Anxiety Disorder in comorbidity with eating disorders in adolescent patients

A literature review

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Abstract:
Background: The number of cases of adolescents suffering from anxiety and eating disorders is on the rise with more female adolescents than male adolescents being affected. However, to our knowledge very few studies exist in this area. *Aim:* Therefore, the purpose of this study was to understand the current assessment and management approaches of generalized anxiety disorders in adolescents with eating disorders. This understanding helps health workers in this area (nurses inclusive) to optimize care for these adolescents through early symptom identification and administering the most appropriate treatment approach. The research question for this study is how anxiety disorder can be assessed and managed in patients with eating disorders. *Methods:* This was a literature review study utilizing an inductive content analysis. Data were retrieved from four databases: EBSCO, CINAHL, PubMed, and google scholar. Twenty-one studies were included in this study after meeting the inclusion criteria. *Results:* Through these studies, four results categories were created: manifestation, comorbidity, assessment, and management. The manifestation category consists of the prevalence and symptoms. The comorbidity category consists of the different psychiatric disorders that can manifest together with anxiety and eating disorders. The assessment category consists of the different tools, criteria, and methods that can be used to diagnose or identify anxiety-related disorders. Lastly, the management category consists of the approaches that can be used to offer support to the affected adolescents. The understanding of the content in each of these categories promotes offering appropriate and timely support to adolescents with anxiety and eating disorders.

Keywords:	Anxiety, affective disorder, comorbidity, eating disorders, nervous, nursing adolescents, teenagers
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1 INTRODUCTION

Anxiety disorders are one of the most prevalent mental health disorders with approximately 31 % prevalence in the population worldwide (Grant, 2013). The World Health Organization (WHO) defines anxiety disorder as an umbrella term for "mental disorders which are characterized by feelings of anxiety and fear." There was not much empirical evidence about the topic around two decades ago. Its impact on society was underestimated. Anxiety disorders can be seen in children and adolescents to continue well into adulthood and continue affecting a big part of the population. Therefore, it could be said that early intervention and management of this disorder can lead to a higher quality of life for many. (Rapee, 2012)

The principal manifestation of anxiety disorder is avoidance (Rapee, 2018), and evidence shows that more females than males are affected worldwide (Al-Yateem et al., 2020). Common anxiety disorders of interest to health workers are panic disorder, social anxiety disorder, generalized anxiety disorder, obsessive-compulsive disorder, posttraumatic stress disorder, and acute stress disorder. The topic of interest in this study will be generalized anxiety disorder to limit the scope of research. Research from the Western world shows that 5% of adolescents suffer from anxiety disorders (Rapee, 2018). During adolescence, individuals are vulnerable to developing symptoms of anxiety disorders because of numerous physiological and psychological transitions (Grant, 2013). Therefore, the focus of this study will be on adolescents which is defined using WHO's definition of individuals between the ages of 10 to 19 years. The terms adolescent, teenager and youth will be used interchangeably in this study as synonyms.

As a coping mechanism, adolescents with anxiety disorders tend to develop other disorders, eating disorders inclusive. (Nyatanga and Dann, 2002) Research shows that anxiety disorder at an early age can already be a predictor of eating disorder at a later age. (Schaumberg et al., 2018) It could be said a correlation between these two disorders has been established to some extent. As such, there is a need to understand the anxiety vulnerability factors, manifestation of anxiety disorders, appropriate assessment, and management approaches to these disorders by health workers. The topic will be approached from the nursing perspective.

2 BACKGROUND

Currently over 117 million adolescents are affected by anxiety disorders worldwide (Olofsdotter et al., 2016). The number of people suffering from anxiety disorders globally is on the rise. By 2013, the anxiety and depression disorders had increased by 50% from 1990 (Al-Yateem et al., 2020). A study done in Finland that compared data from the years 2000 and 2011 showed an increase in numbers of female adolescents diagnosed with anxiety and eating disorders compared to male adolescents. The percentage of adolescents suffering from depression, eating disorders and anxiety disorders have also been increasing. (Kronström et al., 2016)

Anxiety disorders are the most common mental disorders among Europeans (Ströhle, Gensichen and Domschke, 2018). These disorders are globally common among children and adolescents, however, with varying prevalence across countries. Among adolescents and children, these disorders stand at 31.9% in the United States, 26.41% in Spain, 22.5% in Chile, 21.9% in Iran, 36.7% in India, and 28% in United Arab Emirates (Al-Yateem et al., 2020). Anxiety disorders observed among adults largely begin during childhood if not well identified and attended to (Rapee, 2018). In developed countries, anxiety disorders are ranked fourth amongst the causes of mental illness related disabilities (WHO, 2017).

Commonest anxiety disorders among children and adolescents include generalized anxiety disorder (GAD), panic disorder, social anxiety disorder, and significant school refusal/avoidance disorder (Al-Yateem et al., 2020). GAD is characterized by excessive and uncontrollable worry that leads to somatic and cognitive symptoms of anxiety (Grant, 2013; Gale and Millichamp, 2018). GAD affects approximately 1% and 3% of children and adolescents respectively (Gale and Millichamp, 2018).

The principal feature of any anxiety disorder is avoidance. The child or adolescent will try as much as possible to stay away from specific situations, places, or stimuli that cause fearfulness, distress, or shyness. The trigger for this avoidance creates the difference across the several kinds of anxiety disorders (Rapee, 2018). Anxiety disorders can be attributed to the child's temperament and characteristics, genetic factors, and environmental factors (Al-Yateem et al., 2020). Other factors can also put children and

adolescents at risk of anxiety disorders. These factors are the unfavorable family experiences like marital conflict, and death of a parent; school stressors like bullying; abuse that can be emotional, physical, or sexual; maternal substance abuse; and parental mental health like anxiety in parents might create anxiety in the children (Rapee, 2018; Al-Yateem et al., 2020).

Anxiety disorders in children and adolescents are distressing and create negative effects to both the individuals and their families. To the individuals, social, academic, and health effects can be realized. These disorders can also predict substance use and other disorders (Olofsdotter et al., 2016; Al-Yateem et al., 2020). About 25% of children and adolescents seeking treatment for anxiety disorders will also meet criteria for an additional behavioral disorder (for example eating disorders) (Rapee, 2018). The families and parents of the affected individuals usually suffer emotional upset and financial constraints. Despite these observed negative consequences of anxiety disorders, these disorders largely remain unidentified and untreated, especially amongst children and adolescents (Al-Yateem et al., 2020).

Treatment for anxiety disorders takes on both psychotherapy and pharmacotherapy. The choice for a treatment option depends on majorly disorder severity and availability of treatment options (Ströhle, Gensichen and Domschke, 2018); in most cases both treatment options are considered. Pharmacological treatment majorly focuses on the use of selective Serotonin reuptake inhibitors to manage the disorder (Rapee, 2018). Cognitive behavioral therapy is the best psychotherapy and the most evidenced treatment for anxiety disorders (Gale and Millichamp, 2018). Cognitive behavioral therapy involves teaching the child and even the parents (in some cases) specific skills to help them manage the child's anxiety. These skills are acquired from one or a combination of some of the following options: psychoeducation, relaxation, in vivo exposure, contingency management, parent training, cognitive restructuring, and social skills and assertiveness training (Rapee, 2018).

Early identification and treatment of anxiety disorders are fundamental in reducing the anxiety-related burden. Some of the instruments that are useful in screening children and adolescents for anxiety disorders include the Hamilton anxiety rating scale, the Pediatric

anxiety rating scale, a clinician-administered scale with a 50-item symptom checklist, the Screen for child anxiety related disorders, and the Multidimensional anxiety scale for children (Mossman et al., 2018). Undetected and untreated anxiety disorders in childhood and adolescence affect adulthood (Olofsdotter et al., 2016). Unfortunately, anxiety is largely unrecognized in primary and mental health care with very few adolescents receiving treatment. This identification and treatment failure is attributed to several factors among which are limited anxiety disorders knowledge among health workers in the adolescents age groups and limited availability of appropriate screening instruments for children and adolescents (Gale and Millichamp, 2018). Some instruments that commendably assess anxiety symptoms in adults are hard to use in pediatrics yet are the widely available tools.

Additionally, a dearth of data regarding the prevalence and comorbidities of anxiety disorders in non-specialized mental health outpatient settings exists (Olofsdotter et al., 2016). In these places, anxiety may not be a recognizable or main reason for seeking medical attention. Therefore, there was a need to understand the current assessment and management approaches for generalized anxiety disorders in adolescents with eating disorders to optimize care for them. The results from this paper can be used to increase the awareness of anxiety disorder in adolescents in order for nurses to be able to identify the symptoms early on and use nursing interventions in order to avoid poor outcomes due to delayed treatment.

3 THEORETICAL FRAMEWORK

The theoretical framework used for this study is the Neuman systems model due to the holistic approach it takes as well as its focus on prevention and the stages the patient goes through after each line of resistance. It describes and talks about the human needs of protection from stress. According to Neuman, these needs can be identified by the nurse, both patient and nurse agree and set goals to address the needs, and the nurse provides intervention through the concept of prevention (Willls, 2014). The concepts and theories used in this model are interdisciplinary and include; human beings who are client systems with physiological, psychological, socio-cultural, developmental, and spiritual variables; environment of internal, external, and created nature that influence the client's adaptation to stress; health that is a continuum of wellness and illness; and nursing that maintains the client system stability through accurate assessment of all stressors and appropriate support to clients to maintain ideal wellness. (Hardin and Moody, 2004)
As shown in figure 1, the five client variables interact and overlap to influence all the functioning within the client system across the three lines of defense. The prevention interventions take places at three levels of primary, secondary, and tertiary prevention which are key for a nurse/health worker to understand.

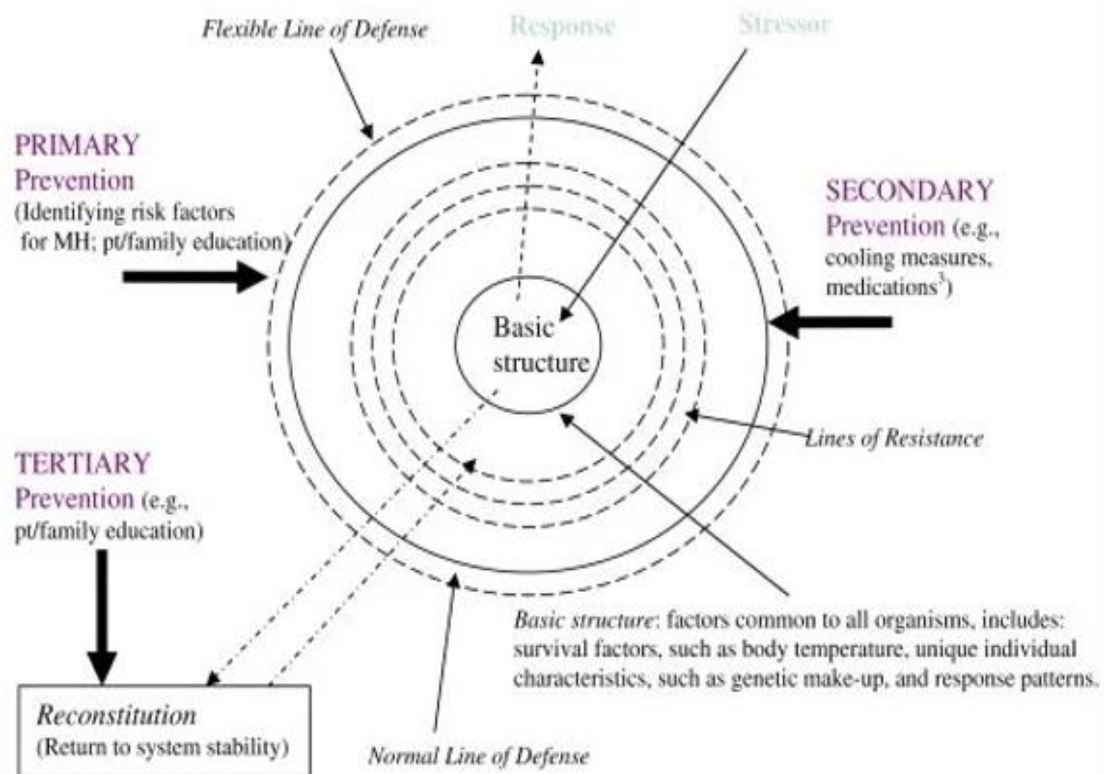

Figure 1. Neuman systems model

The Neuman model manages to talk about the person in relation to the environment in terms of when met with one or more stressors. The normal line of defense (NLD) is influenced by interpersonal, or extrapersonal stressors that arise from the internal or external environment. The model goes from a wellbeing to an illness state of being. Primary prevention is the assessment part of the nursing intervention. In the first line of defense (FLD) the nurse and the patient work together to identify the risk factors so as to manage the stressor before it can invade the second line of defense (SLD) and therefore cause a reaction. However, when the stressor is able to break through the FLD, it results in the person moving into a state of illness. Prevention strategies can be used to strengthen the FLD so as to ease the return the state of stability and promote health. In the secondary prevention, the aim is to manage the symptoms caused by the stressor e.g., through medication. Tertiary prevention is the process of returning to the original state of wellbeing/stability.

Secondary prevention relates to symptomatology following a reaction to stressors, an appropriate ranking of intervention priorities, and treatment to reduce their noxious effects. Tertiary prevention relates to the adjustive processes as reconstitution begins and maintenance factors move the client back in a circular manner toward primary prevention. This model will be used to analyze the chosen articles in this paper. The Neuman model allows the nurses and healthcare workers to analyze how the different disorders interact with the patient and the different stages of intervention that is possible.

4 AIMS AND RESEARCH QUESTION

4.1 Aim

The purpose of this research study was to understand the current assessment and management approaches of generalized anxiety disorders in adolescents with eating disorders. This understanding helps health care workers in this area (nurses) to optimize care for these adolescents through early symptom identification and administering the most appropriate treatment approach.

4.2 Research question

To gather information on the research question, the following sub-questions were posed:

- What screening and management approaches exist for adolescents with generalized anxiety in comorbidity with eating disorders?
- What role does a nurse play in the assessment and management of anxiety disorder in patients with eating disorders?

5 METHODOLOGY

5.1 Data collection

This is a literature review using inductive content analysis with 20 scientific articles to find new insights on how to assess and manage anxiety disorders in adolescents. A total of 21 articles were collected from several databases, namely EBSCO, PubMed, CINAHL, and google scholar. Inclusion criteria and exclusion criteria were used to find articles that were assessed to be of significance to the topic. As inclusion criteria there is the timeframe of the last 10 years, full-text articles, peer-reviewed articles, the language English. The timeframe of 10 years was included to retrieve articles that were up to date. Only peer-reviewed articles were included to increase the validity of this study. English is an inclusion criterion due to the language barrier. Articles included in this study had content relating to generalized anxiety disorders, eating disorders, adolescents, and dated not more than 10 years (2012 to 2021). Review articles and articles in languages other than English were excluded from this study.

In this study, the population of interest is adolescents with anxiety. Adolescents are defined using WHO's definition of individuals between the ages of 10 to 19 years. This population covers three categories of search terms; (1) adolescents, teens, teenagers, and young adults; (2) anxiety, anxiety disorders, and nervousness OR affective disorder; (3) eating disorders, binge eating, bulimia nervosa, and anorexia nervosa. The intervention of interest is the assessment and management of anxiety. This intervention also has two categories of search terms: (1) assessment, examination, screening, management, treatment, education, and support. The outcomes of interest are the benefits of the different management approaches to eating and anxiety disorders. In this study, the different management approaches shall be studied to identify the most prevalent ones. These keywords were used interchangeably to collect articles of interest.

As shown in figure 2, a search in the chosen four databases produced a total of 19 050 hits. After using the forementioned keywords in search engines, EBSCO produced 229 hits, CINAHL156 hits, PubMed 365 results and Google Scholar 18 300 hits after duplicate articles, and articles were excluded due to title and abstract non-suitability. Articles

were excluded or included based on availability of full text, language (English), peer-reviewed only articles, and 21 were chosen according to how relevant to our study they appeared based on reading their abstract. The articles are included as a table in the appendices chapter (appendix 1).

5.2 Data analysis

Inductive content analysis by Elo and Kyngas (2008) was used to synthesis the collected data. Content analysis is a systematic and an objective way of describing and quantifying phenomena (Elo & Kyngas, 2008). Through content analysis, similar words and phrases are categorized together to share the same meaning and make valid inferences. Deductive content analysis allows data synthesis to take place in circumstances where some previous knowledge exists. For this reason and its ability to be used on either qualitative or quantitative data, deductive content analysis was chosen for this study.
This method has 3 phases: the preparation, organizing and reporting phases (Elo & Kyngas, 2008). The preparation phase started by choosing the themes as units of analysis and creating the categorization matrices of main, generic, and sub-categories. Next, the researchers made sense of the data by reading through it several times to be familiar with the data. All the data were coded for correspondence with the identified categories. Finally, the analyzing process and results were reported as in the results section.

5.3 Ethical considerations

This study is done using literature review and can therefore be said to not have harmed anyone in the process. Ethical considerations were however taken into account during the process of article retrieval. Additionally, articles are referenced in order to avoid plagiarism.

6 RESULTS

The twenty-one chosen articles included have all quantitative studies. Through data analysis different methods of assessing and managing anxiety in adolescents with eating disorders (ED) were found. In appendix 2 the different studies from each article and the main observations as well as sub-categories are listed. Those findings were then further grouped into different categories (see table 1).

Appendix 2 shows the key characteristics of all the studies that were included in this literature review. Following the inclusion and exclusion criteria, twenty-one (21) articles were included in this study. Four studies had a cohort design (Norris *et al.*, 2012), (Carrot et al., 2017), (Fairweather-Schmidt and Wade., 2019), (Garcia et al., 2020), eleven studies had cross-sectional study design (Barcaccia *et al.*, 2018; Brand-Gothelf *et al.*, 2014; Bühren *et al.*, 2014; Byrne *et al.*, 2019; Hughes *et al.*, 2013; Mossman *et al.*, 2018; Sander, Moessner and Bauer, 2021; Schaumberg et al.,2019; Byrd-Bredbenne et al.,2021; Levinson et al., 2012; Sidor et al., 2015); two studies had secondary analysis of clinical assessment data (Obeid *et al.*, 2013), (Hicks White and Snyder., 2017) and one other study had both cross-sectional and longitudinal study design (Rojo-Moreno *et al.*, 2015). Two studies had a case study design (Corning., 2016) and (Desocio., 2019). One study had both descriptive, correlational cross-sectional designs (Doumit et al., 2015).
All the study participants in the articles included had an age range of 7 to 19 years with only one study (Sander, Moessner and Bauer, 2021) having 12 to 25 years. The included studies had a sample size that varied from 25 to 699 participants. All studies at least focused on understanding eating disorders and psychiatric disorders among adolescents. These adolescents were either boys or girls alone or both.

Table 1. Creation of categories

Sub-categories	Categories
Screening ED/Anxiety	Assessment tools
Determining ED types	
ED existing with Anxiety	Comorbidity
ED existing with other psychiatric conditions	

<table>
<tr><td>ED manifestation</td><td rowspan="4">Manifestation</td></tr>
<tr><td>ED symptoms/prevalence</td></tr>
<tr><td>Variation of ED across age group</td></tr>
<tr><td>ED types</td></tr>
<tr><td>Limiting factors to ED</td><td>Management</td></tr>
</table>

Table 1 shows how coding and the generation of categories took place. The included articles were read and re-read to be familiar with the content of each study. Coded inform of notes, headings, and comments were made in each read paper. These codes were them brought together and categorized based on their meaning to the researchers to create sub-categories. Nine sub-categories were generated, and these include screening ED/anxiety, determining ED types, ED existing with anxiety, ED existing with other psychiatric conditions, ED types, variation of ED across age group, ED symptoms/prevalence, ED manifestation, and limiting factors to ED
The sub-categories were then put together in a high order categorization to create the final categories as shown in table 1. The categories created included assessment tools, comorbidity, manifestation, and management.

In seeking to understand the current assessment and management approaches of generalized anxiety disorders in adolescents with eating disorders. The above results have indicated that when faced with an adolescent person who has both anxiety and eating disorders, the following categories are important for the nurse to know as described and discussed below, manifestation, comorbidity, assessment tools, and management.

6.1 Manifestation

Under this category, the disorder prevalence and presentation through signs and symptoms were covered. Most of the included studies indicate that eating disorders are very prevalent in females compared to males and even on the rise (Barcaccia et al., 2018). The cause for this difference is not very clear, however, research attributes it to genetic and metabolic differences in the two genders (Byrne et al., 2019). A study by Fairweather-Schmidt (2019) attempted to study the role genetics plays in the development of the comorbidity of disordered eating and anxiety sensitivity using twin participants to rule

out genetics as a variable. The results show that genetics and (to a lesser extent) environmental influences both play a significant role in the development of ED in comorbidity with anxiety disorder. (Fairweather-Schmidt, 2019) The most common anxiety disorders found in comorbidity with eating disorders are general anxiety disorder as well as obsessive-compulsive disorder. (Carrot et al. 2017)
The common symptoms of an adolescent with eating disorders are purposeful restriction, over-exercise, and use of laxative (Barcaccia et al., 2018; Norris et al., 2012). Other symptoms commonly reported are suicidal and self-injury behaviors (Buhren et al., 2013; DeSocio et al. 2019), low self-esteem, and increased perfectionism, and dysfunctional (Sander et al., 2021; Fairweather-Schmidt, 2019). It has been generally observed that as children with anxiety eating disorders increase in age across adolescence to young adulthood, the risk for more severe eating disorder symptoms increases. This observation was more supported by Sander et al. (2021) and Byrne et al. (2019).
Additionally, there is an observed association between eating disorders and anxiety disorders. Adolescents who have an anxiety disorder are most likely to have Anorexia Nervosa eating disorders as opposed to adolescents with depressive disorders who are most likely to have Bulimia Nervosa eating disorder (Buhren et al., 2013; Brand-Gothelf et al., 2014; Obeid et al., 2013; Sidor et al. 2015). Anxiety disorder patients with eating disorders are also commonly present with disturbed body image and weight loss (Barcaccia et al., 2018; Fairweather-Schmidt, 2019).
Many of the adolescents who have sought treatment for eating disorders have been admitted (Brand-Gothelf et al. (2014). Norris et al (2012) argues that due to the delay in the patients seeking for help, the health situation of the patients have already deteriorated considerably and therefore most of them need to immediately receive inpatient care. Forty one percent (41%) of adolescents with an eating disorder and generalized anxiety disorder had prescribed medication. This observation depicts the seriousness of this condition. Hence, creating a need for health workers to be well informed about the manifestation of anxiety-eating disorders among adolescents so that the victims can be appropriately identified.
Much of the research on the topic of eating disorders and anxiety disorders address female patients perhaps due to the fact that previous studies have shown that the prevalence rate for female adolescents with ED in comorbidity with an anxiety disorder (e.g., Garcia et al. 2020) is higher compared to male adolescents. This is also supported in a study by

Sidor et al. (2015), in which they found that the severity of the symptoms in adolescent girls is worse than the symptoms experienced by boys. However, the extent of the comorbidity between anxiety and bulimia nervosa was found to be similar in both genders.

6.2 Comorbidity

Rarely does an eating disorder exist alone in an adolescent. In most cases, it will co-exist with one or more psychiatric disorders in a term called comorbidity. Eating disorders remain the most common comorbid disorder among adolescents with anxiety (Hughes et al., 2013). In this study, Rojo-Moreno et al. (2015) found this comorbidity at 51.4% of all the adolescents studied while Hughes et al. (2013) found it at 78%. Eating disorders can also co-exist with affective psychiatric disorders, for example, major depression and dysthymia (Buhren et al., 2013; Rojo-Moreno et al., 2015; Carrot et al. 2017).
Although this comorbidity exists, strong evidence suggests that anxiety disorders are precursors of eating disorders (Rojo-Moreno et al. 2015; Carrot et al. 2017). An individual is, therefore, more likely to develop an eating disorder if he or she has an anxiety disorder. In the study by Garcia et al. (2020) the participants were asked when the age of onset for their comorbidity was and around 1/3 reported as long as they could remember. It was also found that participants with an anxiety disorder were four times more likely to suffer their whole lives from an eating disorder and 40% of them also reported more severe eating disorder symptoms. This supports the findings from Sidor et al. (2015). Approximately 20% of individuals with an eating disorder also met the criteria for social anxiety disorder (Levinson et al, 2012).
A study by Schaumberg et al. (2019) identified childhood symptoms associated with generalized anxiety disorder as prognostic of eating disorder symptoms and diagnoses in early adolescence.
Comparing Bulimia Nervosa and Anorexia Nervosa, among adolescents with an eating disorder and generalized anxiety disorder, Hughes et al. (2013) showed that the two have similar rates of occurrence. Therefore, neither of these two eating types is more likely than the other to co-exist with anxiety disorders.
Comorbidity comes with its challenges and dangers. Adolescents with comorbid anxiety and eating disorders are more likely to die earlier than those without comorbidity (Hughes et al., 2013). Unfortunately, compared with the adult patients, adolescents have higher

rates of having more than one mental disorder (Buhren et al., 2013). Studies show that a premorbid anxiety disorder negatively affects the prognosis of ED. They are an obstacle in the treatment and therefore need to be addressed in comorbidity with the eating disorder rather than seen as individual disorders. (DeSocio et al. 2019) The fact that previous research are in concordance on the prevalence of anxiety, affective and eating disorders together may point to common risk factors as their possible basis. Research shows that some traits in an individual can make them more vulnerable to developing a mood disorder or eating disorder. These traits can be genetic (MTHFR gene), personality traits (Cluster C traits, pessimistic) or neurobiological factors. Sometimes these traits can come into contact with environmental influences (peer-bullying regarding body concerns, trauma, etc.) leading to anxiety or other affective symptoms which the internalization of can lead to an affective disorder. There is a need for further research on the pathology of these shared vulnerabilties that may be the cause of the comorbidity between eating disorders and mood disorders. (Carrot et al. 2017; Garcia et al. 2020; DeSocio et al. 2019)

6.3 Assessment tools

Several tools for screening adolescents for mental disorders exist and have been used by many mental health professionals. The DSM-IV criteria can be used by any mental health professional to diagnose mental health disorders. In this study, this tool was used by Buhren et al. (2013); Hughes et al. (2013); Carrot et al. (2017); Mossman et al. (2017); Garcia et al. (2020); and Norris et al. (2012) as a preliminary diagnostic criterion for all participants that were included in their studies. However, due to overlapping symptoms in the diagnostic criteria of the DSM-IV it proves to be difficult to diagnose correctly e.g. sudden loss of appetite or decreased weight could be caused by many different disorders. In such cases it is recommended that the healthcare staff carefully interviews the patient and takes all aspects into account of the patient's life before making any assumptions on the diagnosis. (DeSocio et al. 2019)

Eating disorder examination and eating disorder inventory have also been used by authors to measure the eating disorder levels (Brand-Gothelf et al., 2014; Byrne et al., 2019; Barcaccia et al., 2018; Fairweather-Schmidt, 2019). In this questionnaire the questions are regarding the concerns the participants have about their body image, body weight and

dietary habits. The generalized anxiety disorder-7 (GAD-7) was also used in these studies to rate the degree to which generalized anxiety disorder manifested. This was used by Mossman et al. (2017). GAD-7 is a new tool that has not been widely used but is reported to be effective in diagnosing generalized anxiety disorders using a seven-question approach. Apart from the DSM-IV criteria, the rest of the screening tools are specifically important when screening for eating disorders that are co-existing with anxiety disorders. Children's Anxiety Sensitivity Index is a tool used to be able to rate the anxiety experienced by the participants in different scenarios. They are presented with 18 different possible situations and have to give a score of how much anxiety they would experience in those scenarios on a 3-point scale. This tool was used in the Fairweather-Schmidt (2019) study.

An assessment tool called Patient Health Questionnaire (PHQ-4) is, as opposed to the GAD-7, a very brief questionnaire to measure the level of anxiety experienced by the participants in the study done by Sidor et al. (2015). Through this assessment tool the participants can easily answer the questions by giving a score from 0 to 12 depending on the severity of the symptoms.

Another tool for screening anxiety is STICSA, a self-report measure of cognitive and somatic anxiety used in Doumit et al. (2015) study. It helps to assess how anxiety manifests in an individual whether mentally or physically.

Short Evaluation of Eating Disorders (SEED) is a tool to measure the level of severity of ED symptoms. This assessment tool was used in the study Sidor et al. (2015).

6.4 Management

Given the fact that very original studies address management approaches for anxiety and eating disorders, most of the studies in this literature review focused on pharmacological management. Little attention was given to psychosocial and behavioral management. Norris et al. (2012) indicated that most of the pharmacological management approaches are directed at comorbid disorders. As such, most of the studies included in this review showed that adolescents who sought clinical attention received some drugs to manage the anxiety related eating disorders. Unfortunately, adolescents that always seek help with doctors regarding anxiety- eating disorders are very few (Barcaccia et al., 2018; Norris et al., 2012). The study by Norris et al. (2012) showed that only 27% sought treatment. In

support of this delay, many adolescents with anxiety and eating disorders get admitted on their first visit to the mental health clinics. As mentioned earlier, patients with a history of anxiety disorder are found to be four times more likely to suffer from lifetime eating disorder compared to patients without a medical history of anxiety disorder. (Garcia et al. 2020) They also have a worse outcome in their quality of lives when an anxiety disorder precedes an ED e.g., more frequent need for rehospitalisation and suffering from lifetime ED. (Carrot et al. 2017)

When an individual undergoes a sudden loss of weight this disrupts the biological system of their body and can lead to mood disorder symptoms. Malnutrition could be one of the underlying causes of mood disorders and eating disorders. After the management of the nutritional status of the patient and the recovery of it, it should be observed whether it had an effect on the mood symptoms. If the symptoms improve, this rules-out the mood disorder as a diagnosis. (DeSocio et al. 2019) No other of the articles in this study addressed this malnutrition as a vulnerability factor to developing ED and anxiey disorders.

Adolescents with eating disorders are more likely to internalize symptoms of their disorder than adults or deny the presence of the symptoms. Their guardians are more likely to observe affective disorder symptoms compared to eating disorder symptoms in them and seek treatment. Parents/guardians of adolescents are generally included in the treatment plans. The importance of their level of understanding and their personal perceptions of the comorbidity of eating disorders with emotional disorders is of great significance as the adolescents require the support of their guardians during this stage of treatment. An absence of trust can hinder the individual's commitment to successful treatment. For the sake of the therapeutic alliance, the parents also need to be educated on the disorders so that the adolescents will be able to externalize their symptoms and thus form a bond of trust with the healthcare team. Previous research shows the lack of concordance between reports of adolescents with mental health concerns and their perception of their own eating disorder/anxiety disorder symptoms and their guardians' perception of the youths' symptoms. Meaning that the guardians' understanding of the concerns of the adolescents is quite lacking and they are in need of further education and need to be more engaged in the treatment plans. They should also be involved in the interviewing process of the adolescents to some extent as the patient may keep some symptoms secretive (Hicks White

and Snyder, 2017) This is how the treatment has been done in the case study of Dora. The parents of Dora and Dora herself were all a part of the family-based treatment program. There is a need for not only pharmacological care but also lifestyle changes which are attempted by different types of therapy such as behavioral therapy. Treatment of ED and anxiety disorder should be seen as a long-term process and the parents of Dora in this case were a part of the care throughout it. Other non-pharmacological interventions included are psychoeducation, patient education, lifestyle changes (sleep patterns, diet, support groups, learning to seek support), Dialectical Behavior Therapy, and developing coping mechanisms. (DeSocio et al. 2019)

The major disorder promoting factor commonly observed across this study that is even psychological in nature is the perceived public perception. Adolescents who perceive their symptoms to be belittling, tainting their physical appearance, and global self-worth are less likely to be drawing to the eating disorder group or would easily minimize their tendency towards eating disorders as observed by Obeid et al. (2013) and Barcaccia et al. (2018). Additionally, adolescents with comorbid disorders would be more likely to seek mental support than their counter parts without comorbidity (Barcaccia et al., 2018). Unfortunately, Hughes et al. (2013) asserts that comorbidity can complicate the treatment approach. Adolescent identity and sense of self is weak, maladaptive coping way of behaving may overtake the development of self. Low self-esteem is a known risk factor for the development of eating disorders (Corning et al, 2015). Healthy adolescent identity development should be the focus of prevention efforts. There is a lack of priority on building positive, broad-ranging, strengths-based identities in such programs. Most eating disorder prevention programs have mostly focused on only body-esteem, for example," love your body" versus global self-esteem. This redirects our attention once again to the body as an essential and only source of esteem, rather than other aspects of the self which the individual can rely on when body esteem changes. Corning et al. (2015) makes a point by saying the promotion of healthy identity development in adolescents needs to be the primary focus within the field of eating disorder prevention since it has not yet been a focus of eating disorder prevention programs. Corning goes on to say that more testing of the self-affirmation interventions in adolescents at risk for developing ED needs to be done, the research is only at the beginning stages and these prevention efforts are very difficult to implement.

7 DISCUSSION

To our knowledge, there are not many studies that address this research topic for a nursing perspective. This study supports previous research on this topic. There was no disagreement between any of the studies. However, the rate of comorbidity is higher than in past studies. Eating disorders in comorbidity with anxiety disorder are were mostly prevalent in female adolescents compared to male adolescents. However, one study found that the comorbidity rate was similar in both genders. This reflects the need for research on prevention and treatment with an equal focus on both genders to avoid the gender bias in most of the research on the topic. Most studies found that the age of onset for anxiety symptoms was earlier than disordered eating symptoms. And the internalization of them leads to the deterioration of the symptoms. Adolescents with an untreated anxiety disorder usually experience more severe ED symptoms later on in their lives. The adults that are foremost in contact with the adolescent are the caregivers and are therefore also the ones that should seek medical attention for the adolescents suffering from a comorbidity of anxiety and eating disorders. Studies show that youth are more prone to being in denial and hiding the symptoms of eating disorders, thus adults are usually more aware of the change of mood in the adolescent rather than their ED symptoms. Since an adolescent with an ED has different goals (e.g. becoming thinner) than their healthcare team, it is significant for a trusting bond to be built between the patient and the healthcare team. Therefore, it is important that the guardians of the adolescent also receive patient and family education. The family members need a sufficient understanding of the mental concerns of their teenagers to be able to communicate more effectively with them. The caregivers, the patient, and the healthcare team will be able to work as a team towards their shared goals. The focus will need to be on patient-centered care to enhance the effectiveness of the treatment.

The importance of vulnerability traits has been pointed out by several researchers in their studies. Genetic, environmental and personality traits could be risk factors for the development of anxiety symptoms. Certain stimuli could aggravate these symptoms such as peer bullying, social media, etc. It is challenging to diagnose comorbidities, as many symptoms overlap in different disorders or if the symptoms do not fit into one single diagnostic criterion perfectly. In those cases, the healthcare staff needs to do a broad interview with the patient and their guardians to get a better understanding of the

comorbidity of the disorders. Developmental factors and family history, the pattern of symptoms (what came first and what was developed later) are all of great importance when making an assessment and making a care plan.

Through the Neuman systems model, a nurse interacts with the adolescent to understand how their physiological, psychological, and spiritual components are changing. Depending on the time of presentation of the adolescent with a disorder, secondary and tertiary prevention might be possible. However, according to Willls (2014), Neuman system model drives nurses and other health workers in the area of mental service delivery to go beyond waiting for the presentation of patients in clinics and consider community mental health. Community mental health would involve community awareness sessions and screening sessions without necessarily waiting for clinical symptoms. By doing so, primary prevention is attained; adolescents are taught good behavior habits especially those important in times of stress so that the disorders are minimized or the capacity of one disorder does causing another is compromised. It is an important call to the health workers in this area to pay attention to comorbidity among adolescents with mental disorders so that appropriate treatment is offered. According to Neuman systems model, offering appropriate treatment follows disorder identification. Both steps happen at the secondary prevention level. At this level, a health worker (nurse) is guided by this theoretical framework to identify all possible comorbidities in an adolescent presenting with any of the psychiatric disorders. The identification process takes advantage of the existing assessment tools. Based on the type of prevention possible as per the Neuman systems model above, management approaches can also follow the same categorization. An adolescent identified as manifesting with primary, secondary, or tertiary level symptoms would receive a matching kind of management/prevention. A choice between or for both pharmacological and non-pharmacological would be considered. The Pharmacological considers the use of drugs to treat the disorders while the non-pharmacological considers the use of psychotherapy and behavioral change (Wills, 2014). In this literature review, non-pharmacological management has not been well addressed due to limited data accessed.

8 CONCLUSION

The Neuman systems model is very fundamental in assisting nurses to understand anxiety and eating disorders from their manifestation to their management. Studies have shown that the treatment of an eating disorder in comorbidity with an anxiety disorder has a worse prognosis than if it were not in comorbidity with each other. Much of the research has also found anxiety and affective disorders as a precursor to eating disorders in a significant part of the patients. This suggests how vital early intervention by healthcare workers is. There is a need for further research to specifically explore the currently available management approaches for anxiety-eating disorders among adolescents so that the non-pharmacological approaches can be exposed. Further research may be necessary to specifically explore the currently available management approaches for anxiety-eating disorders among adolescents so that the non-pharmacological approaches can be studied.

8.1 Strengths and limitations of this study

Recent articles of the last decade have been used to analyze the latest research. This leads to the study being up to date. The participants in most of the studies in the different articles were both male and female and this is to avoid gender bias. However, some studies have more female participants compared to male participants or only included female participants causing a gender bias in this literature review study as well. This is due to the fact that, as mentioned earlier, more females are diagnosed with eating disorders and how they have a higher rate of suffering from an affective disorder than males. Therefore, it could be argued that it is to some extent representative of the population. However, even though the prevalence rates may differ in both genders, the comorbidity of ED and anxiety disorder and the strength of it are found to be the same for both sexes. For objectivity reasons, the studies were from different countries, this limits the geographical bias. To show openness in this paper everything that has been done has been explained in the methodology and the results sub-chapter. Multiple databases were used to have variety in the sources of the articles. However, only one articles was found with a nursing perspective on this topic. Due to a limitation in time, the validity of the studies was not appraised. Due to the limited findings, it would be recommended to investigate this topic using other research methods such as a case study or interviews.

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APPENDICES

Appendix 1: Chosen articles

1.	Norris et al. (2012)	12.	DeSocio (2019)
2.	Obeid et al. (2013)	13.	Carrot et al. (2017)
3.	Barcaccia et al (2018)	14.	Garcia et al. (2020)
4.	Hughes et al. (2013)	15.	Fairweather-Schmidt and Wade (2019)
5.	Buhren et al. (2013)	16.	Sidor et al. (2015)
6.	Sander et al. (2021)	17.	Levinson et al. (2012)
7.	RojoMoreno et al. (2015)	18.	Eck and Byrd-Bredbenner (2021)
8.	Byrne et al. (2019)	19.	Doumit et al., (2015)
9.	Mossman et al. (2017)	20.	Corning and Heibel (2015)
10.	Brand Gothelf et al. (2014)	21.	Schaumberg et al. (2018)
11.	Hicks White and Snyder (2017)		

Appendix 2: Characteristics of selected studies, their main observations and categories

No.	Author	Study design	Participants	Focus of study	Sample size	Main observations/ coding	Sub-categories
1	Norris et al. (2012)	Retrospective cohort study	Male adolescents	Examining medical and psychological morbidity	699	- *DSM-IV* ED diagnosis met by majority -The most common reported ED symptom was purposeful restriction followed	-Screening ED/Anxiety -ED symptoms/prevalence -ED and Anxiety (Comorbidity) -Treatment of ED/Anxiety

						by over-exercise and laxative use. -Comorbidity reported between ED, anxiety disorders, and depression -27% needed admission on first appointment with ED doctor - almost all studies cite prevalence rates between 5–15% for male patients among clinical samples	
2	Obeid et al. (2013)	Secondary analysis of clinical assessment data	Adolescent females	Self-esteem and social anxiety in adolescents with eating disorders	458	- Demonstration of restricting group reported higher scores on perceived physical appearance and global self-worth (shame) than both the binge/purge and Bulimia Nervosa subgroups -ED differences across adolescent age categories were not significant	-Limiting factors to ED -Variation of ED across age group
3	Barcaccia et al (2018)	Cross sectional	Boys and girls	Role of mass media	148 females and 153 males	-Higher prevalence of ED symptoms has been found in women as compared to men. Thus, women may	-ED symptoms/prevalence -Limiting factors to ED -Screening ED/Anxiety

						be more susceptible than men to body misperceptions caused by the media. -The following assessment tools were used; EDI-2, EDE, body uneasiness test for phobia, and State-Trait Anxiety Inventory for state anxiety	
4	Hughes et al. (2013)	Cross sectional	Children and adolescents	Eating disorders with comorbid diagnosis	371	-DSM-IV diagnosis was used. -8.6% of participants had comorbid diagnosis for anxiety disorder with GAD being the commonest. -Anorexia Nervosa was the most common ED (78%) -In ED with GAD group binge eating has similar rates to purging. -41% of the ED with GAD group had prescribed medication -34% of the ED with GAD group prescribed antidepressants. -children and adolescents	-Screening ED/Anxiety -ED and Anxiety (Comorbidity) -Determining ED types -Treatment of ED/Anxiety - ED types

						with an ED and comorbid anxiety disorders were similar in presentation to those without a comorbid psychiatric disorder	
5	Buhren et al. (2013)	Cross sectional	Female adolescents	Psychiatric disorders in female adolescents with first onset of Anorexia Nervosa	172	-DSM-IV diagnosis was met. -lifetime prevalence of at least one mental disorder in half of the adolescent patients with a first onset of AN -Most frequent comorbid diagnosis observed was an affective disorder (major depression or dysthymia), followed by anxiety disorders. -16.2% of the patients had a pre-existing psychiatric disorder other than an eating disorder (mostly depressive and anxiety disorders). However, pre-existing psychiatric disorders were not associated	-Screening ED/Anxiety -ED and Anxiety (Comorbidity) -ED symptoms/prevalence

						with any current eating disorder symptoms.	
6	Sander et al. (2021)	Cross sectional	Female adolescents and young adults	Anxiety and eating disorder related impairment	320	-Greater anxiety/depression is correlated with more severe ED -Low self-esteem, high perfectionism, and dysfunctional emotion regulation are associated to development and maintenance of ED's. -Whereas late adolescence and young adulthood were correlated to more severe eating disorder symptoms, young participants showed a stronger link between anxiety/depression and ED symptomatology	-ED and Anxiety (Comorbidity) -ED symptoms/prevalence
7	RojoMoreno et al. 2015	Cross sectional and longitudinal	Adolescents	Prevalence and comorbidity of eating disorders	326	-Anxiety disorders were the most common comorbid disorders associated with ED. 51.4% of adolescents diagnosed with ED also had an anxiety disorder. -longitudinal study revealed that anxiety	-ED and Anxiety (Comorbidity) -ED manifestation

						disorders are precursors of ED. -anxiety disorders are strongly associated with EDs	

8	Byrne et al. (2019)	Cross sectional	Boys and girls	Pediatric loss of control eating and anxiety; metabolic syndrome	25	-Involved psychological assessments included eating disorder examination using EDE-child version, trait anxiety using State-Trait Anxiety Inventory for Children, depression using Children's Depression Inventory.	-Screening ED/Anxiety -ED manife tation
9	Mossman et al. (2017)	Cross sectional	Adolescents	Assessing GAD	40	-Met DSM-IV-TR criteria for GAD. -Pediatric Anxiety Rating Scale (PARS) and the GAD-7 -GAD-7, a self-rating scale, may reflect symptom severity in adolescents with GAD	-Screening ED/Anxiety -ED manife tation

10	Brand Gothelf et al. (2014)	Cross sectional	Adolescents	Impact of comorbid depression and anxiety on Anorexia Nervosa.	88	-Met Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria. -Eating disorder Examination (EDE) was used to measure eating disorder -The eating disorder inventory (EDI) was also used. -AN comorbid group reported a significantly greater number of previous hospitalizations with a higher number of suicide attempts.	-Screening ED/Anxiety -ED and Anxiety (Comobidity) -ED manifetation
11	Hicks White and Snyder (2017)	Secondary analysis of clinical assessment data	Adolescents	Examining youth and caregiver reports of depression and anxiety	49	-1/3 of participants reported comorbid anxiety and ED -Caregivers of youth with comorbid ED and anxiety have a different perception of the severity of the anxiety experienced by the adolescent	-ED and Anxiety (Comobidity) -Management

12	DeSocio (2019)	Case study and systematic review	Adolescent	Challenges in diagnosis and treatment of comorbid eating disorders and mood disorders	1	-Patients can seldom fit into one diagnosis category perfectly. Thus, the nurse should not limit their perspective and should focus on patient-centered care to not oversee any symptoms that can be caused due to the comorbidity of two diseases	-Difficulties i diagnosing comorbid di orders -Managemen of comorb disorders
13	Carrot et al. (2017)	Retrospective cohort study and longitudinal study	Female adolescents	If lifetime affective disorders are predictive of long-term outcome in severe adolescent anorexia nervosa	181	-83% of the participants suffered from anxiety or depression disorder at one point: the most common one found was OCD and general anxiety disorder respectively	-Assessment
14	Garcia et al. (2020)	Twin cohort study and longitudinal study	Female twins	Increased rate of ED and their symptoms in females with MDD and anxiety disorders	563	-Patients with major depressive disorder or anxiety disorder: 13% of them had lifetime eating disorder and 39% experienced an eating disorder at one point in their lives	-ED/anxiety symptoms ar prevalence -Screening ED/anxiety

15	Fair-weather-Schmidt and Wade (2019)	Twin cohort study and longitudinal study	Female twins	Genetic architecture and environmental risk factors underpin the anxiety-disordered eating relationship	699	-14% of the genetics was found to have influenced the manifestation of anxiety disorder eating -A smaller but significant percentage of the influence of environment on the development of anxiety disorder eating was found	-Disordered eating an anxiety man festation
16	Sidor et al. (2015)	Cross sectional	Adolescents	Gender differences in the comorbidity of ED and anxiety symptoms	706	-A significant correlation between anorexia nervosa and anxiety was found in females, but not in males -To some extent a correlation was also found between bulimia nervosa and anxiety in both groups of males and females	- Prevalence o ED and anx ety sympton in differe genders
17	Levinson et al. (2012)	Cross sectional and causality	Adolescents	Social anxiety and eating disorder comorbidity	118	-Social Anxiety Disorder has the highest prevalence of all anxiety disorders in individuals with ED -Fear of negative evaluation could predict a mix of disordered eating over other 4 domains of social anxiety	-ED and Anx ety (comorbidity -ED -ED symtoms/pre alence -Screening

18	Byrd-Bredbennet al. (2021)	Cross-sectional	Young adults	Examining links between disordered eating and depression/anxiety	1792	-As anxiety and depression rise in conjunction, disordered eating severity rises	-Screening - ED/anxiety - ED and anx ety (comorbi ity) -Assessment
19	Doumit et al. (2015)	Descriptive, correlational cross-sectional design	Young adults	-Anxiety as a moderator of the relationship between body image and restrained eating	894	- Moderation analyses indicated that anxiety significantly moderated the relationship between body image dissatisfaction and restrained eating, whereas depression and stress did not.	-Screening ED/anxiety - Manageme of anxiety -Assessment
20	Corning et al. (2016)	Case study	Adolescents	Re-thinking eating disorder prevention: The case for prioritizing the promotion of healthy identity development	1	-ED symptoms are followed by intense feelings of insecurity, social anxiety, social-emotional isolation, feeling separated from one's peer group	-Difficulties in plementing E prevention e forts -Healthy iden tity develop ment -Self-affirma tion interve tions

21	Schaum-berg et al. (2019)	Cross-sectional	Adoles-cents	Anxiety disorder symp-toms at age 10 predict eat-ing disorder symptoms and diagnoses in adolescence	7767	-Eating disorders are highly comorbid with other psychiatric conditions, spe-cially anxiety disorders. - Symptoms of GAD in middle child-hood may predict adolescent onset ED symptoms and ED diagnoses.	-ED sympton and cognitions -Assessment -Anxiety sym toms -ED/Anxiety comorbidity