 athletes presenting symptoms during their careers 26% of the coaches were aware of an athlete who had an ED whom they had not identified while she was competing for them 60.2% were interested in extra training on these pathologies

Table 2 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2008	Manley et al. [57]	Canada	The primary aim was to assess registered fitness instructors' ability to recognize an individual with AN (compared to paediatricians) and determine what they would do professionally in that situation. Results are based on surveys	AN	X	X	Fitness instructors Pediatricians	62 56	3% 37%	-On a case scenario, 32% of fitness instructors identified an AN case vs 88% of the paediatricians ($p < 0.001$). 53% of fitness instructors indicated that the woman in the case scenario was an over-exerciser 37% of the instructors wondered about the ethical aspect of taking this woman into their club, and this percentage rose to 63% among those who had identified AN 67% indicated previously encountering exercisers such as the person seen in the case
2011	Torres-McGehee [58]	USA	Cross-sectional and descriptive study design ED knowledge and confidence in that knowledge were explored among administrators, coaches, and auxiliary dancers., using a 30 item survey. Attendance on ED educational programs was assessed	ED	X	X	Auxiliary dance staff -Collegiate administrators -Coaches -Dancers	158 61 44 53	35.1%	-51.9% of participants had inadequate knowledge about ED on true/false questionnaire -Coaches scored 67.4% of correct answers for identification of signs and symptoms of ED and administrators scored 74.3%

Table 2 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2013	Nowicka [59]	Sweden	Qualitative study Investigation of elite coaches' attitudes towards ED, knowledge about ED and early intervention skills when confronted with possible ED in their female athletes	ED: AN, BN	DSM IV	Athletes from 7 to 35	Elite coaches from sport groups in: -Aesthetic -Weight class -Endurance	18 5 7 6	64%	-2/3 did not consider ED as a problem in their sport although most of them reported personally having coached an athlete with ED -1/3 said their knowledge of BN was very limited -If they suspected an ED, 61% would contact the athlete and tell her. Only 11% would refer them to a specialist
2015	Bratland et al. [60]	Norway	Cross-sectional study using self-report via an online survey. The aim is the exploration of group fitness instructors' knowledge of and attitudes towards identification and management of DE. The questionnaire contained items on gender, age, educational background, exercising behaviour, and knowledge of recognition and response to DE	Disordered eating	X	X	Group fitness instructors	837	57%	29% have adequate knowledge about symptoms of ED (defined as listing 3 of these items: preoccupation with food and/or body weight/shape, starvation/fasting, bingeing, purging, excessive/compulsive exercising, body dissatisfaction, drive for thinness, and/or change in physical appearance (weight loss/gain) 47% reported knowledge about how to recognize and respond to ED

Table 2 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2015	Wojtowicz et al. [61]	Canada	Cross-sectional study with web-based survey Purpose was to examine Alberta fitness professionals' (1) experiences with fitness clients suspected of having AN, (2) opinions about the ethical responsibility of fitness professionals and (3) views on related training and ethical issues	AN	X	X	Fitness professionals	143	Below 31%	62% reported having already encountered clients who might have AN 59% of them had taken action 76% thought they should do something for ethical reasons 25.7% had already had instructions about what to do in these situations

AN – Anorexia Nervosa, APA – American Psychiatric Association, BN– Bulimia nervosa, DE – Disordered eating, DSM – Diagnostic and statistical manual of mental disorders, ED – Eating disorders, EDNOS – Eating disorder not otherwise specified, USA – United States of America, *X* – Unavailable data

in other students. One-third of the students stated that they wanted to know more about the subject [40].

Finally, three Australian studies evaluated self-identification among students.

Two of them showed that nearly half of the adult students [42] and half of the secondary school adolescents [44] did not recognize themselves as having bulimic-type ED, illustrated in a case vignette, although the questionnaires showed high levels of symptoms. Those who recognized a problem with their eating significantly more often sought help than the non-recognizers [42, 44]. The third study results showed that a better self-identification of a body image problem significantly increased help-seeking among adolescents presenting an ED or an OSFED (Other specified feeding or eating disorder) or an UFED (unspecified feeding or eating disorder) [45].

In all cases, these training and/or screening programmes were well received by teachers and students and were considered useful.

General population Six articles concerned secondary prevention of EDs in the general population.

One study evaluated the recognition of AN from a case vignette, and one-sixth of the participants correctly identified the diagnosis [48]. Another evaluated self-recognition of bulimic-type ED from a case-vignette of a woman presenting BN. Only half of the individuals (who present bulimic type symptoms on questionnaires) recognized having similar symptoms and those who self-identified significantly more often sought help from health professionals for eating and weight problems than the others [46].

Three studies evaluated training programmes in mental health first aid, among different types of university students and using different measures [47, 49, 50]. Two of them showed effectiveness in increasing knowledge about EDs and in improving recognition of BN symptoms [47, 49]. In the second program, "Should I say something", at 3-months follow-up evaluation, nearly half of the students reported having encountered someone with a mental health problem or with an ED, and nearly all of them were able to provide assistance. They reported that when they suggested these people should seek help from professionals, half of them answered they would do so [49]. The third study, which was an internet dissemination of mental health first aid guidelines for EDs, showed that almost all participants found the documents useful, and a quarter of them tried to help someone after reading them [50].

Another type of study took place in Hamburg, Germany, from 2011 to 2014. It was intended to determine the effect of a public health campaign, the "Psychenet healthcare network campaign", which focused on the time from the occurrence of AN symptoms to the first contact with the healthcare system and the initiation of specific treatment. The public health programme included short films on cinema screens, posters relating to these films, information on the Internet about AN,

Table 3 Articles concerning general medical practice

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (years)	Population	Sample size	Response rate	Main results
1996	Bursten et al. [62]	USA	The purpose of this study was to explore family physicians' experiences with BN. A questionnaire was mailed to a representative sample of Ohio family physicians, asking about gender, age, type of training, years of practice, patients seen per week, the total and current number of bulimic patients, referral patterns and non-office contact with persons who are bulimic and anorexic	BN	At least 2 binge-eating episodes With body weight and shape Per week for 3 months and excessive concern	X	GPs	240	40.3%	28.8% of GPs: no past or current office contact with bulimic patient 35% of GPs: 1 to 3 bulimic patients in their career 60% of GPs: no bulimic patient at the time of the survey Mean total number of bulimic patients in the career was 5.3 (SD = 5.6) Mean number of current bulimic patients was 2.4 (SD = 1.9) Respondents who knew persons with BN ($r = 0.31$) or AN ($r = 0.22$) in a non-office setting were More likely to have had bulimic patients ($p < 0.001$)

Table 3 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (years)	Population	Sample size	Response rate	Main results
2000	Hugo et al. [63]	UK	Retrospective study Aim is to calculate general practitioner (GP) referral rates to a specialist ED service and determine the association between referral rate and general practice and practitioner factors	ED	X	Patients below 65	GPs	434	X	Referrals per practitioner ranged from 0 to 13 (mean = 1.3, median = 1.0) In univariate analysis, significant positive relationship with referral was found for -Female gender (RR = 1.54, $p < 0.001$) -Educational level in the UK, (RR = 1.66, $p < 0.001$) -being a GP trainer, (RR = 1.41, $p = 0.003$) -Provision of full contraceptive services (RR = 1.39, $p = 0.004$)
2005	Flahavan et al. [64]	Ireland	Cross-sectional study using a mailed questionnaire. The aim is to identify current trends and deficits in the screening, diagnosis and management of ED in the Irish primary care setting	AN, BN, BED	DSM IV	X	GPs	91	25%	The average current caseload -Of AN patients per GP s 1.42, -of bulimic patients 0.92 and -of BED patients 0.84 48% of the GPs rated themselves as not confident to instigate a management plan for ED patients

Table 3 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (years)	Population	Sample size	Response rate	Main results
2008	Green et al. [65]	UK	This study aimed to examine the beliefs and attitudes of GPs and how they influenced referral behaviours for ED, and to examine the effect of patient weight (normal or low) at presentation on the GPs' referral behaviours	Disordered eating patterns	X	Vignette with an 18y patient	GPs	88	33%	The patient's weight did not have a significant impact on the decision to refer
			Each practitioner was sent an invitation letter, a vignette (18-year-old woman presenting disordered eating patterns) and a questionnaire. In half of the vignettes the woman had normal weight, and underweight in the other half							Intention to refer the patient was significantly related to subjective norms and cognitive attitudes ($p < 0.001$)

Table 3 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (years)	Population	Sample size	Response rate	Main results
2009	Currin et al. [66]	UK	Cross-sectional study. This study explored the influence of primary care physicians' knowledge of and attitudes towards ED in their treatment decisions A questionnaire (items on knowledge and attitude) and two case vignettes were mailed to the GPs	ED: AN, BN	Academic literature and national UK protocol for the management of eating disorders in primary care from Royal College of Psychiatrists	X	GPs	82	53.2%	-The maximum number of correct answers on the knowledge questions was 18. Individual scores ranged from 2 to 13 (mean = 7.2, SD = 2.5) -43.4% identified the BMI diagnostic threshold as being below 17.5 kg/m^2, but 53.0% believed the threshold to be even lower (16.0 kg/m^2) -3 months of amenorrhea was recognized as a diagnostic criterion for AN by only 39.8% -Few clinicians knew of the association of purging with enlarged parotid glands (54.2%) and delayed gastric emptying (31.3%) -87.7% underestimated the prevalence of BN

Table 3 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (years)	Population	Sample size	Response rate	Main results
2013	Hunt et al. [67]	UK	Qualitative study, focus group The current study used patient vignettes to explore GPs' understanding and experiences of diagnosing and treating patients with AN	AN	X	X	GPs	12	X	-Hesitant diagnoses -Therapeutic relationships with patients with AN considered highly complex
2017	Higgins et al. [68]	USA	In this study, a sample of physicians was recruited online. Videotaped vignettes of a primary care appointment (with a patient presenting AN, four different scenarios) were shown to these participants, who were asked to diagnose the patient, and could suggest a referral	AN	DSM V	X	GPs	160	88%	38.75% assigned non-ED-related medical diagnoses to a AN patient vignette 40.6% of the sample recognized an ED as the sole diagnosis 20.6% listed an ED diagnosis among other possibilities (hypothyroidism, irritable bowel syndrome…)

Table 3 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (years)	Population	Sample size	Response rate	Main results
1997	Ogg et al. [69]	UK	Case–control observational study	AN, BN, atypical AN, atypical BN	DSM III R CIM 10	14–48	Patients in general practice	78	78%	71% of all patients consulted more than 4 times in the 5
			The aims were to see whether patients with ED consult their GPs more frequently than control subjects prior to the diagnosis of the ED and, if so, to describe the patterns of consultation in terms of how frequently they consult and with which types of symptoms				-AN	34		years while only 18% of the controls consulted as frequently
							-BN	19		
							-Partial syndrome	25		
							-Control group	78		

Table 3 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (years)	Population	Sample size	Response rate	Main results
2005	Lask et al. [70]	UK	Case–control observational study. This study aimed to determine whether there are specific patterns in the frequency and content of family physician consultations that might predict its onset	AN	X	Onset of illness ≤ 14	Patients in general practice	57	X	-Total number of consultations over the past 5 years was always
							-AN	19		
							-Emotional disorder	19		significantly greater in the 2 clinical groups than in the non-clinical group ($p = 0.01$)
							-Control group	19		-AN group had a greater number of eating, weight, and shape consultations than the other two groups over each time period. ($p = 0.001$)

AN anorexia nervosa, *BED* Binge Eating Disorder, *BMI* body mass index, *BN* bulimia nervosa, *ICD* International Classification of Diseases, *DSM* diagnostic and statistical manual of mental disorders, *ED* eating disorders, *GP* general practitioner, *UK* United Kingdom, *USA* United States of America, *X* unavailable data, *y* years old

Table 4 Articles concerning health specialists

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
Dentists										
2005	Debate et al. [74]	USA	Randomized cross-sectional study. The purpose was to explore knowledge among dentists and dental hygienists concerning the oral and physical manifestations of EDs. A self-administered paper and pencil questionnaire with 27 items was mailed to subjects	AN, BN	X	X	Dentists Dental hygienists	207 369	33.4%	16% of dentists and 28% of dental hygienists had scores that were categorized as indicative of good knowledge of oral signs associated with ED
2006	Debate et al. [75]	USA	Randomized cross-sectional study. Aims of this study were to: (1) explore readiness among dental hygienists with regard to specific secondary prevention practices in ED, and (2) identify associated health beliefs influencing adoption of ED-specific secondary prevention behaviours among dental hygienists	ED (AN, BN)	X	X	Dental hygienists	378	45%	-17.8% refer patients who may have an ED towards specific treatment and only 7.2% of them communicate with the patient's GP -28.6% correctly identified at least 7/9 oral manifestations of ED -10.1% correctly identified 7 or more physical signs of AN, and only 1.92% correctly identified 7 or more signs of BN

Table 4 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2013	Debate et al. [76]	UK	Longitudinal prospective group randomized controlled trial. The purpose was to determine the efficacy of a theory-driven Web-based training program to increase the ability of oral health students to adopt behaviours related to the secondary prevention of disordered eating behaviours. The study compared web-trained students with the control group (untrained)	Disordered eating behaviors (unhealthy weight control behaviors)	X	X	-Dentists Control group -Dental hygienists Control group	193 154 93 61	41%	E-learning program showed benefit on knowledge ($p=0.001$), role beliefs ($p=0.035$) and self efficacy about ED ($p=0.002$)

Table 4 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2015	Johannsson et al. [77]	Norway	Cross-sectional study The purpose was to investigate knowledge, attitudes and clinical experience with regard to patients with ED among Norwegian dentists. A questionnaire was sent by mail	ED	X	X	Dentists	1726	40%	-Among the 54% of dentists, who had suspected ED in a patient, in 53% of the cases the patient/parent was not informed about the suspicion by the dentist; for 27% the dentist told the patient/parent and had the diagnosis confirmed, and for 19% the dentist told the patient/parent but did not have the diagnosis confirmed -Self-rated general knowledge about ED was significantly better among females than males ($p < 0.001$)
Gynecologists										
1999	Morgan et al. [78]	UK	Cross-sectional study. The aim is to explore gynecologists' attitude and knowledge about EDs A questionnaire concerning EDs covering aspects of diagnosis, characteristic gynecological manifestations, treatment, and attitudes was mailed to the gynecologists	AN, BN	DSM IV	X	Gynecologists and obstetricians with more than 1 year's experience from 4 teaching hospitals in Australia and the UK	115	86%	-20% were confident for diagnosing ED -23% rarely or never inquired about ED in the management of infertility -42% overestimated the weight loss threshold to diagnose AN by 20% or more, – 25% regarded BN as untreatable

Table 4 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2010	Michala et al. [79]	Greece	Cross-sectional study. The aim was to assess the knowledge and attitudes of Greek gynaecologists towards patients with anorexia nervosa. A questionnaire was issued to gynaecologists in several hospitals	AN	DSM IV	X	Gynecologists:	94:	78%	-40% would prescribe the combined oral contraceptive to a woman with AN
							University hospital	20		
							Private maternity unit	40		-4% always weigh women with secondary amenorrhea, 16% never do so
							Trainees	34		-67% would like to learn more about AN
Psychiatrists										
2013	Jones et al. [80]	UK	Cross-sectional study This study examined the ED mental health literacy of psychiatrists, using an online questionnaire	AN, BN	DSM IV	X	Psychiatrists	126	38.3%	-Questionnaire on knowledge about ED: individual scores ranged from 4 to 25/26 (mean = 15.80/26) -3 months of amenorrhea was recognized as a diagnostic criterion by only 42.1% - 'Over-evaluation of shape and weight' was recognized by only 52.1% as a diagnostic criterion of BN - 34.7% mistakenly believed that SSRIs were recommended by NICE for the management of AN

Table 4 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
Gastroenterologists										
2017	Riaz et al. [81]	UK	Cross-sectional study To examine the knowledge and attitudes of gastroenterologists towards individuals with ED using an electronic questionnaire	AN, BN	Academic literature, DSM IV	X	Gastroenterologists	77	2.5%	-Questionnaire on knowledge about ED: individual scores ranged from 3 to 19/21, mean 11.8/21 - 3 months of amenorrhea was recognized as a diagnostic criterion for AN by only 29.3% - 'Over-evaluation of shape and weight' was recognized by only 40.7% as a diagnostic criterion of BN -43.6% were confident in their ability to diagnose ED whilst only 36.4% were confident in their ability to manage these conditions in their current practice

Table 4 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
Others										
2014	Girz et al. [82]	Canada	Cross-sectional study with web-based survey. The study explored: (a) medical residents' knowledge of and feelings of confidence with ED assessment and treatment among children and adolescents; (b) the amount of child and adolescent ED training received over the course of their studies; and (c) the relationship between overall training hours and self-assessed competence and knowledge about EDs in children and adolescents	ED: AN, BN, EDNOS	X	X	Residents: -Family medicine -Psychiatry -Paediatrics -Internal medicine -Emergency medicine -Obstetrics/gynaecology	880 31.1% 24.2% 10.8% 17.2% 7.8% 8.9%	13%	-70% of participants reported receiving ≤ 5 h of training in child and adolescent ED -Mean level of confidence for the identification of symptoms and diagnosis of AN: 4/5, of BN: 3/5 -A major effect of hours of training was observed on confidence for identification between ≤ 5 h, 6–10 h, and > 10 h ($p < 0.001$) -59.6% of the participants reported an interest in further training in early identification and screening

Table 4 (continued)

Year	Authors	Country	Purpose and study design	Psychiatric Disorder	Diagnosis	Age range (year)	Population	Sample size	Response rate	Main results
2019	Maguire et al. [83]	Australia	The aim of the study was to evaluate the effectiveness of an online training program in mitigating barriers to health professionals treating patients with EDs. Pre and post training questionnaires assessed participants' attitudes, knowledge, and skills in relation to treating people with EDs	ED: AN, BN, BED, EDNOS	X	X	Health professionals:	1813	63.9% completed at least 80% of the learning modules	-Almost half of the sample (46.6%) reported that they felt they were sometimes unable to treat patients presenting with an ED
							Physicians	12		-62.3% of participants stated that they had received only 0–5 h of training specifically on ED screening and assessment
							Nurses	394		- There was a significant improvement in knowledge about EDs after completing the Essentials program, with the mean score on the knowledge measure increasing from 2.67 to 3.76 (on a scale of 0–5), $p < 0.001$
							GP	38		
							Social workers	199		
							Psychiatrists	58		
							Psychologists	538		
							Dieticians	279		
							Occupational therapist	83		
							School counselor	14		
							Other	198		

AN anorexia nervosa, *BMI* body mass index, *BN* bulimia nervosa, *DSM* diagnostic and statistical manual of mental disorders, *ED* eating disorders, *EDNOS* eating disorders not otherwise specified, *GP* general practitioner, *SSRIs* selective serotonin reuptake inhibitors, *UK* United Kingdom, *USA* United States of America, *x* unavailable data

BN and BED, their treatment, a list of contacts for ambulatory or hospital care, and prevention in schools consisting in handing out leaflets listing the different treatment options for EDs. Two samples of female patients were recruited in treatment centres for AN in Hamburg: one group was created before the existence of this programme and another group afterwards. The results did not show any significant differences for the duration of illness before treatment, on average 3 years in both cases. As for the time it took to see a doctor, it was about 2 years after the onset of the illness in both situations. All in all, this public health campaign did not reduce the duration between symptom occurrence and specialist consultation/start of treatment [51].

Detection among sports populations (for detailed results see Table 2)

Different professionals from the professional world of sport were studied with respect to ED detection. They are indeed at the forefront when it comes to secondary prevention, as the prevalence of EDs (AN, BN and Eating disorders not otherwise specified—ED-NOS) is higher in sporting populations than in the general population [23].

These studies mainly focused on the sports professionals' implication in early detection, their ability to detect EDs among individuals in sporting activities, their knowledge about EDs and their attitudes when they suspected an ED.

- Most sports professionals feel involved in this kind of detection:
  - Almost all athletics trainers [55], thought it was their role to identify symptomatic individuals practising sport.
  - Among sports coaches from the American National Collegiate Athletic Association (NCAA) which organises sports programmes in many universities, female coaches were significantly more preoccupied by these questions among athletes. More than half of the coaches were interested in extra training on these pathologies, particularly on what to do once the symptoms were detected [56].
- Fitness teachers. In one study, when shown a case scenario of AN in a young woman, over one-third of the coaches wondered about the ethical aspect of taking her into their club. This figure rose around two-thirds among those who had identified AN in this case scenario [57]. Similarly, in a Canadian study on a sample of fitness professionals, three-quarters of them stated they felt ethically obliged to intervene if they were confronted with a case of AN among the people they worked with [61].

  They were all interested in any recommendations on the subject [57].
- Concerning their actual ability to detect an ED among people practising sports: one-third of the coaches from the NCAA stated they had referred an athlete with amenorrhoea to a doctor. They had identified between 2 and 3 symptomatic athletes on average during their careers [56]. One-third of Swedish elite coaches who were interviewed stated they were currently following an athlete with an ED [59]. Among athletics trainers, only a quarter were confident they could identify an ED in one of their athletes [55]. Indeed, more than a quarter of them reported having found out about an ED in an athlete after they had been prepared for competitions. Once the cases were identified, coaches relied mainly on resources from their athletics club and very seldom referred their athletes to GPs or specialists [56].
- Knowledge about EDs, which is needed for detection by these different people, was incomplete and heterogeneous:
  - Among Norwegian fitness club coaches, less than one-third had accurate knowledge of ED signs and symptoms. The level of education was the only factor that significantly influenced their knowledge of EDs [60].
- Thus, over one-third of sports coaches from the NCAA thought that amenorrhoea in an athlete was always normal [56]. Over half the sports coaches from fitness clubs, when presented with a typical clinical case of AN, considered that the person concerned was exercising too much, but they did not envisage the possibility of an ED, despite the fact that two-thirds of the sports coaches interviewed stated they had encountered club members in a similar situation to the case presented [57].

  As for elite coaches, two-thirds were only able to list one or two symptoms of BN [59]. Knowledge of the signs and symptoms required for identification was estimated at over two-thirds for coaches and for administrators of auxiliary dancers (majorettes, color guard, dance teams) on a true/false questionnaire [58]. One-third of Canadian professionals did not feel adequately prepared to manage this kind of situation [61].
- Professionals' attitude to potential cases of ED among sports people:
  - From 10% to one-third of fitness instructors in Canada and Norway thought they could talk to a young woman with AN about their worries concerning her state of health [57][57]. Another Canadian study showed that fitness professionals seemed inclined

to intervene, as 59% of those who had suspected a case of AN stated they had done something about it. However, fewer than half thought that their intervention had some effect [61]. Around two-thirds of elite coaches said they would contact the athlete and tell her that they had observed symptoms of ED, but only 1/9 would refer them to a specialist [59].

Case detection by general practitioners (see Table 3 for detailed results)

General practitioners

These articles focused on different aspects of early detection: the rates of detection in general medical offices, factors influencing the rates of detection and the knowledge of EDs that is necessary for detection among GPs.

There was great variation in GP response rates in the studies on ED detection.

- Rates of detection in medical consultation

The frequency of ED diagnoses established in general medical consultations was lower than what could be expected on the basis of epidemiological data. Certain authors [71] have estimated that the expected point prevalence of AN is 0.15%. On an active file of 2000 patients, one GP would therefore be confronted with 3 cases of AN. Flahavan et al. [64] estimated that 1–5% of the female population could be bulimic. Eighteen cases of BN on an active file of 2000 patients would therefore be expected on the basis of data from the "General Practitioner's guide to eating disorders" [72].

Concerning AN, Irish GPs said they followed 1.34 patients on average [64]. It has been observed that for BN, the detection rate is well below the expected rate: in Ireland, GPs stated that they followed around one patient with BN on average [64]. These results were similar to a previous study conducted in the United States, which evidenced that 1/3 of GPs thought they had never met a patient with BN in their whole career and 2/3 declared not having any in their current active file [62].

In fact, health professionals do not always recognise these illnesses. In Philadelphia, 181 GPs watched videos of people with AN and were asked to give a diagnosis: 40% gave a correct answer, 20% gave several diagnoses including AN. However, 39% did not mention this possibility but instead thought of dysthyroidism, coeliac disease, gynaecological disorders, etc. For those who did give the diagnosis of AN, only 39% would refer the patients to a psychiatrist/psychologist [68]. A British study showed that only a third of GPs recognised 3 months of amenorrhea as a symptom of AN (in accordance with DSM-IV-R criteria in use at that time), and half of them mistakenly used a body mass index below 16 kg/m^2 as a diagnostic criterion of AN [66].

Only one study focused on detection concerning BED; out of 2000 patients, GPs reported they followed on average 0.84 patients affected by this pathology [64]. We would expect more on the basis of epidemiological data [73].

Finally, in the United Kingdom, if all EDs are considered, the rate of referral by GPs to a specialised unit ranged from 0 to 4.14 per 1000 patients aged 65 years or under [63], which is lower than the expected figures.

- Factors associated with ED detection by GPs

It has been shown that GPs who have already been confronted with cases of AN and BN outside their professional life significantly more often diagnose BN than others [62].

At the individual level, the referral rate has been reported to be higher in medical practices where there are several doctors, female GPs, younger doctors, those training other doctors, and those providing contraception; it was also higher when specialised centres were geographically close to the practice, and among doctors who had studied in the UK and not abroad. Finally, doctors who had Membership of the Royal College of General Practitioners (MRCGP) were more likely to refer patients with an ED [63].

Another study evidenced GPs' anxiety towards weighing patients with eating disorder symptoms: the GPs did not know where to refer them, or how to convince them to receive treatment, and based themselves mainly on the patient's weight to make their diagnosis [67].

Concerning GPs' intentions to refer patients with EDs to a specialised unit, one study showed that intentions were significantly linked to subjective norms and cognitive attitudes, but not to the patient's weight for instance, nor to the GP's demographic characteristics [65].

Patients in general medical practice

As we mentioned above, results from studies on GPs showed that patients with EDs were less likely to be detected than could be expected on the basis of epidemiological data. One of the hypotheses investigated in the literature is that patients with EDs consult GPs less frequently than other patients.

However, two studies have shown that adult and adolescent patients with EDs see their GP significantly more frequently than other patients in the 5 years preceding diagnosis [69]. These results were confirmed among young people 14 years and under with AN [70].

The main reasons found for consultation were gastrointestinal (diarrhoea and constipation), gynaecological or psychological symptoms [69].

Among younger patients with AN, the motives concerned weight, body image and eating. These preoccupations were generally not found among other patients [70].

Detection by health specialists (see Table 4 for detailed results)

These articles on early detection by health professionals mainly focused on the following points: their knowledge of EDs and assessments of e-learning programmes aiming to improve ED detection.

Dentists

Dentists and associated professionals play an important role in the secondary prevention of EDs, as they are the first to detect certain complications, especially with BN. They, therefore, have a crucial role in identifying and referring these patients.

However, concerning dental signs suggesting an ED, the dentists and the dental hygienists' knowledge in the USA was generally only moderate; less than one-third of them obtained a score of 7/9 or more on a questionnaire on the subject [74].

Fewer than half of the dental hygienists actually looked for the oral symptoms of EDs and less than a fifth of them referred patients with an ED for specific treatment. Less than a tenth said that they were in contact with the patients' GPs [75]. It is interesting to note that dental hygienists who had a greater perception of the seriousness of BN were twice as likely to assess the oral symptoms of EDs [75]. Concerning dentists, the situation was similar: those who recommended other forms of treatment for their patients' ED were a minority (less than fifth). When dentists suspected an ED in one of their patients, in more than half of the cases, they did not mention it to the patient or to their family. However, for those who did share their suspicion, confirmation of their hypothesis was obtained in more than half the cases [77].

Norwegian dentists identified the media as their first source of information on EDs, followed by the Faculty of dentistry, and only in third position-specific lectures on the subject; moreover, more than half felt that they had not been given enough information on how to treat an ED [77]. An intervention in this respect was carried out in the UK. The objective was to assess an e-learning programme for dentists and dental hygienists, to improve secondary prevention of EDs via the provision of knowledge on the subject. The researchers concluded to a significant improvement in general knowledge, in knowledge of practice guidelines, in representations as to the specific role for their profession, in perceptions of the threat for the patients' health, in the awareness of the benefit/risk ratio and in self-confidence in this field [76].

Gynaecologists, gastroenterologists, psychiatrists, residents and others

Consultations with gynaecologists, gastroenterologists and psychiatrists are favourable venues for ED detection. Indeed, amenorrhoea can precede weight loss in AN, BN can lead to menstrual irregularities despite a normal weight, and EDs can also lead to a risk of infertility. Gastrointestinal symptoms are also frequent among patients with an ED: abdominal distension, gastro-oesophageal reflux, constipation, abdominal pain, etc. [84].

The gynaecologists' knowledge was fairly heterogeneous. Two-thirds were interested in training on the subject [79]. On the whole, they seemed to know about the psychopathology surrounding AN, but not so much for BN. Only 1/5 thought they could confidently diagnose an ED. In cases of oligomenorrhea or amenorrhea, 95% of gynaecologists looked for an associated ED. But more than a third did not assess the eating behaviours of patients with polycystic ovary syndrome [78], despite the fact they are more likely to have BN [85].

Concerning psychiatrists, a fairly heterogeneous level of knowledge about EDs was found: less than half of them linked amenorrhea to AN, one third mistakenly thought specific serotonin reuptake inhibitors were recommended for the treatment of AN, and 14.9% felt they were able to treat a patient with an ED; regarding bulimia, half identified body dysmorphic disorder (BDD) as a symptom of the illness [80].

Similarly, British gastroenterologists' knowledge of AN and BN seemed incomplete. Even though the fear of putting on weight is a well-known criterion in AN, other criteria are not as well known: one-third thought that AN should be suspected only if the BMI was below 16 kg/m^2. Half of them knew that BN is more frequent than AN. The issues relating to complications were better apprehended. Most of the professionals were not satisfied with the training they had received on this topic during their careers [81].

A study carried out on Canadian residents from different specialist fields showed that feeling comfortable with diagnosis increased significantly with each successive increase in hours of training on ED in children and adolescents; more than half were interested in extra training time for early identification and screening for child/adolescent EDs [82].

A recent Australian study showed how an e-learning programme proved useful to improve knowledge on EDs and the health professionals' abilities and confidence in using this knowledge when treating patients with EDs [83].

Discussion

In terms of prevention, while quite a number of studies have been carried out on the primary prevention of EDs [32, 86], fewer studies have been conducted on early detection. It is however an important issue, as it has been demonstrated that early detection improves prognosis [4, 9]. A recent review showed that a shorter DUED could be related to a greater likelihood of remission [5]. Whereas the review by Le & al on primary prevention in 2017 described 112 studies between 2009 and 2015 [32], only 43 articles on early detection were found up to 2021. They mainly focused on AN and BN, and only nine articles explored the case of BED. This could be explained by the fact that the diagnostic criteria changed over time: BED diagnosis first appeared as a proposal in DSM IV-R in 1994 and as a defined diagnosis in the DSM 5 (2013).

To sum up, the area and aims of the studies on early detection were very heterogeneous. Three main areas are the focus of interventions aiming to improve early detection: healthcare (19/43) including general medical care (9/43), schools (11/43), and sport (7/43). The aims were to evaluate (1) among professionals: knowledge about EDs, attitudes towards identification and management of EDs, training programs on EDs, detection rates for EDs and patterns of consultations before ED diagnosis (30/43) and (2) among students or the general population: evaluation of prevention programmes (7/43), and evaluation of knowledge and self-recognition (6/43).

We will discuss here the main findings, firstly the question of the level of knowledge about EDs among professionals and how to improve it, and secondly the results of the main interventional studies, the role of GPs in early detection, and finally proposals for future studies.

Level of knowledge about EDs among professionals and how to improve it

This was the main domain investigated by the studies reviewed.

Whatever their profession, the professionals liable to be involved in early detection had only partial knowledge of the symptoms to be recognised for the identification of EDs [35, 41, 56, 59, 60, 66–68, 74, 77–81, 83]. It should also be noted that the majority of the studies were based on surveys, generating recruitment biases. Individuals willing to participate may already be familiar with these pathologies.

For residents, the greater the number of training hours on EDs, the more confident they felt in their ability to diagnose [82]. There is a need to improve the levels of knowledge among healthcare professionals (initial training and continuing education). Some authors suggest that in initial training curricula, specific training modules in the area of early identification of EDs should be included [82]. But this means finding windows in health professional training to include new content in already crowded schedules. An advantage of e-training interventions is that they can be used as a resource or tool to supplement existing curricula for health professionals such as dentists who require both didactic and skill-based training [76]. E-learning programs about EDs can also be interesting for continuing education among healthcare professionals. These programs are a cost-effective method of knowledge and skill-building. They can reach a wide audience at relatively low cost, enabling the distribution of learning materials to promote mental health literacy among health professionals and, in turn, improve the diagnosis and treatment of patients with EDs in the health system [77, 83]. Thus, several proposals exist but need to be evaluated.

International guidelines provide information on how to diagnose EDs. However, only 3.8% of British GPs reported using local published guidelines or protocols, and none of them use national guidelines [87]. Some authors, therefore, think information needs to be provided in a form that is readily accessible when patients with ED present in primary care or in psychiatry, rather than in the form of guidelines that are not used because it is not easy to find the information needed [66, 80]. This is why international guidelines have developed short documents focused on the question of early detection not only for professionals but also for families and patients [88–92].

Assessment of professional knowledge is only an intermediate step in the detection process, but patient-centred studies focusing on early detection are scarce.

Results of the main interventional studies

There were very few interventional studies about the improvement of early detection, whatever the population.

One important area for early detection is the school environment, as school age is the most frequent period of ED onset. To improve early detection, one team proposed to train school personnel [37] on the identification of students at risk for ED, how to approach them and where to refer them. They obtained an improvement in the detection of students with these pathologies [37]. Some authors have developed interventions centered directly on students; one study showed that primary prevention is not a suitable method to improve early detection [36]. Two different teams evaluated one and the same prevention program in high schools and in universities. The results showed that school screening combined with educational programs (NEDSP) were successful secondary prevention tools to identify and promote treatment for those presenting clinical symptoms of EDs in universities [39], but the effects on early detection were less

conclusive in the high school NEDSP program evaluation [38]. Another program proposed to train students by asking ex-patients to explain the first symptoms of ED; these sessions enabled some students to recognize symptoms of ED in themselves or in other students [40]. Indeed, studies have shown that self-identification of a body image problem [45] or a problem with eating [44] increased help-seeking among adolescent students. Two prevention programs focused on university students, training them for mental health first aid and they showed an improvement in ED recognition in the general population [47, 49]. Finally, a public health campaign did not reduce the time-lapse between symptom occurrence and specialist consultation/start of treatment for AN [51].

Role of primary care in early detection

GPs are key professionals in early detection, as patients with EDs seem to have seen their GP significantly more frequently than other patients in the five years preceding ED diagnosis [69, 70]. However, GPs very rarely mention ED diagnoses in their patient population compared to what could be expected from the epidemiological data [62, 63]. Reasons for the low detection and referral rates for AN remain poorly understood [68]. As previously mentioned, there may be a lack of training [93], and poor knowledge of EDs could also be explained by the relative rarity of these cases in primary care. Demographic variables can also impact the detection rate for EDs, for instance gender and ethnicity of the physician and ethnicity of the patient [68]: female physicians are more likely than male physicians to diagnose AN [63], and white/Caucasian physicians are more likely to correctly diagnose a vignette of a patient with AN, especially if the patient in the vignette is also white/Caucasian [68].

Some results also show that BN is clearly less well detected in primary care than AN. This may be due to the fact that as BMI is lower among patients with AN, this pathology is more easily detected during a physical examination. Clinicians may also miss cases of BN because of the belief that it is a rare condition in their population [66]. Furthermore, BN is more likely to be experienced as a shameful illness, so that patients do not spontaneously talk about the symptoms [94]. Stigma and shame are two of the most prominent barriers to help-seeking for EDs [95], as is lack of insight into the disorder [46, 96]. De-stigmatising BN could be a lever for its detection. Indeed, in the United Kingdom, some authors have described the Diana effect [97]: shortly after public revelations on Princess Diana's BN, the number of BN cases increased. This is probably because people who had BN were able to talk about their symptoms and seek help [98]. Further to this, people suffering from bulimic-type ED are more likely to recognize their pathology when they self-induce vomiting; thus better information about non-purging type BN needs to be incorporated into prevention programs [42, 46]. A better dissemination of mental health literacy on eating disorders [99] among students and the general population could help to improve self-identification and help-seeking [44–46, 50]. Mental health literacy has been defined as "knowledge and beliefs about mental disorders which aid their recognition, management or prevention"[100].

Proposals for future studies

To increase early detection, research should seek to identify methods to reduce barriers to help-seeking (stigma, shame, denial, lack of ED literacy, negative attitudes towards treatment) [95]. Almost all the studies about self-recognition were conducted in Australia; thus it would be interesting to replicate them in other countries and to include males subjects [42].

Research is needed on young people's living environments, particularly school and university, and also sport centers. Finally, it would be interesting to evaluate proposals that appear in the literature.

For example, future studies should evaluate the impact of training for school personnel by previously trained school nurses in countries where this is possible [37]; or detection of EDs by periodically checking weight [101]. Other studies should try to identify means whereby students suspected of having an ED could be more strongly motivated to seek evaluation by a health professional when they are detected [38, 39]. Mental health first aid approaches as proposed in Australia [102] or sessions delivered to students by ex-patients [40] could be evaluated in controlled trials, with longer follow-up periods [47, 49].

Similarly, the prevalence of AN, BN and ED-NOS is higher among people practising sports than in the general population [23]. Thus, research should be developed to evaluate the implementation of specific recommendations for the field of sport [103] and sport at the university [55], after training sessions for professionals [56]. Guidelines of this type have been developed, for example in Australia by Fitness Australia [104]. Fitness centers should also have lists of local clinicians and therapists to counsel clients with a suspicion of ED [60]. Another suggestion is to make information brochures available for fitness professionals and clients providing information on EDs and local treatment centers [61] and to evaluate their impact.

It also seems important to publish the recommendations on EDs for each profession and each speciality concerned, as is already the case with gynaecologists in the United States [105] or in France [106], and with dentists in France [107].

It is also important to widen the health professional focus in training for early detection, as some people who could be in a position to detect EDs were not included in

the published studies, for instance, endocrinologists, pharmacists, or patients' relatives (in the general population).

It is also worth noting that apart from a few studies on school students [36, 38–40, 42, 44, 45] and on the general population [46–51], most of the articles reviewed here were centred on people in charge of interventions. Assessment of their knowledge is only an intermediate phase in the detection process. It would be interesting to assess certain aspects related to the patients or the people concerned themselves.

Limitations

The field is very heterogeneous and there are few studies on each different theme or each population, leading to a poor level of evidence. In addition, none of the studies in the review met all the quality criteria defined by the Kmet form [34]. But as mentioned earlier, early detection is a key point in treatment effectiveness [5] and to our knowledge, this review is the first to be performed on this question, and to suggest the fields that should be investigated in future studies.

What is already known on this subject?

International guidelines mention the need for early detection. But the means to achieve this have not been detailed. Literature reviews on primary prevention exist but not on secondary prevention.

"What your study adds"

This review summarises all studies on the early detection of EDs. Different types of the population can be focused on to improve early detection, including health professionals, students and school personnel, sports professionals, and the general population. There are several means to improve early detection, which are described and discussed in this review.

Conclusion

Early detection of EDs can be carried out in all sectors of the lives of young people and adults, particularly by adults in the close circle, whether in school, sport or healthcare.

It should be based on a prevention policy that targets information dissemination and training in order to improve detection. Finally, this policy should be implemented alongside a policy for the organisation of care by way of a clear, accessible care trajectory and patient-centred assessments.

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Declarations

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References

1. BEAT (2017) Delaying for years, denied for months. https://www.beateatingdisorders.org.uk/uploads/documents/2017/11/delaying-for-years-denied-for-months.pdf
2. Ambwani S, Cardi V, Albano G et al (2020) A multicenter audit of outpatient care for adult anorexia nervosa: symptom trajectory, service use, and evidence in support of "early stage" versus "severe and enduring" classification. Int J Eat Disord 53:1337–1348. https://doi.org/10.1002/eat.23246
3. Treasure J, Russell G (2011) The case for early intervention in anorexia nervosa: theoretical exploration of maintaining factors. Br J Psychiatry 199:5–7. https://doi.org/10.1192/bjp.bp.110.087585
4. van Son GE, van Hoeken D, van Furth EF et al (2009) Course and outcome of eating disorders in a primary care-based cohort. Int J Eat Disord 43:130–138. https://doi.org/10.1002/eat.20676
5. Austin A, Flynn M, Richards K et al (2020) Duration of untreated eating disorder and relationship to outcomes: a systematic review of the literature. Eur Eat Disord Rev. https://doi.org/10.1002/erv.2745
6. Andrés-Pepiñá S, Plana MT, Flamarique I et al (2020) Long-term outcome and psychiatric comorbidity of adolescent-onset anorexia nervosa. Clin Child Psychol Psychiatry 25:33–44. https://doi.org/10.1177/1359104519827629
7. Huas C, Caille A, Godart N et al (2010) Factors predictive of ten-year mortality in severe anorexia nervosa patients. Acta Psychiatr Scand 123:62–70. https://doi.org/10.1111/j.1600-0447.2010.01627.x
8. Fennig S, Hadas A (2010) Suicidal behavior and depression in adolescents with eating disorders. Nord J Psychiatry 64:32–39. https://doi.org/10.3109/08039480903265751
9. Lindblad F, Lindberg L, Hjern A (2006) Improved survival in adolescent patients with anorexia nervosa: a comparison of two swedish national cohorts of female inpatients. AJP 163:1433–1435. https://doi.org/10.1176/ajp.2006.163.8.1433
10. Treasure J, Stein D, Maguire S (2015) Has the time come for a staging model to map the course of eating disorders from high risk to severe enduring illness? An examination of the evidence: a staging model for eating disorders. Early Interv Psychiatry 9:173–184. https://doi.org/10.1111/eip.12170
11. Fonville L, Giampietro V, Williams SCR et al (2014) Alterations in brain structure in adults with anorexia nervosa and the impact of illness duration. Psychol Med 44:1965–1975. https://doi.org/10.1017/S0033291713002389

12. Roberts ME, Tchanturia K, Treasure JL (2010) Exploring the neurocognitive signature of poor set-shifting in anorexia and bulimia nervosa. J Psychiatr Res 44:964–970. https://doi.org/10.1016/j.jpsychires.2010.03.001
13. Davies H, Schmidt U, Stahl D, Tchanturia K (2011) Evoked facial emotional expression and emotional experience in people with anorexia nervosa. Int J Eat Disord 44:531–539. https://doi.org/10.1002/eat.20852
14. Caglar-Nazali HP, Corfield F, Cardi V et al (2014) A systematic review and meta-analysis of 'systems for social processes' in eating disorders. Neurosci Biobehav Rev 42:55–92. https://doi.org/10.1016/j.neubiorev.2013.12.002
15. Cardi V, Tchanturia K, Treasure J (2018) Premorbid and illness-related social difficulties in eating disorders: an overview of the literature and treatment developments. Curr Neuropharmacol 16:1122–1130. https://doi.org/10.2174/1570159X16666180118100028
16. Levine MP (2012) Loneliness and eating disorders. J Psychol 146:243–257. https://doi.org/10.1080/00223980.2011.606435
17. Cargill BR, Clark MM, Pera V et al (1999) Binge eating, body image, depression, and self-efficacy in an obese clinical population. Obes Res 7:379–386. https://doi.org/10.1002/j.1550-8528.1999.tb00421.x
18. Deloitte access economics (2012) Butterfly report: Paying the price: the economic and social impact of eating disorders in Australia. https://www2.deloitte.com/au/en/pages/economics/articles/butterfly-report-paying-price-eating-disorders.html
19. Deloitte Access Economics (2020) Social and economic cost of eating disorders in the United States of America. In: Report for the strategic training initiative for the prevention of eating disorders and the academy for eating disorders
20. BEAT (2015) The cost of eating disorders. Social, health and economic impacts. Beating Eating Disorders. https://www.basw.co.uk/system/files/resources/basw_54403-3_0.pdf
21. Godart NT, Legleye S, Huas C et al (2013) Epidemiology of anorexia nervosa in a French community-based sample of 39,542 adolescents. Open J Epidemiol 3:53–61. https://doi.org/10.4236/ojepi.2013.32009
22. Smink FRE, van Hoeken D, Hoek HW (2012) Epidemiology of eating disorders: incidence, prevalence and mortality rates. Curr Psychiatry Rep 14:406–414. https://doi.org/10.1007/s11920-012-0282-y
23. Sundgot-Borgen J, Torstveit MK (2004) Prevalence of eating disorders in elite athletes is higher than in the general population. Clin J Sport Med 14:25–32. https://doi.org/10.1097/00042752-200401000-00005
24. Haute Autorité de Santé (2010) Recommandations de bonnes pratiques. Anorexie mentale : prise en charge. Accessible en ligne sur https://www.has-sante.fr/portail/upload/docs/application/pdf/2010-09/reco_anorexie_mentale.pdf
25. Arango C, Díaz-Caneja CM, McGorry PD et al (2018) Preventive strategies for mental health. Lancet Psychiatry 5:591–604. https://doi.org/10.1016/S2215-0366(18)30057-9
26. National Institute for Health and Care Excellence (2017) Eating disorders: recognition and treatment. Full guideline. National Institute for Health and Care Excellence, United Kingdom. https://www.nice.org.uk/guidance/ng69/resources/eating-disorders-recognition-and-treatment-pdf-1837582159813
27. APA (2006) American Psychiatric Association practice guidelines for the treatment of psychiatric disorders: compendium 2006. American Psychiatric Association, Arlington. https://psychiatryonline.org/pb/assets/raw/sitewide/practice_guidelines/guidelines/eatingdisorders.pdf
28. Australian Government Department of Health (2016) Australia National eating disorders Collaboration, Australian Government Department of Health, Australia. https://www.nedc.com.au/eating-disorders/prevention/preventing-eating-disorders/secondary-prevention/
29. The BELLA study group, Herpertz-Dahlmann B, Dempfle A et al (2015) Eating disorder symptoms do not just disappear: the implications of adolescent eating-disordered behaviour for body weight and mental health in young adulthood. Eur Child Adolesc Psychiatry 24:675–684. https://doi.org/10.1007/s00787-014-0610-3
30. Liechty JM, Lee M-J (2013) Longitudinal predictors of dieting and disordered eating among young adults in the US: longitudinal predictors of disordered eating. Int J Eat Disord 46:790–800. https://doi.org/10.1002/eat.22174
31. Patton GC, Coffey C, Carlin JB et al (2008) Prognosis of adolescent partial syndromes of eating disorder. Br J Psychiatry 192:294–299. https://doi.org/10.1192/bjp.bp.106.031112
32. Le LK-D, Barendregt JJ, Hay P, Mihalopoulos C (2017) Prevention of eating disorders: a systematic review and meta-analysis. Clin Psychol Rev 53:46–58. https://doi.org/10.1016/j.cpr.2017.02.001
33. Tricco AC, Lillie E, Zarin W et al (2018) PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med 169:467. https://doi.org/10.7326/M18-0850
34. Kmet L, Lee R (2004) Standard quality assessment criteria for evaluating primary research papers from a variety of fields. HTA Initiative 2004:2
35. Price JA, Desmond SM, Price JH, Mossing A (1990) School counselors' knowledge of eating disorders. Adolescence 25:945–957
36. Mann T, Nolen-Hoeksema S, Huang K et al (1997) Are two interventions worse than none? Joint primary and secondary prevention of eating disorders in college females. Health Psychol 16:215–225. https://doi.org/10.1037//0278-6133.16.3.215
37. Chally PS (1998) An eating disorders prevention program. J Child Adolesc Psychiatr Nurs 11:51–60. https://doi.org/10.1111/j.1744-6171.1998.tb00431.x
38. D'Souza CM, Forman SF, Austin SB (2005) Follow-up evaluation of a high school eating disorders screening program: knowledge, awareness and self-referral. J Adolesc Health 36:208–213. https://doi.org/10.1016/j.jadohealth.2004.01.014
39. Becker AE, Franko DL, Nussbaum K, Herzog DB (2004) Secondary prevention for eating disorders: the impact of education, screening, and referral in a college-based screening program. Int J Eat Disord 36:157–162. https://doi.org/10.1002/eat.20023
40. Noordenbos G, Duyn CV (2009) Do lessons about eating disorders by ex-patients contribute to early recognition? Eat Disord 17:435–444. https://doi.org/10.1080/10640260903210248
41. Harshbarger JL, Ahlers-Schmidt CR, Atif M et al (2011) School counselors' knowledge of eating disorders. Eat Weight Disord 16:e131-136. https://doi.org/10.1007/bf03325319
42. Gratwick-Sarll K, Mond J, Hay P (2013) Self-recognition of eating-disordered behavior in college women: further evidence of poor eating disorders "mental health literacy"? Eat Disord 21:310–327. https://doi.org/10.1080/10640266.2013.797321
43. Knightsmith P, Treasure J, Schmidt U (2013) We don't know how to help: an online survey of school staff. Child Adolesc Mental Health 19:208–214. https://doi.org/10.1111/camh.12039
44. Gratwick-Sarll K, Bentley C, Harrison C, Mond J (2016) Poor self-recognition of disordered eating among girls with bulimic-type eating disorders: cause for concern? Self-recognition of disordered eating. Early Interv Psychiatry 10:316–323. https://doi.org/10.1111/eip.12168
45. Fatt SJ, Mond J, Bussey K et al (2020) Seeing yourself clearly: self-identification of a body image problem in adolescents with an eating disorder. Early Interv Psychiatry. https://doi.org/10.1111/eip.12987

46. Mond J, Hay P, Rodgers B, Owen C (2006) Self-recognition of disordered eating among women with bulimic-type eating disorders: a community-based study. Int J Eat Disord 39:747–753. https://doi.org/10.1002/eat.20306
47. Hart LM, Jorm AF, Paxton SJ (2012) Mental health first aid for eating disorders: pilot evaluation of a training program for the public. BMC Psychiatry 12:98. https://doi.org/10.1186/1471-244X-12-98
48. Darby AM, Hay PJ, Mond JM, Quirk F (2012) Community recognition and beliefs about anorexia nervosa and its treatment. Int J Eat Disord 45:120–124. https://doi.org/10.1002/eat.20886
49. Gratwick-Sarll K, Bentley C (2014) Improving eating disorders mental health literacy: a preliminary evaluation of the "should i say something?" workshop. Eat Disord 22:405–419. https://doi.org/10.1080/10640266.2014.925764
50. Melioli T, Rispal M, Hart LM et al (2018) French mental health first aid guidelines for eating disorders: an exploration of user characteristics and usefulness among college students. Early Interv Psychiatry 12:229–233. https://doi.org/10.1111/eip.12369
51. Gumz A, Weigel A, Wegscheider K et al (2018) The psychenet public health intervention for anorexia nervosa: a pre–post-evaluation study in a female patient sample. Primary Health Care Res Dev 19:42–52. https://doi.org/10.1017/S1463423617000524
52. Jacobs D (1999) Results of 1998 National Eating Disorders Screening Project. Unpublished data
53. Becker AE, Franko DL, Speck A, Herzog DB (2003) Ethnicity and differential access to care for eating disorder symptoms. Int J Eat Disord 33:205–212. https://doi.org/10.1002/eat.10129
54. Austin SB, Ziyadeh NJ, Forman S et al (2008) Screening high school students for eating disorders: results of a national initiative. Prev Chronic Dis 5:A114
55. Vaughan JL, King KA, Cottrell RR (2004) Collegiate athletic trainers' confidence in helping female athletes with eating disorders. J Athl Train 39:71–76
56. Trattner Sherman R, Thompson RA, Dehass D, Wilfert M (2005) NCAA coaches survey: the role of the coach in identifying and managing athletes with disordered eating. Eat Disord 13:447–466. https://doi.org/10.1080/10640260500296707
57. Manley RS, O'Brien KM, Samuels S (2008) Fitness instructors' recognition of eating disorders and attendant ethical/liability issues. Eat Disord 16:103–116. https://doi.org/10.1080/10640260801887162
58. Torres-McGehee TM, Leaver-Dunn D, Green JM et al (2011) Knowledge of eating disorders among collegiate administrators, coaches, and auxiliary dancers. Percept Mot Skills 112:951–958. https://doi.org/10.2466/02.13.PMS.112.3.951-958
59. Nowicka P, Eli K, Ng J et al (2011) Moving from knowledge to action: a qualitative study of elite coaches' capacity for early intervention in cases of eating disorders. Int J Sports Sci Coach 8:343–345. https://doi.org/10.13140/2.1.3962.9440
60. Bratland-Sanda S, Sundgot-Borgen J (2015) "I'm concerned—What Do I Do?" recognition and management of disordered eating in fitness center settings: disordered eating in fitness center settings. Int J Eat Disord 48:415–423. https://doi.org/10.1002/eat.22297
61. Wojtowicz AE, Alberga AS, Parsons CG, von Ranson KM (2015) Perspectives of Canadian fitness professionals on exercise and possible anorexia nervosa. J Eat Disord 3:40. https://doi.org/10.1186/s40337-015-0074-y
62. Bursten MS, Gabell L, Brose J, Monk J (1996) Detecting and treating bulimia nervosa: how involved are family physicians? J Am Board Fam Pract 9:241–248
63. Hugo P, Kendrick T, Reid F, Lacey H (2000) GP referral to an eating disorder service: why the wide variation? Br J Gen Pract 50:380–383
64. Flahavan C (2006) Detection, assessment and management of eating disorders; how involved are GPs? Irish J Psychol Med 23:96–99. https://doi.org/10.1017/S079096670000971X
65. Green H, Johnston O, Cabrini S et al (2008) General practitioner attitudes towards referral of eating-disordered patients: a vignette study based on the theory of planned behaviour. Ment Health Fam Med 5:213–218
66. Currin L, Waller G, Schmidt U (2009) Primary care physicians' knowledge of and attitudes toward the eating disorders: do they affect clinical actions? Int J Eat Disord 42:453–458. https://doi.org/10.1002/eat.20636
67. Hunt D, Churchill R (2013) Diagnosing and managing anorexia nervosa in UK primary care: a focus group study. Fam Pract 30:459–465. https://doi.org/10.1093/fampra/cmt013
68. Higgins A, Cahn S (2018) Detection of anorexia nervosa in primary care. Eat Disord 26:213–228. https://doi.org/10.1080/10640266.2017.1397419
69. Ogg EC, Millar HR, Pusztai EE, Thom AS (1997) General practice consultation patterns preceding diagnosis of eating disorders. Int J Eat Disord 22:89–93. https://doi.org/10.1002/(SICI)1098-108X(199707)22:1%3c89::AID-EAT12%3e3.0.CO;2-D
70. Lask B, Bryant-Waugh R, Wright F et al (2005) Family physician consultation patterns indicate high risk for early-onset anorexia nervosa. Int J Eat Disord 38:269–272. https://doi.org/10.1002/eat.20163
71. Lucas AR, Beard CM, O'Fallon WM, Kurland LT (1991) 50-year trends in the incidence of anorexia nervosa in Rochester, Minn.: a population-based study. Am J Psychiatry 148:917–922. https://doi.org/10.1176/ajp.148.7.917
72. Myers S, Treasure J (1993) A General Practitioner's guide to eating disorders. In: Maudesley Practical Handbook Series No. 2. Boots Pharmaceuticals, London
73. Hudson JI, Hiripi E, Pope HG, Kessler RC (2007) The prevalence and correlates of eating disorders in the national comorbidity survey replication. Biol Psychiat 61:348–358. https://doi.org/10.1016/j.biopsych.2006.03.040
74. DeBate RD, Tedesco LA, Kerschbaum WE (2005) Knowledge of oral and physical manifestations of anorexia and bulimia nervosa among dentists and dental hygienists. J Dent Educ 69:346–354
75. DeBate RD, Plichta SB, Tedesco LA, Kerschbaum WE (2006) Integration of oral health care and mental health services: dental hygienists' readiness and capacity for secondary prevention of eating disorders. J Behav Health Serv Res 33:113–125. https://doi.org/10.1007/s11414-005-9003-1
76. DeBate RD, Severson HH, Cragun DL et al (2013) Evaluation of a theory-driven e-learning intervention for future oral healthcare providers on secondary prevention of disordered eating behaviors. Health Educ Res 28:472–487. https://doi.org/10.1093/her/cyt050
77. Johansson A-K, Johansson A, Nohlert E et al (2015) Eating disorders—knowledge, attitudes, management and clinical experience of Norwegian dentists. BMC Oral Health. https://doi.org/10.1186/s12903-015-0114-7
78. Morgan JF (1999) Eating disorders and gynecology, knowledge and attitudes among clinicians. Acta Obstet Gynecol Scand 78:233–239. https://doi.org/10.1034/j.1600-0412.1999.780311.x
79. Michala L, Antsaklis A (2010) Anorexia nervosa: a psychiatric illness with gynecological manifestations. A survey of knowledge and practice among Greek gynecologists. Eur J Obstetr Gynecol Reprod Biol 153:170–172. https://doi.org/10.1016/j.ejogrb.2010.07.030
80. Jones WR, Saeidi S, Morgan JF (2013) Knowledge and attitudes of psychiatrists towards eating disorders. Eur Eat Disord Rev 21:84–88. https://doi.org/10.1002/erv.2155

81. Riaz H, Jones RW, Donnellan C et al (2017) Knowledge and attitudes of gastroenterologists towards eating disorders. ARC J Psychiatry 2:29–40
82. Girz L, Robinson AL, Tessier C (2014) Is the next generation of physicians adequately prepared to diagnose and treat eating disorders in children and adolescents? Eat Disord 22:375–385. https://doi.org/10.1080/10640266.2014.915692
83. Maguire S, Li A, Cunich M, Maloney D (2019) Evaluating the effectiveness of an evidence-based online training program for health professionals in eating disorders. J Eat Disord 7:14. https://doi.org/10.1186/s40337-019-0243-5
84. Sato Y, Fukudo S (2015) Gastrointestinal symptoms and disorders in patients with eating disorders. Clin J Gastroenterol 8:255–263. https://doi.org/10.1007/s12328-015-0611-x
85. Kimmel MC, Ferguson EH, Zerwas S et al (2016) Obstetric and gynecologic problems associated with eating disorders. Int J Eat Disord 49:260–275. https://doi.org/10.1002/eat.22483
86. Stice E, Becker CB, Yokum S (2013) Eating disorder prevention: current evidence-base and future directions. Int J Eat Disord 46:478–485. https://doi.org/10.1002/eat.22105
87. Currin L, Waller G, Treasure J et al (2007) The use of guidelines for dissemination of "best practice" in primary care of patients with eating disorders. Int J Eat Disord 40:476–479. https://doi.org/10.1002/eat.20385
88. Haute Autorité de Santé (2010) Document d'information destiné aux familles et aux patients. Anorexie mentale : prise en charge. In: Recommandations pour la pratique clinique
89. Haute Autorité de Santé (2010) Document d'information. L'anorexie mentale : et si ça me concernait ? In : Recommandations pour la pratique clinique
90. Haute Autorité de Santé (2010) Anorexie mentale : prise en charge—1. Repérage. https://www.has-sante.fr/upload/docs/application/pdf/2010-09/fs_anorexie_1_cdp_300910.pdf
91. National Institute for Health and Care Excellence. (2017) Eating disorders : recognition and treatment. Information for the public. https://www.nice.org.uk/guidance/ng69/resources/eating-disorders-recognition-and-treatment-pdf-1837582159813
92. The Royal Australian and New Zealand College of Psychiatrists (2016) Eating disorders— Your health in mind, Your guide. https://www.yourhealthinmind.org/getmedia/04db94cb-960a-44fb-b705-42d05f76f5b3/Eating-disorders-YHIM.pdf.aspx?ext=.pdf
93. Linville D, Brown T, O'Neil M (2012) Medical providers' self perceived knowledge and skills for working with eating disorders: a national survey. Eat Disord 20:1–13. https://doi.org/10.1080/10640266.2012.635557
94. Hepworth N, Paxton SJ (2007) Pathways to help-seeking in bulimia nervosa and binge eating problems: a concept mapping approach. Int J Eat Disord 40:493–504. https://doi.org/10.1002/eat.20402
95. Ali K, Farrer L, Fassnacht DB et al (2017) Perceived barriers and facilitators towards help-seeking for eating disorders: a systematic review. Int J Eat Disord 50:9–21. https://doi.org/10.1002/eat.22598
96. Weigel A, Rossi M, Wendt H et al (2014) Duration of untreated illness and predictors of late treatment initiation in anorexia nervosa. J Public Health 22:519–527. https://doi.org/10.1007/s10389-014-0642-7
97. Bulimia: The Princess Diana Eating Disorder (2018) https://www.mirror-mirror.org/princess-diana-eating-disorder.htm. Accessed 8 Jul 2018
98. Steinhausen H-C (2002) The outcome of anorexia nervosa in the 20th century. Am J Psychiatry 159:1284–1293. https://doi.org/10.1176/appi.ajp.159.8.1284
99. Mond JM (2014) Eating disorders "mental health literacy": an introduction. J Ment Health 23:51–54. https://doi.org/10.3109/09638237.2014.889286
100. Jorm AF, Korten AE, Jacomb PA et al (1997) "Mental health literacy": a survey of the public's ability to recognise mental disorders and their beliefs about the effectiveness of treatment. Med J Aust 166:182–186. https://doi.org/10.5694/j.1326-5377.1997.tb140071.x
101. Mallick MJ (1984) Anorexia nervosa and bulimia: questions and answers for school personnel. J Sch Health 54:299–301. https://doi.org/10.1111/j.1746-1561.1984.tb08939.x
102. Mental health first aid Australia (2020) Eating disorders : mental health first aid guidelines. https://mhfa.com.au/sites/default/files/MHFA_eatdis_guidelines_A4_2013.pdf
103. Bonci CM, Bonci LJ, Granger LR et al (2008) National athletic trainers' association position statement: preventing, detecting, and managing disordered eating in athletes. J Athl Train 43:80–108. https://doi.org/10.4085/1062-6050-43.1.80
104. Marks P, Harding M (2004) Fitness Australia Guidelines: Identifying and managing members with eating disorders and/or problems with excessive exercise. In: A collaborative project between The Centre for Eating & Dieting Disorders [CEDD] and Fitness First Australia on behalf of Fitness Australia
105. ACOG Committee Opinion No. 740 (2018) Gynecologic Care for Adolescents and Young Women With Eating Disorders. Obstetr Gynecol 131:e205. https://doi.org/10.1097/AOG.0000000000002652
106. Haute Autorité de Santé FFAB (2019) Boulimie et hyperphagie boulimique. In: Troubles des conduites alimentaires, Aspects gynécologiques et obstétricaux
107. Haute Autorité de Santé FFAB (2019) Boulimie et hyperphagie boulimique. In: Repérage et prise en charge de l'état dentaire par le chirurgien dentiste