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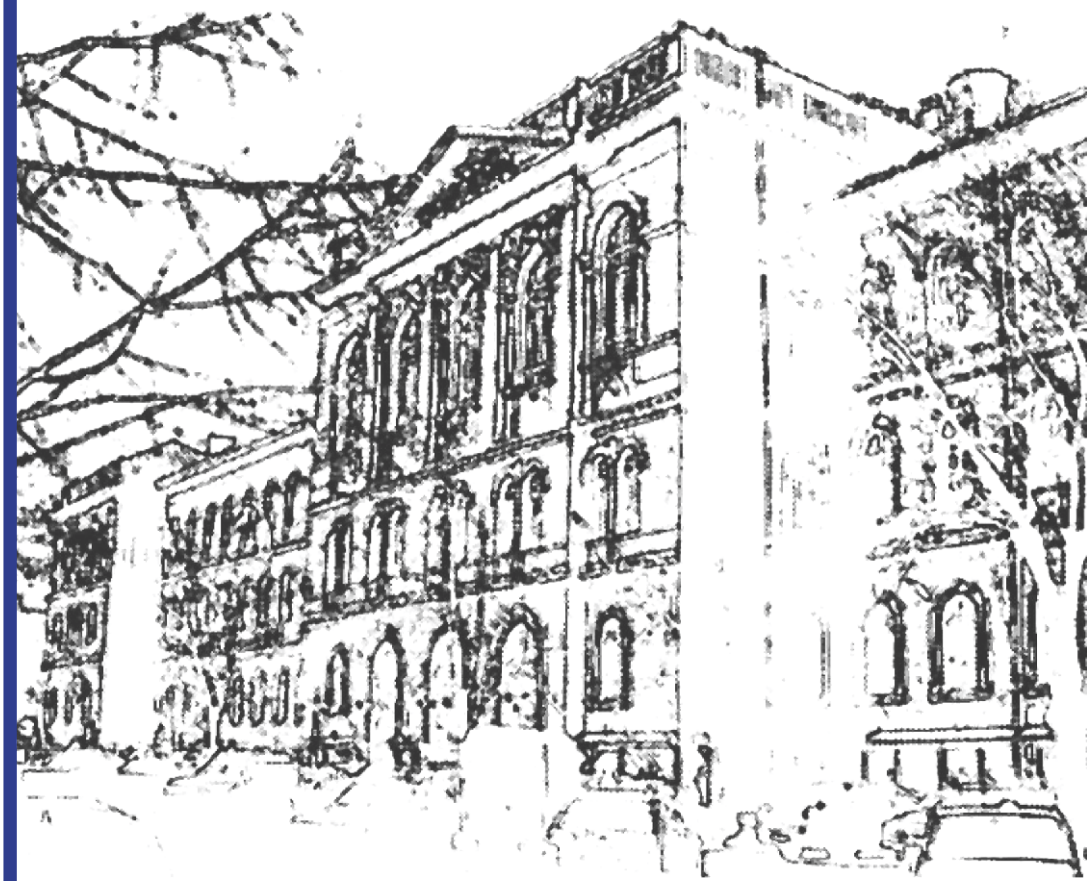

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JOURNAL OF EVIDENCE-BASED PSYCHOTHERAPIES

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CBT IN A CHANGING WORLD: MIGRATION AND CULTURAL DIVERSITY

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Journal of Evidence-Based Psychotherapies (JEBP) is publishing in conjunction with the European Association for Behavioural and Cognitive Therapies (EABCT) the Special Issue dedicated to the main theme of EABCT's 2023 Annual Congress in Antalya – *CBT in a Changing World: Migration and Cultural Diversity*. Authors of keynotes, symposium contributions, open papers and posters accepted for presentation at the conference and focused on investigating innovative CBT approaches and techniques were invited to submit to this Special Issue. Thus, our purpose for this special issue is to bring into the spotlight new developments in the field of CBT that can be effective in approaching current global concerns in terms of mental health.

Each of the eight articles included in this special issue stands solidly on its own merits in terms of their contribution to presenting therapeutic advances that can address mental health concerns in relation to current global challenges. We have made an effort to impose a logical flow in their ordering, motivated by an interest in emphasizing some of the methodological similarities and topics.

The issue begins with the article of Miljković and collaborators which investigates the mental health of migrants in relation to the use of different coping strategies. The following two articles focus on psychotherapeutic interventions that target anxiety symptoms. The second article of Tore explores processes underlying the effectiveness of a prevention program aimed at reducing social anxiety in preadolescents. The third article of Pleumeekers and colleagues maintains the focus on stress and anxiety management by examining the potential of a breath pacer as an adjuvant in cognitive behavioral therapy using a case studies design. The next two papers are systematic reviews of the literature. The fourth article authored by Hohn and Maricuțoiu used a systematic scoping review method to analize help-seeking behaviors in anxiety disorders. The fifth article by Kerimler and colleagues presents results based on a systematic review of prior studies indicating recovery criteria rates of patients with adolescent-onset anorexia nervosa. The sixth paper written by Kamburitis examines the relationship between alexithymia, emotion regulation strategies, and subjective well-being in schizophrenic patients. The seventh article authored by Tabur and colleagues explores personality disorders, mental health and

their relationships with preoperational thinking in diagnosed patients and normal population. The eight article authored by Tomoiagă and colleagues presents results exploring the usability of the MoodWheel app which is based on the ecological momentary assessment method for mood evaluation.

We consider, that taken together, the papers selected for this Special Issue are able to illustrate important developments of CBT, in terms of intervention techniques, models, technologies and applications.

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STRESS COPING SKILLS AND STRATEGIES AS ANTIDOTE TO MENTAL HEALTH FOR ADULT MALE MIGRANTS – OPEN SPACE FOR CBT INTERVENTIONS

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Abstract

Migrants often encounter numerous stressors that can significantly impact their mental health. Understanding the coping strategies employed by migrants and assessing their mental health status is crucial for developing effective support systems. The main aim of this study was to examine the most common coping skills and strategies of young adult migrants in order to generate ideas for creating a comprehensive CBT support program. The study explored the frequency of different coping strategies employed by migrants in correlation with their levels of depression, anxiety, and stress. This study utilized a quantitative approach and recruited a sample of 184 male migrants from 14 different countries facing stressful situations. The findings revealed that religion was the most commonly used coping strategy, followed by planning for the next steps and actively coping with the situation. Substance use was identified as the least utilized coping strategy. The mental health scores of male migrants reflected moderate levels of depression, anxiety, and mild manifestations of stress symptoms. These results underscore the importance of understanding and addressing the coping mechanisms and mental health needs of migrants to provide appropriate support and interventions.

Keywords: migrants, coping strategies, mental health, stress, religion, depression, anxiety, stress management.

Migrants frequently encounter various stressors that can markedly influence their mental well-being. It is imperative to comprehend the coping mechanisms adopted by migrants and evaluate their mental health status to formulate efficacious support systems. This research divulges essential insights into coping strategies and

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mental health among migrants in challenging circumstances, elucidating the predominantly employed coping mechanisms, as well as the levels of depression, anxiety, and stress.

In 2018, an estimated 25,000 refugees and migrants entered Bosnia and Herzegovina, primarily through the Serbian and Montenegro border, in contrast to 755 recorded arrivals in 2017 (UNHCR, 2019). From 2017 to 2024, approximately 150,000 refugees and migrants entered Bosnia and Herzegovina, with around 3,000 still residing in Temporary Reception Centers such as Lipa and Borici in Bihac, and Blazuj and Usivak in Sarajevo (IOM, 2024). The Una Sana route remains the most popular for refugees and migrants attempting to enter Croatia and the European Union. In these centers, supported by the European Union, the International Organization for Migration (IOM) addresses the basic needs of migrants, including food, hygiene products, water, sanitation, and facilities. According to IOM (2024) reports, the countries of origin vary from North Africa (Algeria, Tunisia, Morocco, and Libya) to the Middle East (Yemen, Iraq, Iran, and Palestine) and across South Asia (Afghanistan, Pakistan, India, and Bangladesh).

The reasons for leaving one's country of residence and home differ among migrants. Some individuals flee from war or persecution, while others seek new economic opportunities. The modes of travel and transportation also vary, ranging from perilous boat journeys on the open Mediterranean Sea to air travel to Turkey or Serbia, followed by crossing numerous borders to reach the center of Europe. Some migrants undertake extensive journeys on foot, covering over 5000 km from Asia or Africa to Europe, traversing countries, borders, and landscapes. Regardless of the method each migrant employs to reach Bosnia and Herzegovina at this stage in their lives, they may have experienced distinctly traumatic events during their journey and in their overall life experiences.

The UN Refugee Agency’s annual Global Trends study found that 68.5 million people had been internally displaced across the world at the end of 2017 (Edwards, 2018). As of May 2023, over 110 million individuals have experienced forced displacement globally due to persecution, conflict, violence, or human rights violations. These figures mark the highest levels of displacement ever recorded (UNHCR, 2024). Mental health among refugees and migrants still hasn’t received enough attention, yet it needs to be understood and explored better (Nickerson et al., 2011). Among refugees, there is usually a high prevalence of psychological difficulties and problems, especially anxiety disorders, depressive problems, PTSD, and suicide (Carney & Freedland, 2002; Heeren et al., 2012; Nickerson et al., 2010).

CBT Coping Skills and Strategies

Coping is defined as the 'constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person' (Lazarus and Folkman, 1984: p. 141). Additionally, coping can be considered a bridge and protective mediator

between stress and psychological well-being (Lazarus and Folkman, 1984). Stress occurs when environmental pressure surpasses an individual's coping capacity, serving as the first line of defence. Essentially, there exists a discrepancy between demands and individual coping strategies (Park & Folkman, 1997). In concluding thoughts on stress and coping strategies, one might invoke the wisdom of Epictetus: *People are often not disturbed by things, but by the views they take of them.*

Coping strategies can be assessed individually or analysed as adaptive and maladaptive methods. They can also be examined as problem-focused or emotion-oriented. Individuals with PTSD are more likely to employ an emotion-oriented coping style when faced with adversity (Voges & Romney, 2003). Cognitive-Behavioural Therapy (CBT) coping skills involve managing negative emotions in a healthy way, providing strategies for navigating difficult situations with reduced tension, anxiety, depression, and stress. These coping skills and strategies aim to assist individuals in managing uncomfortable emotions, such as anxiety and depression, promoting physical well-being and improved decision-making. CBT coping skills are particularly beneficial for individuals with specific mental health conditions, helping reduce symptoms in people with PTSD. CBT works by altering unhealthy behavioural patterns through changing the interpretations that lead to them. It teaches the skills and cognitive strategies needed to better cope with whatever challenges life presents.

Problem-based coping is considered a proactive and adaptive set of strategies. Focusing on the problem includes actively seeking and formulating alternative solutions, learning new skills, and adopting more efficient and helpful behaviour's. On the other hand, emotion-based coping (such as avoiding the situation, distancing oneself from emotions, acceptance, seeking emotional support, selective attention, or using alcohol and drugs, sleeping too much) can be viewed as more maladaptive. Individuals might feel that they have no control over the situation, perceiving the problem as something outside of their reach and unchangeable (Folkman & Moskowitz, 2000).

The two most commonly researched and documented coping stress strategies are social support and religion. A strong sense of community can be an important protective factor against mental health problems and can enhance problem-solving abilities (Hjern & Jeppsson, 2005). Social support has been found to play a significant moderating role in the relationship between exposure to trauma and PTSD among Eritrean and Sudanese asylum seekers (Nakash et al., 2017). Refugees often find solace in religion and seek meaning when facing trauma (Goodman, 2004; Bolea, 2003). A study with Bosnian refugees who immigrated to Chicago concluded that religion is an essential mechanism used to cope with stress (Weine et al., 2002). Religion can foster a sense of meaning after trauma, which is crucial following traumatic events (Vanista-Kosuta & Kosuta, 1998).

This study aims to delve deeper into cognitive-behavioural potential protective factors that can assist migrants along their migration journey and likely safeguard their mental health. The focus will be more on salutogenesis rather than

pathology. If we examine an average migrant odyssey, we might find many triggers that could potentially lead to depression, anxiety, and even PTSD.

Research problem and goal

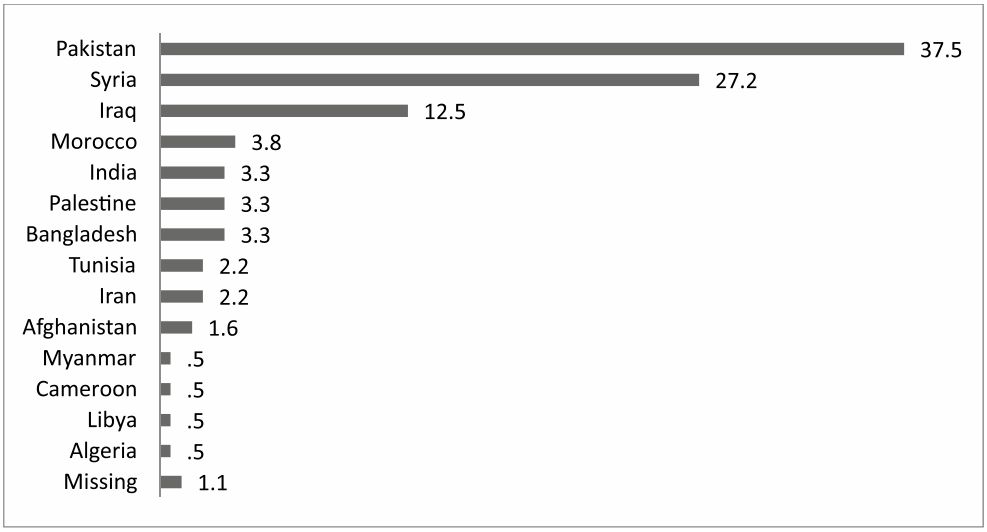
The aim of this research was to examine the most prevalent coping skills and strategies employed by young adult migrants to generate insights for the development of an effective Cognitive-Behavioral Therapy (CBT) support program. Potential findings would shed light on the mental health status of migrants affected by the crisis, as well as the psychological factors serving as protective mechanisms, aiding them in navigating emotional challenges. Abandoning one's place of origin, along with numerous stressors during the migration journey, can deteriorate the mental health of any individual. Understanding which protective factors play a significant role in preserving mental health can be of great importance in fostering programs that have the potential to enhance these skills and traits among adult male migrants. Since the migrant route shifted through B&H at the end of 2017, there have not been grand studies examining these phenomena among migrants in B&H. This study would like to provide answer to these questions:

1. *What are the most common coping strategies for migrants?*
2. *What is the level of depression, anxiety, and stress among migrants?*
3. *Do CBT coping skills and strategies serve as moderators between depression, anxiety and stress scales as predictors, and hopelessness as outcome?*

Method

Participants

The survey comprised 184 participants in the final data analysis, conducted within Temporary Reception Centres in Bosnia and Herzegovina. All participants met the criterion of being male, a prerequisite for this survey. The average age was 27 years, ranging from 18 to 52 years, with the majority being single males (*n=139; 75.5%*), one individual reported being divorced *(n=1; .5%*), and the remaining were married (*n=44; 23.9%*). The survey instruments were available in Arabic, Urdu, Farsi, and English, distributed on a voluntary basis, primarily during the registration process. According to the responses from the surveyed subjects, the majority of participants originated from Pakistan (*37%*), followed by Syria (*27%*), and Iraq (*12.5%*). As we can see in graph 1, a total of 14 countries were represented in this research.



Graph 1. Country of Origin

Instruments

Participants completed self-report measures, including a coping strategies inventory The Brief – COPE, DASS -21-The Depression, Anxiety and Stress Scale and BHS – Beck Hope(lessness) Scale.

The Brief-COPE (Carver, 1997). The instrument consists of 28 items that measure 14 factors of 2 items each, which correspond to a Likert scale ranged from 0 (never) and 3 (almost always). Cronbach's alphas for the Brief COPE sub-scales in this research range from .20 to .72. In this study total score of Cronbach alpha is *α=.87*. Factors: (I) Self-distraction (1 and 19; *α=.43*); (II) Active coping (2 and 7; *α=.20*); (III) Denial (3 and 8; *α=.24*); (IV) Substance use (4 and 11; *α=.72*); (V) Use of emotional support (5 and 15; *α=.55*); (VI) Use of instrumental support (10 and 23; *α=.52*); (VII) Behavioral disengagement (6 and 16; *α=.36*); (VIII) Venting (9 and 21; *α=.38*); (IX) Positive reframing (12 and 17; *α=.55*); (X) Planning, (14 and 25; *α=.48*); (XI) Humor (18 and 28; *α=.63*); (XII) Acceptance (20 and 24; *α=.27*); (XIII) Religion (22 and 27; *α=.48*); (XIV) Self-blame (13 and 26; *α=.24*). Sample of items: *"I've been learning to live with it"*. Subscales can be combined in three aggregate dimensions, Problem (2, 7, 10, 12, 14, 17, 23 and 25; *α=.76*), Emotion (5, 9, 13, 15, 18, 20, 21, 22, 24, 26, 27 and 28; *α=.71*) and Avoidant (1, 3, 4, 6, 8, 11, 16 and 19; *α=.71*) coping strategies. Original author recommend examining each scale separately and independently of complete scale. In this study focus will be on three coping aggregate dimensions.

BHS - Beck Hope(lessness) Scale (Beck et al., 1974) measures negative attitudes about the future. Responding to the 20 true or false items on the participants

can either endorse a pessimistic statement or deny an optimistic statement. Beck et al. (1974, p. 864) defined hopelessness *"as a system of cognitive schemas whose common denomination is negative expectations about the future"*. Sample of items: *"When things are going badly, I am helped by knowing they cannot stay that way forever"*. Cronbach's alphas in most research are above $\alpha > .80$ (Aloba et al., 2019; Bouvard et al., 1992; Steed, 2001). In this study total score of Cronbach alpha is $\alpha=.63$. Due to the dichotomy of the scale, lower score is expected. In this study focus will be on total scale.

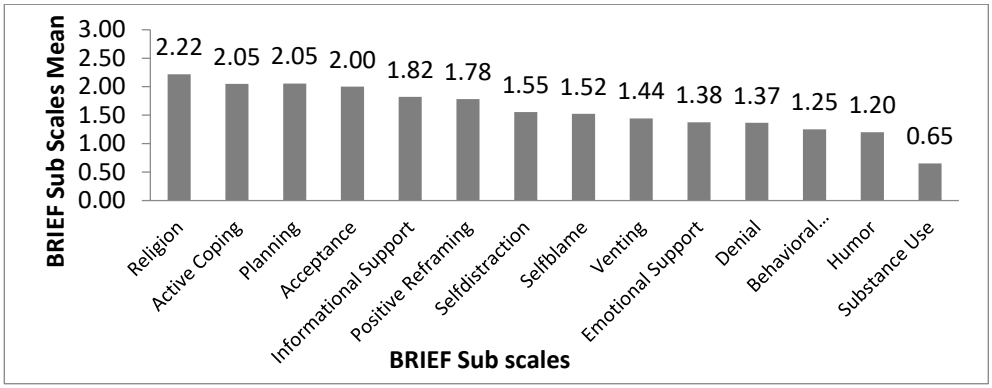
DASS-21 – The Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995). DASS-21 is a set of three self-report scales designed to measure the emotional states of depression, anxiety and stress. The rating scale is as follows: 0 *(did not apply to me at all – NEVER), 1 (applied to me to some degree, or some of the time – SOMETIMES),* 2 *(applied to me to a considerable degree, or a good part of time – OFTEN),* 3 *(applied to me very much, or most of the time - ALMOST ALWAYS).* Each of the three DASS-21 scales contains **7** items, divided into subscales with similar content. The depression scale (3,5,10,13,16,17 and 21; $\alpha=.62$) assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest / involvement, anhedonia and inertia *(e.g., "I couldn't seem to experience any positive feeling at all").* The anxiety scale (2,4,7,9,15,19 and 20; $\alpha=.80$) assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect *(e.g., "I was aware of dryness of my mouth").* The stress scale (1,6,8,11,12,14 and 18; $\alpha=.33$) is sensitive to levels of chronic nonspecific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset / agitated, irritable / over-reactive and impatient *(e.g., "I found it hard to wind down").* Scores for depression, anxiety and stress are calculated by summing the scores for the relevant items. Cronbach's alphas in most research are above $\alpha > .70$ for all subscales (Lee et al., 2019). In this study total score of Cronbach alpha is $\alpha=.88$. In this study focus will be on three separated sub-scales (Anxiety, Depression and Stress).

Statistical analysis

The primary software employed for analysis was IBM SPSS 23. Reliability analysis of instruments underwent testing using Cronbach's alpha. Descriptive statistics were utilized to present the main statistics of the instruments. The Pearson correlation coefficient was employed to assess correlation. Finally, interaction (moderation) effects were tested through the IBM SPSS extension Andrew Hayes Process Macro for Moderation Analysis.

Results

As it can be seen from Graph 2., the results demonstrated that migrants utilized a range of coping strategies when faced with stress.



Graph 2. Coping strategy in stressful situation for migrants

In stressful situations, migrants use different coping strategies. In this research, the most frequently employed coping strategy is religion (*M=2.22*), followed by planning for the next steps (*M=2.05*) and actively coping with the situation (*M=2.05*). Substance use (*M=.65*) is the least utilized strategy in stressful situations for migrants.

Table 1. Scoring for Depression, Anxiety and Stress (DASS) scale

	DASS - Depression	DASS – Anxiety	DASS – Stress
N	184	184	184
M	**1.06 (Min=0-Max=3)**	**1.10 (Min=0-Max=3)**	**1.22 (Min=0-Max=3)**
ΣM	**7.43 (Min=0-Max=21)**	**7.8 (Min=0-Max=21)**	**7.55 (Min=0-Max=21)**
SD	.69	.67	.62
MIN	0	0	0
MAX	3	3	3

Note: N=Participants; M=Mean; ΣM=Sum of Means; SD=Standard Deviation; MIN=Minimum score range; MAX=Maximum score range

Table 1. indicates that the mental health scores of the migrants indicated moderate levels of psychological symptoms. Specifically, on the depression sub-scale, migrants achieved an average mean score of *M=7.43*, signifying a lower level of moderate depressive symptoms. The anxiety sub-scale unveiled moderate anxiety symptoms, with an average mean score of *M=7.8*. Furthermore, the stress sub-scale exhibited an average mean score of M=*7.55*, indicating a mild manifestation of stress symptoms.

Table 2. Correlation between Hopelessness (BHS), Depression, Anxiety, Stress (DASS) and frequency of different coping strategies (BRIEF)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.BHS	1	.459**	.479**	.416**	.340**	-.310**	-.017	.252**	-.311**	-.156*	-.173*	-.304**	.139	.004	.125	-.262**	-.340**	.211**	-.059	.191**	.319**	.236**
2.DASS Total		1	.994**	.923**	.912**	.027	.274**	.372**	-.085	.060	.158*	-.075	.198**	.187*	.334**	.004	-.074	.314**	.155*	.299**	.333**	.252**
3.DASS Depression			1	.898**	.886**	.010	.261**	.368**	-.100	.051	.145*	-.087	.201**	.179*	.329**	-.008	-.087	.297**	.150*	.293**	.339**	.245**
4.DASS Anxiety				1	.761**	-.010	.273**	.346**	-.107	.042	.132	-.119	.189*	.175*	.344**	.025	-.111	.338**	.121	.278**	.320**	.246**
5.DASS Stress					1	.126	.274**	.341**	.015	.105	.207**	.033	.160*	.195**	.275**	.030	.026	.291**	.179*	.285**	.259**	.235**
6.BRIEF Problem Coping						1	.642**	.463**	.779**	.725**	.723**	.771**	.351**	.459**	.257**	.560**	.506**	.261**	.453**	.427**	.147*	.302**
7.BRIEF Emotion Coping							1	.645**	.447**	.523**	.505**	.440**	.643**	.713**	.659**	.594**	.447**	.599**	.525**	.464**	.372**	.464**
8.BRIEF Avoidant Coping								1	.246**	.374**	.487**	.257**	.501**	.528**	.471**	.259**	.076	.487**	.611**	.698**	.758**	.742**
9.BRIEF Active Coping									1	.391**	.418**	.561**	.213**	.364**	.079	.438**	.396**	.191**	.334**	.245**	-.050	.191**
10.BRIEF Info. Support										1	.339**	.425**	.358**	.378**	.235**	.389**	.359**	.215**	.303**	.359**	.140	.267**
11.BRIEF Positive Reframing											1	.361**	.212**	.367**	.344**	.316**	.361**	.259**	.404**	.401**	.275**	.304**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
12.BRIEF Planning												1	.265**	.259**	.086	.548**	.403**	.107	.309**	.258**	.050	.127
13.BRIEF Emotional Support													1	.370**	.368**	.251**	.016	.285**	.378**	.311**	.380**	.340**
14.BRIEF Venting														1	.334**	.294**	.249**	.356**	.391**	.364**	.310**	.428**
15.BRIEF Humor															1	.225**	.083	.326**	.319**	.291**	.388**	.323**
16.BRIEF Acceptance																1	.327**	.169*	.354**	.226**	-.010	.183*
17.BRIEF Religion																	1	.036	.190**	.178*	-.111	-.018
18.BRIEF Selfblame																		1	.289**	.320**	.344**	.416**
19.BRIEF Selfdistraction																			1	.195**	.288**	.268**
20.BRIEF Denial																				1	.386**	.399**
21.BRIEF Substance Use																					1	.411**
22.BRIEF Behav.Disengagement																						1

Note: *N*=184; **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 2. shows that hopelessness is in correlation with depression (*r=.479*), anxiety (*r=.416*), stress (*r=.340*), problem focused coping *(r=-.310)* and avoidant focused coping strategies (*r=.252*). No noticeable or significant correlation with emotion focused strategies. Depression has a positive small correlation (*r=.261*) with emotion-focused coping strategies and a moderate correlation (*r=.368*) with avoidant-focused coping strategies. There is no correlation with problem-focused coping strategies. Anxiety has a positive small correlation (*r=.273*) with emotion-focused coping strategies and a moderate correlation (*r=.346*) with avoidant-focused coping strategies. There is no correlation with problem-focused coping strategies. Stress has a positive small correlation (*r=.274*) with emotion-focused coping strategies and a moderate correlation (*r=.341*) with avoidant-focused coping strategies. There is no correlation with problem-focused coping strategies.

Table 3. Linear regression and interaction (moderation) effect for Hopelessness (BHS) as outcome, Depression, Anxiety, Stress (DASS) as predictor and frequency of aggregate dimensions of the BRIEF coping strategies as moderators

Measure	*R*	*F*	*p*	B^{MOD}	SE^{MOD}	t^{MOD}	p^{MOD}
BRIEF Problem Focused Coping (W1)	.567	28.411	.01**	.057	.043	1.322	.188
BRIEF Emotion Focused Coping (W2)	.483	18.282	.01**	.027	.05	.53	.596
BRIEF Avoidant Focused Coping (W3)	.470	17.045	.01**	-.036	.042	-.848	.398

Note. N=184; *X*=independent variable (DASS); *Y*= dependent variable (BHS); *W*=Moderator (BRIEF).
R= Coefficient of determination; *F*=F-statistics; *p*=significance; ***p* < .01.
B^{MOD}=beta interaction (moderation) coefficient; SD^{MOD}=standard deviation for (moderation) coefficient; t^{MOD}= t-test interaction of moderator and independent variable; p^{MOD}=Interaction significance.

In Table 3. we can see that problem focused coping aggregate dimensions of the BRIEF scale, with DASS as additional independent variable explain *56%* of the variance of the BHS. Emotion focused coping and DASS as additional independent variable explain *48%* and avoidant focused coping and DASS as additional independent variable explain *47%* of the variance of BHS. None of the three aggregate dimensions are significant moderator.

Discussion

This research underscores the diverse coping strategies employed by migrants facing stressful situations. Religion was identified as the most frequently used coping strategy, followed by planning for the next steps and actively coping with the situation. Substance use was reported as the least utilized coping strategy among migrants, indicating a preference for more adaptive coping mechanisms. The significant role of religion, coupled with planning and active coping, suggests the

resilience and proactivity of migrants in managing stress. The significant use of religion as a coping strategy by migrants emphasizes the importance of spirituality and faith in their coping process. Religion likely serves as a source of solace, hope, and meaning, offering comfort and support in times of stress. The findings also highlight the significance of planning and active coping strategies among migrants. Planning for the next steps indicates a proactive approach to managing stress, showcasing the resilience and determination of migrants to navigate challenging circumstances. Active coping suggests engaging actively with stressors, utilizing problem-solving skills, and seeking solutions rather than passively enduring them.

The moderate levels of depression, anxiety, and mild stress symptoms underscore the need for targeted mental health support and interventions. These scores highlight the importance of addressing the mental health concerns of migrants, as moderate levels of depression and anxiety can have significant impacts on their well-being and integration. Considering the conditions migrants are facing, the results seem relatively low. One reason for these relatively low scores can be traced to the cultures of the countries of origin, where discussions about emotions are not the primary focus. Additionally, individuals may withhold their emotions until the end of their journey when they can finally express themselves. While the migrant population exhibited moderate levels of psychological symptoms, the findings suggest that the overall mental health status falls within a manageable range. However, it is crucial to monitor and address these symptoms to prevent further deterioration and ensure the well-being of migrants.

Even though none of the three aggregate dimensions of coping strategy were deemed significant moderators, they concurrently function as substantial indicators of hopelessness. Subsequently, individual subscales of coping strategies were examined as moderators, and none of the 14 subscales proved to be significant moderators. Among the three aggregate dimensions, problem-focused coping strategies, along with DASS as a predictor, accounted for the highest percentage of explained variance.

Clinical implications

The results emphasize the importance of considering the cultural and religious backgrounds of migrants when designing mental health support interventions. Acknowledging the significance of religion as a coping strategy can inform the development of culturally sensitive interventions that incorporate and respect migrants' spiritual beliefs and practices. Addressing the coping strategies and mental health needs of migrants can pave the way for the development of appropriate support systems, fostering their well-being and successful integration into the host society. These interventions should focus on enhancing coping skills, promoting adaptive strategies beyond religion, and offering accessible and culturally appropriate mental health support services. There are multiple ways that can be used in order to assist people on the move.

Psychoeducation: Providing psychoeducation to adult male migrants about the nature and effects of stress can enhance their understanding and awareness of their own mental health. This knowledge empowers them to recognize stress triggers, symptoms, and the importance of seeking appropriate support.

Culturally Sensitive Assessment: Implementing culturally sensitive assessment tools and techniques enables mental health professionals to gain a deeper understanding of the specific stressors faced by adult male migrants. This assessment can inform the development of tailored coping strategies that take into account cultural, social, and contextual factors.

Cognitive Restructuring: Cognitive restructuring techniques help individuals identify and challenge negative thought patterns, replacing them with more realistic and positive thoughts. By reframing their perceptions, adult male migrants can reduce stress, manage anxiety, and develop a more adaptive mindset.

Mindfulness and Relaxation Techniques: Practicing mindfulness and relaxation techniques, such as deep breathing exercises, meditation, and progressive muscle relaxation, can help adult male migrants manage stress, improve emotional regulation, and enhance overall well-being. These techniques promote self-awareness, relaxation, and a sense of calm in the face of stressors.

Social Support and Community Engagement: Establishing social support networks and encouraging community engagement are vital for the mental health of adult male migrants. Facilitating connections with local communities, support groups, or fellow migrants can provide opportunities for emotional support, social integration, and shared experiences, reducing feelings of isolation and loneliness.

Coping Skills Training: Providing skills training workshops that focus on effective coping strategies equips adult male migrants with practical tools to manage stress. These workshops may cover topics such as problem-solving, assertiveness, communication skills, time management, and self-care. By developing these skills, migrants can enhance their resilience and adaptive coping mechanisms.

Trauma-Informed Care: Recognizing and addressing the potential trauma experienced by adult male migrants is crucial. Implementing trauma-informed care approaches can help mental health professionals provide a safe and supportive environment, ensuring that trauma-related symptoms are appropriately addressed through evidence-based therapies like trauma-focused CBT.

Limitations and directions for future research

Future studies should undoubtedly incorporate a larger and more diverse sample. Special attention ought to be directed towards families, as this study exclusively concentrated on single men. The study should be broadened by incorporating variables such as resilience and self-efficacy. A longitudinal study, encompassing testing at various stages of the migration journey, could also prove to be beneficial and yield significant results. The Brief-COPE instrument sub-scales have only two items, which contributed to lower internal consistency for most of the

sub-scales. The results for these sub-scales should be taken with high caution. Future research should use other scales for this measure.

Conclusion

Overall, this research underscores the complexity of stress coping strategies among migrants, highlighting the roles of religion, planning, and active coping. By recognizing and addressing the mental health needs of migrants, tailored interventions can be developed to support their well-being and facilitate their successful integration into the host society. Depression, anxiety, and stress scores were relatively low. One of the main reasons is likely not the absence of these factors but rather the influence of the cultural context. At times, individuals may suppress their emotions until the end of their journey when they can finally find relief. Most of the time, migrants seek solace in religion, plan for the next step, engage in active coping, and accept the situation. While none of the three aggregate dimensions of coping strategy emerged as significant moderators, all three dimensions are significant predictors of hopelessness at the same time. To paraphrase Frankl (1984), coping strategies are crucial because when we are no longer able to change a situation, we are challenged to change ourselves.

Authors' note

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UNDERLYING PROCESSES IN THE NORWEGIAN UNIVERSAL PREVENTIVE PROGRAM FOR SOCIAL ANXIETY

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Abstract

Few prevention investigations undergo testing of mechanistic hypotheses. To date, no published study has reported the processes underlying the effectiveness of a prevention program aimed at reducing social anxiety in a population-based sample of preadolescents.

A parallel multiple mediator model was used to examine the mediation of outcomes from the Norwegian Universal Prevention Program for Social Anxiety (NUPP-SA) by five intermediary variables that well approximate established DSM-5 social anxiety disorder diagnostic criteria.

The NUPP-SA works differently for preadolescents with subsyndromal versus syndromal social anxiety. Among the former, the NUPP-SA intervention works via public performance, avoidance, physical/cognitive, and assertiveness factors. For the latter, the NUPP-SA works via the public performance factor. The intervention did not work for either group via the social encounter factor.

Universal prevention programs are essential for reducing the impacts of chronic disorders at the individual, institutional, and societal levels. Introducing a universal prevention program in school settings requires validation, including these results demonstrating that the NUPP-SA affects both those with syndromal and subsyndromal social anxiety symptoms via public performance. These results support the notion that many children with subsyndromal social anxiety disorder can be impacted with adequate intervention, which is both feasible and, given the widespread problem with public speaking, suggests a target for universal implementation.

Keywords: mediation, prevention, intervention, social anxiety, adolescents.

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Social Anxiety Disorder (SAD) is among the most common, widespread, and incapacitating psychiatric disorders, also among children and adolescents (Aune et al., 2022; Burstein et al., 2013; Stein & Stein, 2008).

SAD is often called "the neglected disorder" (Nagata et al., 2015, p. 724). Individuals with SAD are not diagnosed until an average of 7 years after symptom onset, and only 10–20% of those with SAD seek treatment (Aune & Stiles, 2009). Despite some promising treatment results among older children and young adolescents (Beidel et al. 2007; 2021), the effectiveness of even proper treatment is reported as low (Cartwright-Hatton, 2004; Yang et al., 2019).

In a meta-analysis, Scaini et al. (2019) demonstrated larger effect sizes in treatment outcome studies that included social skills training sessions. Another meta-analysis by Yang et al. (2019) compared SAD interventions in children and adolescents, demonstrating that psychological interventions comprised of Cognitive Behavior Therapy (CBT) and Behavior Therapy (BT) were significantly more effective than control conditions. However, there was an average 21.8% dropout rate in the intervention groups, with higher dropout rates in CBT compared with BT interventions. Further, high heterogeneity in primary outcome measures suggests possible systematic differences among included studies. Furthermore, the waitlist conditions were inferior to other control conditions like psychological placebo (Ingul et al., 2014) and no treatment (Herbert et al., 2009). Ten out of 17 randomized controlled trials (RCTs) included a waitlist as the only control condition for comparison, which may have also impacted findings. Finally, Yang et al. (2019) concluded that the risk of bias was moderate to high in most of the studies included, indicating that their results should be considered cautiously. Moreover, Beidel et al. (2021) showed that 63% of children treated with the Social Effectiveness Therapy for Children (SET-C) and 60% of those treated with Pegasys-VR™ no longer met SAD diagnostic criteria posttreatment; however, neither group reached the clinically recommended cutoff score of ≤17 on the Social Phobia and Anxiety Inventory for Children (SPAI-C), indicating that participants in both treatment conditions continued to report multiple SAD symptoms posttreatment.

The cumulative evidence shows a high prevalence of SAD among adolescents (Aune et al., 2022; Burstein et al., 2013). Kessler et al. (2005) described SAD as a primary diagnosis that emerges in early development, often leading to later depression and substance abuse. In addition, few young people with SAD receive treatment, and the reported treatment effectiveness is reported to be low.

This was the impetus for developing the Norwegian Universal Prevention Program for Social Anxiety (NUPP-SA). The NUPP-SA uses a cognitive behavioral format. The program targets all grades 6–9 students, parents/guardians, teachers, school staff, and county health and welfare workers. The NUPP-SA is efficacious in a cluster RCT (Aune & Stiles, 2009) with the SPAI-C as the primary outcome measure and the SCARED (Screen for Child Anxiety Related Emotional Disorders) as a secondary outcome measure.

Further, Aune and Stiles (2009), Ingul et al. (2014), Beidel et al., (2021), and most studies included in the meta-analyses by Yang et al. (2018) and Scaini et al. (2016) used the SPAI-C as the primary outcome measure, allowing comparison of results across studies. Previous studies examining the factor structure of the SPAI-C have suggested a five-factor (Aune et al., 2008; Fitzgerald et al., 2019; Ogliari et al., 2012; Storch et al., 2004) model. Fitzgerald et al. (2019) examined a relatively large sample of adolescents in Ireland, applying confirmatory factor analysis and DSM-5 (APA, 2013) criteria to support the five-factor structure proposed by Aune et al. (2008) including *assertiveness*, *physical/cognitive*, *public performance*, *social encounter*, and *avoidance* factors or subscales. The five-factor structure provides a good approximation to the established DSM-IV (APA, 1994) and the DSM-5 (APA, 2013) criteria, and is easily interpretable and theoretically justified.

A key intervention study objective is understanding the psychological processes by which predictor variables affect outcomes. Mediation analysis has been used to examine relations among predictor and outcome variables in studies examining the intermediate effects of, for example, behavior inhibition (Buzzell, 2017), social support, and social self-efficacy (Aune et al., 2021) among individuals suffering from SAD. However, SAD intervention studies with older children and young adolescents rarely report intermediate effects.

The present study

Using a cluster RCT, Aune and Stiles (2009) demonstrated that the NUPP-SA shows both prevention and treatment effects. Assessing the intervention among both participants with SPAI-C pretest scores ≥18 (i.e., syndromal) (n = 190) and the overall sample (N = 1,439) revealed effect sizes of .88 and .21, respectively. However, to date, no study has tested hypotheses regarding the mechanism by which the NUPP-SA process works.

Although the SPAI-C has been used in many RCTs across various interventions (Yang et al., 2019), to our knowledge, no study has reported the specific effects of interventions on specific SAD characteristics. Furthermore, examining how social anxiety prevention interventions work for the total sample and those with syndromal social anxiety will help disassemble interventions, allowing them to become more targeted.

To address this need, we used data from the RCT by Aune and Stiles (2009) to examine the underlying mechanisms of the NUPP-SA in a large population-based sample of older children and young adolescents. The five SPAI-C factors identified by Aune et al. (2008) and Fitzgerald et al. (2019), and which resembled the diagnostic criteria described both in DSM-IV (APA, 1994) and DSM-5 (APA, 2013) were the intermediate variables, and the SCARED social anxiety subscale was the

outcome variable. The SPAI-C and SCARED inventories were assessed at both assessment points.

This study aims to examine which specific factors of the SPAI-C the NUPP-SA intervention effect contains.

For this explorative study, we hypothesized that the NUPP-SA, based on CBT, will have significantly similar indirect effects (IE) across the five factors in both the syndromal and the total sample.

Method

Participants and procedure

Older children and young adolescents in grades 6–9 who were 11–14 years old (M = 12.6, SD = 1.1, range 11–14) and living in two municipalities in the central region of Norway participated in the study. A total sample of 1,748 (856 boys, 892 girls) returned a consent form signed by them and one parent/guardian. A total sample of 1,633 students participated in assessments I and II, 12 months apart. Guidelines for obtaining a valid SPAI-C score (Beidel et al., 1998) were followed strictly, resulting in a final sample of 1,439 participants (692 boys, 747 girls) with valid scores at both assessment points.

The two municipalities from the Nord-Trøndelag province, chosen to participate in the study were randomly assigned to the intervention or nonintervention control conditions. This design was used to avoid the cross-contamination that may occur when an intervention is applied to students at different schools within the same county. A detailed description of the participants, procedures, components, adherence, competence, and integrity of the NUPP-SA, along with a chronological overview of the intervention, was published previously (Aune & Stiles, 2009). Table 1 describes the overall sample demographics.

Measures

Social Phobia and Anxiety Inventory for Children (SPAI-C)

The SPAI-C is a widely used self-report inventory that evaluates the somatic, cognitive, and behavioral aspects of social anxiety and SAD according to the DSM-IV (APA, 1994) criteria (Aune et al., 2008, 2022; Fitzgerald et al., 2019; Storch et al., 2004) and DSM-5 (APA, 2013) criteria (Aune et al., 2022) among older children and young adolescents. The SPAI-C assesses the severity of a range of social fears using 26 items rated on a 3-point Likert scale. Its psychometric properties are moderate to excellent according to various studies across cultures and continents (Scaini et al., 2012). It has high-to-excellent reliability and moderate-to-high validity (Beidel et al., 1995) and differentiates children and adolescents with SAD from normal controls (Beidel et al., 1995), externalizing disorders (Beidel, 1996), and

other anxiety disorders (Beidel et al., 2000). These findings have been held for different Norwegian population-based samples (Aune et al., 2008; Hjemdal et al., 2007) and various clinical samples (Ingul et al., 2014). Previous studies examining the factor structure of the SPAI-C have suggested a five-factor (Aune et al., 2008; Fitzgerald et al., 2019; Ogliari et al., 2012; Storch et al., 2004) model. Fitzgerald et al. (2019) examined a relatively large sample of adolescents in Ireland, applying confirmatory factor analysis and DSM-V criteria to support the five-factor structure proposed by Aune et al. (2008) including *assertiveness, physical/cognitive, public performance, social encounter,* and *avoidance* factors or subscales.

The *assertiveness* subscale is related to question like (scared when becoming the center of attention), whereas the *physical/cognitive* subscale, the *public performance, social encounter*, and *avoidance* subscales are assessed by question like (when I'm with other people, I think "scarry" thoughts) (scared when speaking in front of class) (scared when joining a large group) and (avoid social situations; parties, school, playing with others), respectively.

In their factor analysis with principal axis factoring and an oblique rotation, Aune et al. (2008) revealed a best fit for a five-factor solution, with Cronbach alphas of .82, .76, .80, .64, and .67 for *assertiveness, physical/cognitive, public performance, social encounter*, and *avoidance*, respectively. Internal consistency (Cronbach alpha) for the total SPAI-C was .92.

Screen for Child Anxiety Related Emotional Disorders

The SCARED is a 41-item self-report inventory developed as a sensitive and specific measure for assessing DSM-IV symptoms of panic, general anxiety, separation anxiety, social anxiety, and school refusal. Items are rated on a 3-point Likert scale. SCARED is appropriate for older children and adolescents aged 9–18 years and has demonstrated adequate psychometric properties in two large clinical samples (Birmaher et al., 1997, 1999), a community sample (Muris et al., 1998), and a project examining anxiety disorders at the National Institute of Mental Health (Behrens, Swetlitz, Pine & Pagliaccio, 2019). In a meta-analysis, Hale et al. (2011) reported adequate internal consistencies for both the total scale and each of the subscales, except for school refusal. This five-factor structure has been confirmed in both clinical and community samples (Ogliari et al., 2006; Wren et al., 2007). In their evaluation of the Norwegian version of the SCARED with 4,425 participants from seven Norwegian samples and four Danish and Swedish samples, Skarphedinsson and Villabø (2015) reported excellent internal consistency for the total scale and acceptable-to-good consistency for the subscales. Convergent validity showed that the SCARED social anxiety subscale was correlated ($r = .63$) significantly more highly with the SPAI-C than the other SCARED subscales. Herein, a Cronbach's alpha coefficient of .93 was obtained for the total SCARED, and .80 for social anxiety subscale.

Norwegian Universal Prevention Program for Social Anxiety (NUPP-SA)

The NUPP-SA uses a cognitive behavioral format. The program targets all students in grades 6–9, their parents/guardians, teachers, school staff, and county health and welfare workers. All public health nurses were given 1 day of lectures, followed by supervision, on psychoeducation and the principles of CBT for SAD treatment. Teachers, school personnel, community health and welfare workers, primary physicians, and parents/guardians received a 1–2-hour lecture. For teachers and school personnel, the management of social anxiety, both individually and in the classroom environment, was emphasized. The lecture for parents/guardians focused on social anxiety as a common phenomenon and explored the distinction between normal and pathological social anxiety. Parents were motivated to encourage their children to expose themselves to potentially threatening social situations and to engage in social contact with their children's classmates, particularly those who appeared overly shy or insecure in social situations.

Altogether, the students received 3 hours of school interventions, beginning with a 45-minute lecture about anxiety, emphasizing normalcy and how anxious thoughts, affects, and associated somatic symptoms can be recognized to avoid their misinterpretation. Forty-five minutes were then spent completing a handout on skills to increase the student's perceived ability to cope with situations that might provoke social anxiety. The aim was to teach coping strategies that counteract cognitive distortions and misattributions. The students were encouraged to verbalize and write down scary or threatening thoughts that either they or others may have had in various social and performance situations. They were also challenged to imagine and write down less threatening, more realistic thoughts. They were encouraged to identify thoughts that could help them engage in social situations, even when they were anxious or scared. During the final 45 minutes, the students were asked to write an essay based on one of three prompts, all of which focused on different aspects of coping with social anxiety.

At the end of the lectures for each target intervention group, a booklet with the project website was provided, containing psychoeducational information about social anxiety along with a description of CBT. Finally, a three-page psychoeducational overview with study information was printed in the local newspaper. A more detailed, chronological overview of the intervention was published previously (Aune & Stiles, 2009).

Statistical analyses

Descriptive analyses were conducted using SPSS Statistics for Windows (v. 27.0; IBM SPSS, Armonk, NY, USA). Means and standard deviations for the outcome variable (SCARED social phobia subscale) and the five SPAI-C mediators (*assertiveness*, *physical/cognitive symptoms*, *public performance*, *social encounter*,

and *avoidance*) are presented for assessment points I and II. The correlations among the five mediators and outcome variable at assessment point I are also reported.

Before testing the study hypothesis, we considered Baron and Kenny's (1986) basic assumptions for conducting mediation. However, more recently published methodological studies (Hayes, 2018; MacKinnon & Luecken, 2008; Rucker et al., 2011) have demonstrated that IE can be estimated exclusive of the basic steps proposed by Baron and Kenny (1986).

Our goal was to test how the NUPP-SA intervention program and the variation between the intervention (0) and nonintervention (1) groups ($X_{0,1}$) causes variation in the five mediating factors (i.e., *assertiveness*, *physical/cognitive symptoms*, *public performance*, *social encounter*, and *avoidance*), which in turn causes variation in the outcome variable.

To assess for mediation, Hayes' (2018) PROCESS macro for SPSS (v. 3.5; SPSS Inc, Chicago, IL, USA) was used. Hayes' PROCESS macro employs a regression-based path analysis approach. To test for the statistical significance and obtain the 95% bias-corrected confidence level for the IE, standard maximum likelihood bootstrapping was performed by estimating 5,000 bootstrap samples for the hypothesized model. Bootstrapping as a resampling method was recommended to estimate mediation (Hayes, 2018). If the 95% confidence interval (CI) does not include 0, it means a significant IE ($p < .05$). All reported regression coefficients are unstandardized.

We used a parallel multiple mediator model to test the various mediators' specific IE, while simultaneously controlling for all the other mediators in the model. Cumulatively, the specific IE yield the total effect of *X* on *Y* through all mediators in the model. The direct effect of *X* quantifies how much two cases that differ by one unit on *X* are estimated to differ on *Y*, independent of all mediators (Hayes, 2018). A pairwise comparison was applied to test whether one IE differed significantly from the others.

Ethics

The Regional Ethics Committee (REK.nr. 084-03) and the Privacy Ombudsman for Research, Norwegian Social Science Data Services approved the study. Written consent forms, to be signed by their parents or guardians, were distributed to the children during class. Those children who had yet to return the written consent form within a week were given a reminder.

Results

Demographic characteristics and clinical status for the intervention and nonintervention groups were published previously (Aune & Stiles, 2009). Tables 1

and 2 show overviews of the main demographic and clinical characteristics of the two samples, respectively.

Table 1. Demographic Characteristics of the Intervention and Control Groups

Characteristic	Intervention group		Control group			
	n	%	*n*	%	χ^2	*P*
Gender					0.89	.77
Girls	413	51.2	334	52.4		
Boys	388	48.8	304	47.6		
Grade/age					2.02	.57
6th grade	191	23.9	120	18.9		
7th grade	210	26.2	155	24.3		
8th grade	190	23.7	202	31.7		
9th grade	210	26.2	161	25.2		
Parents/guardian, living with					0.92	.99
Both parents	626	78.2	502	78.6		
Mother alone and/or with new partner	148	18.5	115	18.0		
Father alone and/or with new partner	21	2.6	14	2.2		
Other guardians	4	0.5	2	0.3		
Not reported	2	0.2	5	0.8		
Siblings/stepsiblings, living with					0.11	.75
No	85	10.6	71	11.1		
Yes	701	87.5	554	87.5		
Not reported	15	1.9	13	2.0		

Table 2. Means (*M*) and Standard Deviations (*SD*) of all Dependent Variables at Assessment One (I) and Two (II) by Group (Intervention/Control)

	Intervention group (*n* = 801)				Control group (*n* = 638)			
	I		II		I		II	
Dependent variable[1]	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SPAI-C	9.44	7.76	7.02	6.96	9.22	6.60	8.28	7.51
SCARED								
Total difficulties	10.75	11.24	8.97	9.58	11.09	9.54	10.98	11.33
Social anxiety disorder	3.39	2.82	2.97	2.76	3.58	2.76	3.38	2.97
Panic and somatic disorder	2.31	3.58	1.72	2.91	2.24	2.93	2.21	3.58
General anxiety disorder	2.55	3.24	2.28	3.06	2.69	3.00	3.05	3.41
Separation anxiety disorder	1.76	2.49	1.34	2.11	1.88	2.37	1.62	2.48
School avoidance	0.73	1.23	0.67	1.17	0.72	1.24	0.71	1.27

[1]SPAI-C: Social Phobia and Anxiety Inventory for Children; SCARED: Screen for Child Anxiety Related Emotional Disorders.

The intervention and nonintervention groups did not differ in any demographic or clinical variables at pre-intervention. Tables 3 and 4 show the means and standard deviations of the SCARED social anxiety subscale and the five SPAI-

C factors at assessment points I and II for the total sample and for the syndromal SAD participants, respectively.

Table 5 shows the correlations among the five SPAI-C factors and SCARED social anxiety subscale for the subsyndromal sample at assessment point I.

Table 3. Descriptive Characteristics for Total Sample (N = 1,439) on Outcomes and Mediators at Assessment Points I and II by Intervention/Control Group

	Intervention group (n = 801)				Control group (n = 638)			
Assessment point	I		II		I		II	
Dependent variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SCARED social anxiety subscale (n = 1,428)	3.39	2.82	2.97	2.76	3.58	2.76	3.38	2.97
SPAI-C factors (N = 190)								
Assertiveness	2.42	1.93	1.75	1.75	2.49	1.79	2.11	1.94
Physical/cognitive	1.06	.97	.73	1.08	1.05	1.20	.89	1.17
Public performance	2.83	2.51	2.27	2.46	2.46	2.20	2.57	2.48
Social encounter	.48	.93	.34	.68	.48	.76	.40	.84
Avoidance	.84	1.20	.57	.95	.84	1.04	.74	1.09

Table 4. Descriptive Characteristics for the Syndromal Social Anxiety Group (N = 190) on Outcomes and Mediators at Assessment Points I and II by Intervention/Control Group

	Intervention group (n = 112)				Control group (n = 78)			
Assessment point	I		II		I		II	
Dependent variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SCARED social anxiety subscale (n = 186)	6.47	3.20	4.55	3.36	6.55	2.75	5.62	3.36
SPAI-C factors (N = 190)								
Assertiveness	5.33	1.66	3.16	2.19	5.01	1.43	3.80	2.19
Physical/cognitive	2.98	1.59	1.55	1.58	3.00	1.46	1.81	1.54
Public performance	6.89	2.20	4.12	2.98	6.19	1.76	4.97	2.92
Social encounter	1.88	1.54	.76	.96	1.56	1.14	1.09	1.36
Avoidance	2.79	1.56	1.23	1.38	2.55	1.15	1.65	1.44

Table 5. Descriptive Statistics and Correlation Coefficients for the SCARED Social Anxiety Subscale and SPAI-C Factors (N = 1,439) at Assessment Point I.

Variables	Mean	*SD*	1	2	3	4	5
1. SCARED social anxiety subscale (n = 1,428)	3.47	2.80					
2. *Assertiveness*	2.45	1.87	.525**				
3. *Physical/cognitive*	1.06	1.23	.490**	.557**			
4. *Public performance*	2.67	2.38	.539**	.611**	.548**		
5. *Social encounter*	.48	.86	.376**	.538**	.482**	.515**	
6. *Avoidance*	.84	1.13	.483**	.648**	.580**	.555**	.584**

**$p < 0.01$ level (two-tailed).

As expected, there were significant correlations ($p < .001$) between SCARED social anxiety subscales and the five SPAI-C factors, ranging from $r = .376$ (*social encounter*) to $r = .539$ (*public performance*). Correlations among the

five factors were moderate to high, ranging from r = .482 (*social encounter* and *physical/cognitive*) to r = .648 (*avoidance* and *assertiveness*), explaining 26% and 32.5% of the variance, respectively.

Total sample

The mediation analysis used a bootstrapping method to examine whether and how the factors of assertiveness, physical/cognitive, public performance, avoidance, social encounter, and public performance mediated the relation between NUPP-SA and social anxiety symptoms. In other words, it asked: how does the NUPP-SA work?

First, at assessment point I, there was no significant difference between the intervention and the control group (b = .188, se = .150, t = 1.265, p = .206). Second, there was a significant total effect of the intervention (b = .413, se = .153, t = 2.680, p = .007), with a SCARED social anxiety subscale mean score difference of 0.41 (Table 3), or 12.1%, between the intervention and nonintervention groups at assessment point II. Third, controlling for the five mediating factors, a nonsignificant direct effect ($C`$ = .105, se = 119, t = .880, p = .380) (Table 6) was found between the intervention and nonintervention groups at assessment point II, demonstrating a full mediation effect of the intervention (predictor variable) to social anxiety (outcome variable) via the five mediating factors. The mediators accounted for approximately 41% of the total effect on social anxiety symptoms. Fourth, Table 6 shows that the effect of the NUPP-SA is via four intermediary factors: *assertiveness*, *physical/cognitive*, *public performance*, and *avoidance.* However, the NUPP-SA does not work significantly via *social encounter* (F(1, 1409) = 2.650, p < .104). Fifth, we examined the magnitude of each indirect mediator path to reveal significant IE for *assertiveness* (IE = .086, BootSE = .032; 95% CI = .030 – .156); *physical/cognitive* (IE = .052, BootSE = .025; 95% CI = .010 – .107); *public performance* (IE = .110, BootSE = .053; 95% CI = .010 – .219); and *avoidance* (IE = .060, BootSE = .028; 95% CI = .015 – .124). However, *social encounter* (IE = .000, BootSE = .013; 95% CI = −.032 – .024), showed that the bootstrap CI estimates crossed 0, which indicates a nonsignificant IE for this factor. Sixth, we examined pairwise comparisons between the IE to reveal that the IE for *social encounter* was significantly lower than the IE for *assertiveness* (IE = .086, BootSE = .039; 95% CI = .023 – .172), *physical/cognitive* (IE = .053, BootSE = .027; 95% CI = .008 – .115), *avoidance* (IE = −.060, BootSE = .032; 95% CI = −.136 – −.011), and *public performance* (IE = −.111, BootSE = .057; 95% CI = −.232 – −.008). The IE for all other pairwise comparisons were nonsignificant (Figure 1).

Table 6. Regression Coefficients, Standard Errors, and Model Summaries for the NUPP-SA Intervention Program. Parallel Multiple Mediator Model Depicted in Figure 1 (N = 1,411)

	Outcome																							
	M1 (*Assertiveness*)				M2 (*Physical/Cognitive*)				M3 (*Public performance*)				M4 (*Social encounter*)				M5 (*Avoidance*)				Y (SCARED SAD)			
Antecedent		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*
X (*County*)	*a*1	.353	.098	<.001	*a*2	.150	.059	.011	*a*3	.283	.133	.032	*a*4	.064	.039	.104	*a5*	.172	.053	.001	*C`*	.105	.119	.380
M1 (*Assertiveness*)																					*b*1	.244	.119	<.001
M2 (*Physical/cognitive*)																					*b2*	.542	.075	<.001
M3 (*Public performance*)																					*b3*	.390	.032	<.001
M4 (*Social encounter*)																					*b4*	−.005	.109	.965
M5 (*Avoidance*)																					*b5*	.350	.090	<.001
Constant	*i*M1	1.750	.065	<.001	*i*M2	.740	.040	<.001	*i*M3	2.280	.088	<.001	*i*M4	.332	.026	<.001	*i*M5	.566	.036	<.001	*iy*	1.202	.101	<.001
	R^2 = .009				R^2 = .005				R^2 = .003				R^2 = .002				R^2 = .007				R^2 = .405			
	$F(1, 1409)$ = 13.122		p < .001		$F(1, 1409)$ = 6.371		p = .012		$F(1, 1409)$ = 4.594		p = .032		$F(1, 1409)$ = 2.650		p = .104		$F(1, 1409)$ = 10.335		p = .001		$F(6, 1404)$ = 159,151		p < .001	

C` = Direct effect from X to Y controlling for the model mediators.

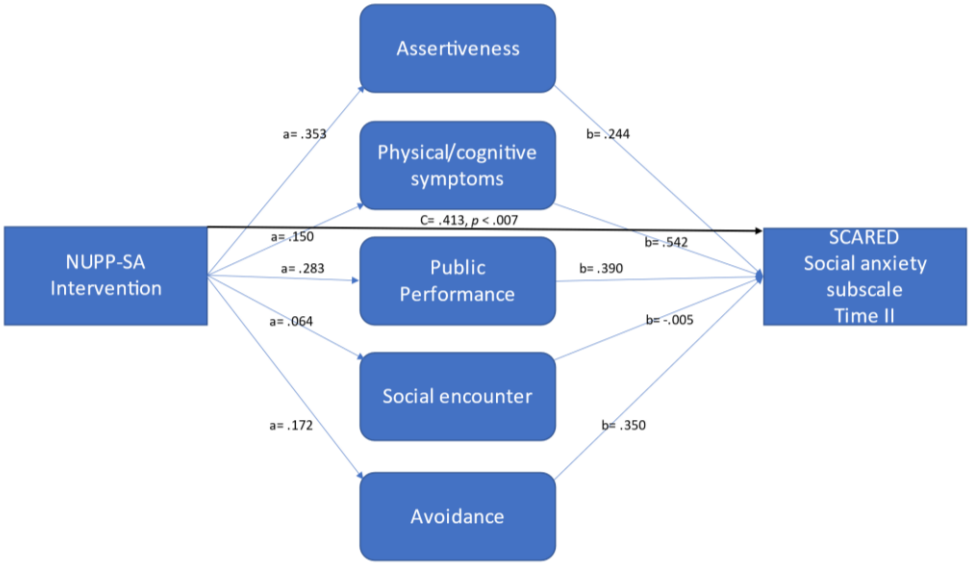

Figure 1. The direct effect of the intervention, where the various slopes show the indirect effects across the five factors for the total sample.

Syndromal sample

At assessment point I, the intervention and nonintervention groups had a nonsignificant SCARED social anxiety subscale difference (b = .077, se = .449, t = .172, p = .864). There was a significant total effect of the intervention (b = 1.064, se = .501, t = 2.124, p = .035), demonstrating a SCARED social anxiety subscale mean score difference of 1.07 (see Table 4) or 23.5%, between the intervention and nonintervention groups at assessment point II. Controlling for the five mediating factors, a nonsignificant direct effect (C` = .373, se = .380, t = .984, p = .326) was found between the intervention and nonintervention groups at assessment point II, demonstrating a complete mediation from the predictor variable (intervention versus control) to social anxiety (outcome variable) through the mediation factors. The mediators accounted for approximately 47% of the total effect on social anxiety symptoms. Table 7 shows that the NUPP-SA significantly acts through the intermediary factor *public performance* (IE = .074, BootSE = .300; 95% CI = .012 – 1.203). Inversely, the NUPP-SA does not work significantly via the *social encounter*, *avoidance*, *physical/cognitive*, or *assertiveness* factors. Pairwise comparisons among the five intermediary factors show that *public performance* was significantly stronger than *assertiveness* (IE = −.552, BootSE = .304; 95% CI = −1.223 – −.016) and *social encounter* (IE = −.643, BootSE = .340; 95% CI = −1.356 – −.028). For all other pairwise comparisons, there were nonsignificant IE between factors (Figure 2).

Table 7. Regression Coefficients, Standard Errors, and Model Summary Information for the Syndromal Social Anxiety Disorder Sample (N = 186) Examining the Effects of the NUPP-SA Intervention Program. Parallel Multiple Mediator Model Depicted in Figure 1

	Outcome																							
	M1 (*Assertiveness*)				M2 (*Physical/Cognitive*)				M3 (*Public performance*)				M4 (*Social encounter*)				M5 (*Avoidance*)				Y (SCARED SAD)			
Antecedent		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*		Coeff.	*SE*	*P*
X (*County*)	*a*1	.614	.320	.057	*a*2	.340	.224	.131	*a*3	.847	.436	.054	*a*4	.309	.154	.046	*a5*	.457	.200	.024	*C`*	.373	.380	.326
M1 (*Assertiveness*)																					*b*1	.037	.134	.783
M2 (*Physical/cognitive*)																					*b2*	.170	.181	.940
M3 (*Public performance*)																					*b3*	.678	.093	<.001
M4 (*Social encounter*)																					*b4*	.221	.242	.362
M5 (*Avoidance*)																					*b5*	.229	.220	.300
Constant	*i*M1	3.136	.205	<.001	*i*M2	1.508	.143	<.001	*i*M3	4.010	.279	.001	*i*M4	.726	.099	<.001	*i*M5	1.188	.128	<.001	*iy*	1.293	.379	<.001
	R^2 = .020				R^2 = .012				R^2 = .020				R^2 = .021				R^2 = .028				R^2 = .474			
	$F(1, 184)$ = 3.660		p = .057		$F(1, 184)$ = 2.230		p = .131		$F(1, 184)$ = 3.770		p = .054		$F(1, 184)$ = 4.031		p = .046		$F(1, 184)$ = 5.210		p = .024		$F(6, 179)$ = 2163.78		p < .001	

C` = Direct effect from X to Y controlling for the model mediators.

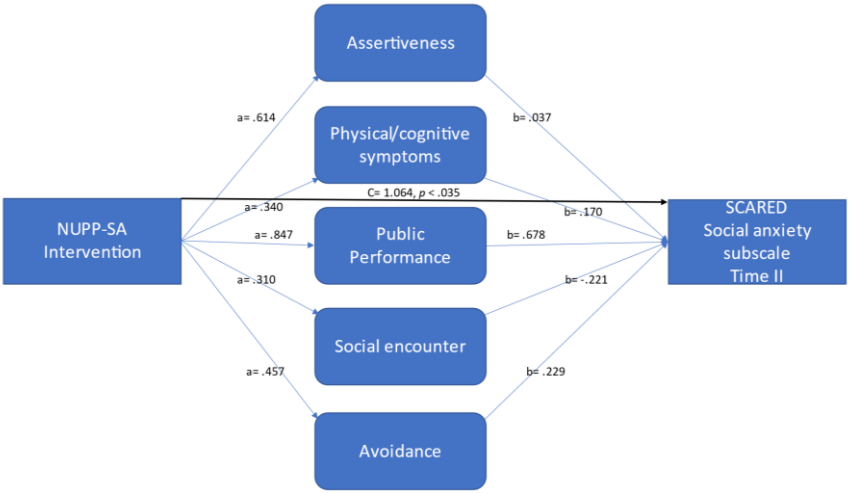

Figure 2. The direct effect of the intervention, where the various slopes show the indirect effects across the five factors for the syndromal sample.

Discussion

There is notable value to using mediating variables in intervention outcome studies (Hayes, 2018). Employing path analyses, we examine the specific IE of five intermediary factors to explain NUPP-SA intervention program outcomes in a cluster randomized population-based sample of older children and young adolescents aged 11–14 years.

For the total sample, the NUPP-SA program has a broad effect, working significantly via the *assertiveness*, *physical/cognitive*, *public performance*, and *avoidance* factors, indicating that post-intervention, those in the intervention group were significantly more assertive and less scared, experienced fewer physical/cognitive symptoms, were more at ease in public performance situations, and were less avoidant compared with those in the nonintervention group. In contrast, the NUPP-SA works significantly via the public performance factor among the syndromal sample. Thus, our hypothesis that the NUPP-SA program showed significant and similar indirect effects across the five factors both for the syndromal group and the total sample was partially supported.

To our knowledge, this is the first study to disassemble the SPAI-C and examine the mediating effects of five factors. This data provides compelling evidence about how the NUPP-SA program affects young people across various levels of social anxiety symptoms, by reducing public performance anxiety. This applies to those in both the total and syndromal groups. The essential feature of SAD

is a marked or intense fear or anxiety about social situations in which the individual may be scrutinized by others (APA, 2013). Thus, in a society that requires increasing demands for self-presentation, reduced performance anxiety may considerably help children and adolescents in their development toward becoming self-confident, self-presenting individuals.

Unexpectedly, the NUPP-SA did not work significantly via social encounters for the syndromal or total sample. This factor consists of three SPAI-C items (*Scared at parties and go home early*; *Scared when I meet new kids*; and *Scared in the school cafeteria*), which may not apply to the age population we sampled. There are several reasons for this finding. First, this age group seldom attends parties without some parental/guardian arrangement and support. Further, few schools in Norway have a school cafeteria for students in this age range. Instead, students eat packed lunches in their classrooms. Second, the correlation coefficient (see Table 3) between the SCARED social anxiety subscale and the *social encounter* factor was relatively low, explaining 14.1% of the shared variance. This indicates that the two measures do not represent the social anxiety construct similarly. Third, while the NUPP-SA includes a psychoeducational and cognitive approach, it does not teach or apply social skills in social encounters in the same way as programs like SET-C (Beidel et al., 2004). The results herein indicate that incorporating a greater focus on positive social encounters may lead to even greater effectiveness for NUPP-SA. In a meta-analysis, Scaini et al. (2016) demonstrated larger effect sizes from outcome studies that include social skills training. However, including social skill training and peer generalization sessions in a universal preventive program may be challenging. Nevertheless, Beidel et al. (2021) showed that a web-based artificial intelligence application designed to replace peer generalization sessions is as effective as practicing in vivo social and peer generalization skills. Hence, the NUPP-SA program may benefit from adopting a web-based approach tailored to the individual, with specific skills based on their five-factor social anxiety profile.

Contrary to our expectations, the NUPP-SA works differently, in some ways, for the total and syndromal samples. While the NUPP-SA seems to work more generally for the former, its impacts were more specific within the latter. Although the original study showed large effect sizes for the syndromal sample (Aune & Stiles, 2009), the results from this study reveal that this effect is significantly mediated via the *public performance* factor. Possible explanations for the different effects between the total and syndromal samples may be the content and magnitude of the NUPP-SA. In their meta-analysis, Scaini et al. (2016) reported a significant moderating effect of the "number of treatment sessions" (p. 108) given with treatment studies administering more therapy sessions showing larger effect sizes. Larger effect sizes were also reported in studies that included social skills training (Scaini et al., 2016). The reported results from Scaini et al. (2016), Yang et al. (2019), and our findings indicate that the NUPP-SA works as an effective universal preventive intervention program for older children and young adolescents across social anxiety symptom

levels. However, for those with syndromal social anxiety or SAD, the NUPP-SA program may be extended successfully to include more social skills training sessions.

These findings also shed light on whether children and adolescents with SAD lack appropriate social skills (Beidel et al., 2010) or whether a deficit in social skills results from cognitive distortions that undermine their confidence in using them once acquired (Clark & Wells, 1995). Our findings indicate that a psychoeducation and cognitive intervention approach is helpful to those with subsyndromal social anxiety who suffer mainly from cognitive distortions and assumptions. Inversely, for those with syndromal social anxiety, who most likely meet SAD diagnostic criteria, social skills training, and peer generalization sessions may be necessary to achieve clinically significant treatment effects. The finding that the NUPP-SA works via public performance for those with syndromal social anxiety indicates that many young people may suffer from the DSM-5 (APA, 2013) performance-only specifier, but do not fear or avoid nonperformance social situations. However, this assumption must be tested in further investigations.

SAD is often underrecognized with long delays between symptom onset and treatment initiation (Nagata et al., 2015). Zarger and Rich (2016) found that only 13% of adolescents with SAD had ever disclosed their social fears to a healthcare professional. Moreover, adolescents are reluctant to receive treatment because of fear of stigma and negative evaluation. Furthermore, treatment effectiveness remains relatively low (Nagata et al., 2015). One possible reason for this is that treatments developed in academic settings may be inappropriate or infeasible for application in traditional clinical or community settings (Beidel et al., 2021). However, the results herein emphasize that we can significantly impact many children with subsyndromal and syndromal SAD through a multifactor intervention. The fact that a large portion of this population has difficulty with public speaking also supports the need for universal implementation.

Kessler et al. (2007) indicated that 50% of mental disorders emerge before the age of 14 and as much as 75% before the age of 24. Aune et al. (2022) have demonstrated that adolescents with subclinical social anxiety also report mental health issues over a range of areas, like those with a full-blown social anxiety disorder. Considering these facts, modeling estimates indicate that existing treatments can remove only a limited burden of SAD at the population level (Werner-Seidler et al., 2021). Thus, prevention might be the strategy to reduce SAD's disease burden. To legitimize the implementation of a prevention program upon an entire population justifies some ethical considerations. First, the prevalence of the targeted burden must be high. Secondly, few people seek treatment for the specific difficulty, and the effect of the treatment is low. Lastly, the intervention demonstrates an effect at all levels of the burden. The NUPP-SA seems to satisfy these assumptions.

Strengths and limitations

This study has several strengths and some limitations. This study included only two assessment points. More assessment points would have been beneficial to gain more information about the intervention mechanisms accounting for the detected effect. Thus, interpretations of causal relationships ought to be considered with caution. The original study by Aune and Stiles (2009) used a cluster-randomized intervention pre–post design with only one cluster per condition. However, the differences in levels of social anxiety between the two conditions at assessment point II could not be explained by either initial differences in demographic and clinical variables or by measures like stressful life events and bullying. A self-report measure was used to assess syndromal social anxiety; nevertheless, the correspondence between meeting SAD diagnostic criteria on the Anxiety Disorders Interview Schedule for Children and syndromal social anxiety on the SPAI-C is reasonably good (Aune et al., 2008). A population-based sample with relatively high participation was used, which allowed us to examine the intervention effects on different subgroups. Furthermore, IE estimation using a parallel multiple mediator model with the five SPAI-C factors allowed testing of each mechanism while simultaneously accounting for the between-factor associations.

Clinical implications

Primary prevention programs are increasingly important for reducing the impacts of chronic disorders and diseases on individuals, institutions, and society (Pigeot et al., 2010). According to Kessler et al. (2005), more attention should be directed to preventing primary disorders like SAD. Implementing an effective, universal preventive program like the NUPP-SA in schools (which offers ready access to young people and their families) offers opportunities that would be otherwise unavailable (Aune & Stiles, 2009). This investigation also has practical implications for developing efficient interventions by identifying and subsequently targeting critical program components. Moreover, dismantling how an intervention is conducted using various samples gives us valuable opportunities for customizing, rather than applying strictly manualized approaches. Ideally, doing so may help immunize young people against SAD, the most prominent, impairing, and costly childhood anxiety disorder.

Conclusion

The results indicate that the NUPP-SA works differently across the total sample compared to those with SAD symptoms (syndromal social anxiety). Compared to the control group, the NUPP-SA total intervention group demonstrated statistically significantly reduced social anxiety associated with becoming less

assertive, experiencing fewer somatic and cognitive symptoms, feeling more eased doing presentations, and showing less avoidance. In contrast, among those showing SAD symptoms, significantly reduced social anxiety is associated with decreased public performance anxiety. This indicates that the NUPP-SA has a significant universal impact on the most prominent social anxiety disorder symptom.

Authors' note

Declaration: The authors declare that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in his paper.

Conflict of interest: None.

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EXAMINING THE POTENTIAL OF A BREATH PACER AS AN ADJUVANT IN COGNITIVE BEHAVIORAL THERAPY: CASE STUDIES IN DIGITAL HEALTH FOR MENTAL WELL-BEING

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Abstract

Increasing mental health issues worldwide call for effective interventions. Breathing therapy, particularly slow-paced exercises, is gaining recognition for enhancing mental well-being. Integrating these exercises with cognitive behavioral therapy (CBT) appears effective for stress and anxiety management. Technological solutions for home therapy have emerged, improving patient engagement. This study assesses a tactile breath pacer as a CBT adjunct for various mental health conditions.

Six participants with conditions including autism, depression, burnout, bipolar disorder, insomnia, and anorexia engaged in therapy using the moonbird breath pacer for a month, with regular email check-ins.

The breath pacer's integration into CBT showed positive outcomes. Participants found it user-friendly, adapting it into their daily routines. Customized usage patterns promoted relaxation, emotion regulation, and improved sleep, with many extending use for sleep enhancement.

This study demonstrates the benefits of technology in therapy, specifically for emotion regulation, relaxation and sleep. It supports blended care, combining in-person and remote therapy elements, with personalization encouraging active client engagement.

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Incorporating a breath pacer into CBT shows promise for mental well-being. Technology-enhanced exercises complement traditional therapy, offering personalized treatment and client empowerment. The study emphasizes the potential of technology-assisted mental health care in advancing personalized therapeutic methods.
Abbreviations: CBT = Cognitive Behavioral Therapy.

Keywords: cognitive behavioral therapy, breath pacer, breathing exercises, case study, digital health, mental health.

The prevalence of mental health issues is increasing globally, affecting diverse individuals across age groups (World Health Organization, 2021). The World Health Organization stated that approximately 450 million individuals worldwide are currently living with mental or neurological disorders, encompassing conditions like anxiety disorders, depression, bipolar disorder, and eating disorders (WHO, 2021). These disorders not only inflict individual suffering but also exert substantial societal consequences, leading to impaired functioning, diminished quality of life, and heightened physical health risks (Connell et al., 2012). Consequently, addressing mental health has become paramount, with therapeutic interventions forming the cornerstone of efforts to mitigate these issues (American Psychological Association, 2023).

Breathing therapy, a technique involving conscious control of breathing patterns, has garnered recognition as an effective therapeutic approach (Brown et al., 2013). Slow-paced breathing, characterized by controlled inhalations and exhalations at a frequency lower than the resting pace (4-10 breaths per minute), has demonstrated significant positive effects on mental well-being (Lehrer, 2018; Homma & Masaoka, 2008; Jerath et al., 2015). This technique fosters relaxation and overall emotional equilibrium, in contrast to uncontrolled breathing linked to anxiety and stress (Scharpe, 2021). Studies underscore the potential of slow breathing exercises in ameliorating stress, anxiety, insomnia, and depression (Homma & Masaoka, 2008; Jerath et al., 2015; Prinsloo et al., 2011; Yu & Song, 2010; Hopper et al., 2019).

Cognitive Behavioral Therapy (CBT) represents a well-established therapeutic approach for addressing mental health conditions (David et al., 2018). CBT centers on identifying and transforming negative thought patterns and behaviors, yielding positive and adaptive changes (Hofmann et al., 2012). Research has hinted at the efficacy of combining CBT with breathing exercises to enhance sleep quality and heart rate variability in patients with major depression (Chien et al., 2015).

The demand for accessible and at-home therapeutic options has surged in recent years, fostering innovative interventions to facilitate safe and effective treatments (Brown et al., 2013; Cho & Lee, 2019). These interventions harness

technology to empower clients to initiate and sustain therapy independently within the comfort of their homes. These digital care approaches aim to circumvent the constraints of traditional in-office therapy, including cost and lengthy waiting lists (Saad et al., 2021). Digital tools, such as smartwatches, apps, breath pacers, and audio guides, have arisen to support breathing therapy through auditory, visual, or tactile cues (Honinx et al., 2023). External guidance via devices augments the accessibility and efficacy of breathing exercises, more so than self-guided practices (Scharpe et al., 2021).

The moonbird (Moonbird BV), a portable breath pacer, is designed to facilitate relaxation, stress reduction, and improved sleep quality (Vermeylen et al., 2022). By delivering gentle tactile guidance, the moonbird synchronizes users' breathing rhythm at a slow pace. Recent research demonstrates the feasibility, user acceptance, and positive impact of the moonbird on sleep quality (Vermeylen et al., 2022). Tactile feedback proves particularly valuable for individuals who feel disconnected from their bodies and surroundings (Gallace & Spence, 2010; Della Longa et al., 2022). Incorporating touch in breathing exercises reduces cognitive load and enhances somatic experiences and motor learning (Della Longa et al., 2022; Yu et al., 2015).

The moonbird device might add a tangible therapeutic dimension beyond conventional digital CBT interventions. While digital CBT has proven effective, introducing a tactile tool introduces a haptic element that enhances engagement and offers a novel sensory experience. Moreover, these tools can liberate individuals from the confines of computers or laptops, enabling therapeutic engagement in various settings. This fusion of technology and tactile interaction marks a progressive stride toward comprehensive and adaptable therapeutic support for individuals seeking enhanced mental well-being (Steffen et al., 2021).

Nevertheless, a comprehensive understanding of device utilization, user experiences, and overall effectiveness in therapeutic settings remains limited. This study investigates the integration of the moonbird breath pacer as a therapeutic adjuvant, employing six case studies to offer real-life insights into participants' experiences while considering various therapy-specific and contextual factors. By identifying potential challenges and benefits, these case studies inform future implementation strategies and the design of larger-scale follow-up studies.

Ultimately, this study endeavors to advance therapeutic practices by showcasing the potential of technology-assisted at-home breathing therapy as a complement to standard therapy sessions for individuals with mental health disorders. It also explores the potential benefits of a physical breath pacer as a therapeutic tool that can empower patients to actively participate in their therapeutic journey, optimize patient outcomes, and cultivate a positive therapeutic experience.

Methodology

Setting and recruitment

The study was conducted at Faresa, an evidence-based psychological center based in Belgium with profound expertise in CBT. Faresa offers comprehensive services for individuals and companies seeking to address mental well-being, focusing on both preventive measures and curative purposes. Their team specializes in diagnostics, coaching, and psychotherapy.

A total of six participants (five women and one man, between 24 and 54 years) took part in this qualitative research study. The responsible clinical psychologist and CBT therapist screened all clients who were receiving therapy at the time. She selected participants based on their interest in the study, treatment demand and her assessment of moonbird's added value for their treatment. This resulted in a heterogenous group of individuals with various mental health conditions, including autism, depression, burnout, bipolar disorder, sleeping problems, and anorexia. This diverse range of disorders provided valuable insights into the respective symptoms and contributed to the overall potency of the study. To ensure anonymity, patient identities have been fictionalized.

Materials

For this study, the digital therapeutic device Moonbird (Moonbird BV) was employed. Moonbird is a portable, handheld device designed to facilitate calming breathing exercises by expanding and contracting at a slow rhythmic pace, allowing users to synchronize their breathing patterns with its movement. Through this synchronized interaction, the device guides individuals in engaging in calming breathing exercises, primarily aimed at alleviating stress, anxiety, and sleep problems.

The tactile breath pacer is equipped with a photoplethysmography (PPG) sensor, through which it measures heart rate (HR) and connects wirelessly to an accompanying mobile app via Bluetooth Low Energy (BLE). The mobile app provides real-time biofeedback on HR, heart rate variability (HRV), and heart coherence.

Various other features and options are available on the app. Based on the heart rate measured, the ideal breathing rhythm can be calculated. Additionally, users can choose from default exercises with adjustable duration, which can be downloaded onto the breath pacer for standalone use. Alternatively, they can enter individual breathing exercises or educational journeys based on CBT. These journeys consist of audio guides with multiple episodes focusing on themes like stress management, improved sleep, and anxiety reduction.

Pre- and post-exercise check-ins are integrated into the app, serving a dual purpose in this study: empowering users to gain insights into their emotional and

physical states before and after each breathing exercise, while also providing the therapist with valuable information to evaluate the sessions. By capturing the user's self-reported experiences, the check-ins create a comprehensive overview of how the breathing exercises impact their mental and physical states.

Throughout the exercises, the app provides biofeedback to monitor heart rate and HRV, as well as to indicate whether the breathing is occurring coherently, meaning that the heart rate and breathing rate are in sync.

Procedure

The standard face-to-face therapy at Faresa is based on evidence-based treatment protocols from Cognitive Behavior Therapy (CBT or CBT). CBT aims to bring about behavioral change through cognitive and behavioral interventions tailored to the client. Behavior, thinking and feeling are central to this approach.

Following an initial introduction to moonbird during the therapy session, participants were provided with the device for at home use. The therapist demonstrated the device, while the client was able to follow using an own device. They downloaded and explored the app together, i.e. all the features were shown (e.g. statistics) and different types of exercises were tested. After that, clients were given the opportunity to try out for themselves which exercise appealed to them.

Moonbird recommends a minimum usage period of one month, as noticeable physical effects typically emerge within 3-4 weeks (Lin et al., 2023). The frequency and duration of usage were determined in consultation with the therapist, and tailored to each participant's unique requirements and progress. Some participants used the device multiple times daily, while others utilized it once a day or on an as-needed basis.

Prior to each session, the therapist reviewed the completed exercises and client progress in the moonbird app. During each session, ten minutes were set aside to discuss experiences, feedback or questions regarding the moonbird device and app. It was also possible to ask questions outside the sessions, via mail. Regular check-ins and progress updates, both during the session and via bi-weekly emails, were conducted by the therapist to monitor adherence to moonbird usage and track participants' progress. This allowed for any necessary adjustments to the usage pattern and provided additional support when needed. The personalized approach ensured that the moonbird usage was optimized for each participant's specific circumstances.

Data collection

Throughout the study period, the participants engaged in scheduled therapy sessions with the therapists. These sessions served as a moment for open discussions about emotions, physical sensations, and personal experiences with moonbird. The topics covered during these sessions were diverse, ranging from individual progress

and presenting concerns to the specifics of moonbird implementation and the observed effects. Both the patient and the therapist also orally shared their respective impressions regarding the use of moonbird, including feedback from the moonbird app, providing valuable insights into the therapeutic process. These impressions were written down by the therapist in a prepared template in between sessions.

Case description

All names used in the case descriptions are pseudonyms *(***Box 1 - Box 6***)*.

Box 1. *Case 1: Autism*

Patient presentation

Marion V. is a 24-year-old woman with autism. She is hypersensitive which often makes her overstimulated. Marion exhibits black-and-white thinking patterns and struggles with compulsive thoughts. Additionally, she experiences frequent rumination, resulting in difficulty falling asleep at night. A significant challenge for Marion is emotion regulation leading to explosive expressions of anger and impacting her overall mood and stress resilience. Marion experiences problems in her private life because social contacts are difficult to build, and she doubts a lot about whether she is handling things properly. This leads to withdrawal and feelings of being overwhelmed. She expresses a need for clarity and structure, as disorientation occurred when these elements were absent.

Implementation of breathing therapy

Marion participated in a therapy program that incorporated the use of the breath pacer in several areas to optimize the therapy: to (1) reduce general stress levels, (2) redirect attention during intense emotional moments (emotion regulation), and (3) facilitate falling asleep. The guided exercises offered by the moonbird were seen as an added value because it offers support, as Marion has a great need for structure. Marion engaged with the moonbird approximately 2-3 times daily and continued the usage after one month.

Box 2. *Case 2: Depression and burnout*

Patient presentation

Sarah B., a 54-year-old woman, sought therapy for depressive symptoms and burnout and has been in long-term therapist treatment (for 4 years). Sarah struggles to meet the demands of a job, often finding it challenging to get out of bed and structure her day. The symptoms often manifest as mood fluctuations, which she perceives as exhausting. Sarah expresses a strong desire to lead a fulfilling life, but faces difficulties in achieving this goal, resulting in significant distress.

Implementation of breathing therapy

The primary objective of adding breathing therapy for Sarah was to promote relaxation and reduce anxiety. In this context, the breath pacer served as a physical tool to enhance self-confidence and self-reliance. Adding the breathing therapy aimed to minimize ups and downs and foster a more positive and calm emotional state. Initially, it was agreed to use the moonbird once a day for one month, but the use was extended as advised by the therapist.

Box 3. *Case 3: Bipolar disorder, fear of failure, and overtiredness*

Patient presentation

Kobe J., a 34-year-old man, pursued treatment for bipolar disorder, fear of failure, and overtiredness. He has been in long-term treatment for 6 years. Kobe experiences mood swings, difficulty regulating stress, and trouble falling asleep when he faces a deviation from his set structure. Fluctuating sleep patterns and mood/depression also contribute to his symptoms of fatigue. Kobe heavily relies on structure and stability in his life, leading to limited engagement in social activities.

Implementation of breathing therapy

Kobe's therapy primarily consisted of CBT with an emphasis on psychoeducation. The breath pacer was integrated into his treatment as a physical tool to embed structure in the daily pattern, as the tactile aspect in combination with the biofeedback offered a more accessible alternative to meditation or other options for establishing structure. Initially, the device was used daily for two months. Later, Kobe decided to use it only on days when he felt the need, tailoring its application to his specific needs.

Box 4. *Case 4: Sleeping problems*

Patient presentation

Els V. is a 48-year-old woman who suffers from sleeping problems, specifically difficulty falling asleep and staying asleep. These issues significantly impact her mood, fatigue levels, and stress resilience. Els experiences hindrances in her personal and professional life due to persistent tiredness and difficulties with concentration.

Implementation of breathing therapy

The breathing device was incorporated in Els' therapy to enhance relaxation and improve sleep. The contribution of breathing therapy in this case concerned attention shifting in bed and incorporating moments of rest. Initially, Els practiced during the day, gradually transitioning to practicing before bedtime. The aim was to establish regular moments of rest throughout the day and then address relaxation therapy and attention shifting before sleep. It was agreed to use the device at least once a day for one month, primarily during the day initially and then switching to evenings. Progress updates were requested via email after two and four weeks, and the therapist regularly monitored the usage of the device. Els voluntarily continued using the breath pacer after the one-month therapy.

Box 5. *Case 5: Burnout*

Patient presentation

Josefien L., a 26-year-old woman, has been undergoing therapy for a period of two years to address her symptoms of burnout. She is overtired from constantly exceeding her limits, leading to emotional overwhelm, physical exhaustion, and reduced mental stability. As a result, Josefien often requires rest and breaks, learning to prioritize and make choices in her weekly activities to avoid overload. This ongoing recovery process has a significant impact on her daily life.

Implementation of breathing therapy

The breath pacer was introduced to facilitate at-home self-check-ins, promote relaxation, and provide distraction. The goal for Josefien was to establish a stronger connection with her body and regularly assess her well-being. It involved creating a cocoon-like space to momentarily detach from external stimuli. The planned duration for the breath pacer usage was one month, but it was extended to slightly less than two months since the effects were not noticeable yet after 1 month and Josefien therefore wanted to use the app longer. Josefien used the device when needed, both in the morning and evening (twice a day), as well as during moments of increased nervousness.

Box 6. *Case 6: Anorexia and stress-related symptoms*

Patient presentation

Nora S. is a 42-year-old woman with anorexia and stress-related symptoms. Nora experiences abdominal pain after eating, particularly when consuming certain foods, although no physical cause was identified. She also struggles with eating larger portions and exhibits sensitivity to stressors. Nora suffers from increased heart rhythm and feeling insecure about her body and appearance. The pressure from her environment further exacerbated her condition, making it challenging for her to make progress. Additionally, she often finds herself preoccupied with meal options and engaged in excessive rumination.

Implementation of breathing therapy

The breath pacer was integrated into Nora's therapy to alleviate evening stress and improve her ability to fall asleep faster while enhancing the quality of her sleep. The primary objective was to shift her attention from brooding thoughts to focusing on her breathing in bed, thereby facilitating easier and faster sleep initiation. The agreed duration of the device usage was one month, although Nora continued to utilize it for an extended period. She practiced with the device a few times a week in the evening and occasionally once during the day on the weekends.

Results

In the following section, comprehensive findings are reported from both the patients and the therapists involved, providing a well-rounded understanding of the experiences of incorporating the moonbird device in therapy. This multi-dimensional perspective achieves a more nuanced assessment of the device's impact on the therapeutic process.

Case 1: Autism

Patient findings

Marion reported positive experiences while using the moonbird both via the checkins in the app and during the sessions. She even indicated she was looking forward to the sessions. In the short term (<1 month), she noticed an improved ability to relax and fall asleep more quickly. The breathing exercises and the accompanying voice guidance helped Marion to quiet her thoughts. Marion did not perceive any long-term effects (>1 month), the effect appeared primarily during the device's use itself. *"I found it pleasant to work with moonbird, in fact I was looking forward to it."* Her self-reported physical state was improved as Marion was able to sleep a little better. However, her self-reported mental state seemed unchanged by the use of the moonbird.

Therapist findings

Marion was highly motivated to work with the moonbird and considered it a pleasant part of her day. In the short term, the therapist observed Marion to be calmer and emotionally more stable. Marion's breathing pattern became more coherent. A few weeks after starting to use the moonbird, therapy was discontinued at Marion's request because she felt better. However, she wished to continue practicing with the moonbird. The therapist noticed improvements in Marion's mental state, including more organized thoughts and an enhanced ability to articulate her concerns. It is important to note that these effects cannot be solely attributed to the moonbird, as Marion simultaneously received behavioral therapy. Marion was satisfied with the therapist's approach.

Case 2: Depression and burnout

Patient findings

Sarah experienced challenges in consistently using the moonbird. In both the short and long term, she noticed increased calmness. Initially, she did not perceive the device as immediately valuable, as she found comparable exercises on the internet that also yielded positive results. However, after using the moonbird more frequently, she recognized its effectiveness and value. Sarah relied on the device, particularly during periods of work-related stress, and observed its beneficial impact after a few days. Sarah preferred exercises with a guided voice but occasionally struggled to maintain the breathing tempo. She primarily listened to the informative audio sessions. Eventually, she decided to purchase her own device, although it remains a challenge to use the moonbird consistently.

Therapist findings

Assessing the effect of the moonbird on Sarah's well-being was challenging due to her inconsistent practice. She had been struggling with behavioral change throughout therapy and experienced difficulties in taking action by herself. Although she realized that she needed to use the moonbird more in order to feel an effect, she had difficulty doing so. After two months, she started using the moonbird more frequently and her therapist noticed a calming effect. However, there were subsequent periods of reduced usage. Motivating Sarah to use the moonbird regularly posed difficulties for the therapist. *"Initially, I noticed no effect. However, after I started using the moonbird more frequently, I noticed that I became calmer. I am thinking of purchasing one myself."*

Case 3: Bipolar disorder, fear of failure, and overtiredness

Patient findings

Kobe reported a positive experience while using the moonbird, particularly during the breathing exercises. He perceived limited additional value in the app. In total, Kobe utilized the moonbird approximately 10-15 times, gradually increasing the exercise duration from 6 to 15 and then 30 minutes. He also utilized the device's preprogrammed exercises, often while watching TV. Additionally, Kobe employed the moonbird before job interviews and during moments of panic or stress. *"I often used it while watching TV. But I have also used it before a job interview, and during moments of panic or stress."*

Therapist findings

During the initial phase, the breathing device was sparingly used until Kobe expressed a desire to experiment with it. Since the patient is quite rational, he took some time to figure out how he was going to implement moonbird into his structure (with/without app, when, where..). The application data revealed that engaging in exercises with the moonbird consistently improved Kobe's mood and energy levels by approximately 25% each time. Coherent breathing patterns were observed and immediate physical effects and mental impact within a few days were noted. However, due to the absence of physical therapy sessions during the intervention period (the patient only had sessions once a month or less), a comprehensive understanding of additional short-term or long-term effects is limited.

Case 4: Sleeping problems

Patient findings

Els expressed satisfaction with the breathing device and found the experience enjoyable. The focus on breathing facilitated falling asleep and maintaining sleep. She felt more relaxed, experienced fewer mood swings, and demonstrated improved concentration throughout the day. Initially, Els used the moonbird during the day or in the evening as she perceived immediate use for falling asleep as too 'frenetic'. Instead, she spent some time outside, engaging in relaxation. This ritual created a pleasant moment of relaxation for her.

When she encountered difficulties falling asleep, she used the moonbird for a breathing exercise, which had a soothing effect. While it didn't cause immediate sleep, it facilitated sleep shortly afterward. Consequently, she kept the moonbird in her bedside table drawer. She made a habit of sitting outside with the moonbird each night as a preventive measure, although its effectiveness varied. Even during sleepless nights, performing exercises with the moonbird often helped her. Most importantly, it instilled confidence in her ability to manage sleep difficulties. This confidence subsequently facilitated easier sleep onset. *"Most importantly, it gives me confidence: I know that if I can't sleep, I have something that can help. And that then naturally causes me to fall asleep more easily. I feel less melancholy, but happier and more positive. I can enjoy myself again"*

In the short term, Els experiences that a moment of relaxation makes her feel calm and relaxed, leading to reduced mood swings. In the long term, Els gained better control over brooding thoughts, improved daytime restfulness, and developed increased self-confidence. Her physical state improved as she achieved better quality sleep, increased daytime energy, and a greater sense of mental and physical well-being. Mentally, her ability to focus improved, allowing her to concentrate more effectively and for extended periods. Moreover, she experienced a decrease in

feelings of melancholy and an increase in overall happiness and positivity, enabling her to once again find enjoyment in life. Els found it tedious to use the app for tracking her feelings and measuring parameters such as heart rhythm and preferred to work without it. During the exercise, her breathing rhythm slowed down, with longer inhalations and exhalations. Els conveyed her desire for an exercise that facilitated her breathing gradually slowing down.

Therapist findings

After 3-4 weeks, notable improvements in Els' sleeping problems were observed. Especially given the longstanding nature of her sleeping issues, she initially held little hope for improvement. Els had previously attempted various sessions without significant success, leading to skepticism about therapy. She stated that the moonbird had proven more effective for her sleeping problems than anything she had tried before. Els took charge of setting her own breathing rhythm and used the device multiple times a day, including in the evening. Eventually, she exclusively used the device, preferring not to rely on the accompanying app. As a result, her therapist observed short-term calmness, long-term increased self-confidence, and a more positive outlook. She gained both physical and mental energy, and her hopefulness for the future was restored.

Case 5: Burnout

Patient findings

In the short term, the moonbird proved highly effective during intense moments, preferably without audio. Audio cues sometimes triggered Josefien, especially when problems and symptoms were discussed. *"You could see the evolution of a panicked feeling through breathing, and it's nice that you can do that yourself. The moonbird is ideal for people with panic or stress."* Mentally, Josefien gained more confidence in her abilities as she realized the calming impact the moonbird could have. She appreciated being able to observe the progression of her breathing and regain control in moments of panic or stress. Josefien found the moonbird particularly suitable for individuals experiencing acute stress. She valued the flexibility of being able to stop the exercise whenever she desired, as well as the freedom to proceed at her own pace without external guidance. However, Josefien expressed dislike toward box breathing exercises, as they demanded more focus and endurance. Overall, Josefien found the use of the moonbird to be quite clear in its purpose.

Therapist findings

The mental and physical check-ins within the app occasionally triggered Josefien. Additionally, she was unaware that the exercise duration could be adjusted. It is important for therapists to provide adequate follow-up and regularly check in with clients to address such concerns. In the short term, Josefien experienced a greater sense of calmness and increased confidence. The moonbird primarily served as a breather, with tension subsiding after practicing approximately three minutes, resulting in the exercise to be halted. Her mental state also became more stable. Ideally, a longer exercise period would be beneficial for Josefien's recovery process.

Case 6: Anorexia and stress-related symptoms

Patient findings

Nora was positively surprised during the sessions, as the moonbird proved to be more effective than anticipated. However, there was a need to actively find a stimulus-free environment to ensure optimal practice. Nora noticed that the more frequently she engaged with the device, the greater her sense of calmness. She also discovered the importance of selecting appropriate moments for practice, typically when her mind was less preoccupied, and she could dedicate focused time to the exercises. Nora expressed that if she continued utilizing the moonbird for a longer duration, it could have proven beneficial to her during sleepless nights. However, during those times, she tended to prefer doing breathing exercises independently, without relying on the device, as she found that excessive focus on the device and the transition between inhaling and exhaling could be distracting. *"I was positively surprised, it worked better than expected. In the long run, I was focusing on my breathing instead of intrusive thoughts."* In the short term, Nora experienced increased calmness and a decrease in her heart rate. In the long term, she found it helpful in redirecting her focus from brooding thoughts to concentrating on her breathing. Nora expressed a desire for an auditory cue indicating the end of an exercise, as the automatic termination of the device sometimes led to prolonged exhalation, disrupting her practice.

Therapist findings

Assessing Nora's mood and energy levels was challenging due to her inconsistent completion of check-ins. The moonbird facilitated the steps in working around eating problems, as it allowed Nora to work on physical and mental peace independently. Direct effects on her primary eating-related concerns were challenging to determine, as moonbird usage did not directly target those issues. Nevertheless, according to the therapist the device effectively promoted overall

calmness and facilitated the therapeutic process. After an initial adjustment period, marked improvements were observed after two weeks, characterized by reduced heart rate and improved breathing coherence. Nora expressed satisfaction with the therapist's approach and the efficacy of the moonbird device.

Discussion

In this study, we aimed to examine the potential of integrating the moonbird device into CBT for various mental health conditions, such as autism, depression, burnout, bipolar disorder, sleeping problems, and anorexia. We explored diverse ways of incorporating the device into therapy sessions and examined its therapeutic benefits.

In all cases, the moonbird breathing device was introduced at the outset of therapy sessions and seamlessly integrated into the framework of Cognitive Behavioral Therapy (CBT). The primary objective was to investigate how guided breathing exercises, inducing physical changes, could enhance therapy and promote self-awareness, self-confidence, and self-reliance. Patients were encouraged to engage with the moonbird regularly, typically between one and three times daily or as needed, based on their unique requirements. Therapists conducted regular check-ins and provided updates during sessions and via email to monitor progress and ensure exercise adherence. Although the initial agreement was for a month of moonbird usage, some cases extended this duration to accommodate individual progress and needs. Patients enjoyed flexibility in tailoring moonbird usage frequency and timing to suit their specific needs.

The moonbird device served as a valuable tool for redirecting attention during intense emotional moments, facilitating relaxation, and improving sleep initiation and quality. It provided patients with a dedicated space for self-reflection and self-care. Interestingly, many participants extended the moonbird trial period beyond one month, often due to self-request or therapist advice. Furthermore, regardless of the initial reason for incorporating the moonbird into therapy, several participants found it particularly effective for improving their sleep, aligning with recent studies highlighting its efficacy in addressing insomnia (Vermeylen et al., 2022).

These findings bear significant implications for mental health therapy, emphasizing the potential of health technology to augment treatment experiences and outcomes. Integrating technology into therapy empowers therapists to provide individuals with additional tools for symptom management and overall well-being. The moonbird device, with its portability and accessibility, can seamlessly integrate into daily routines, allowing individuals to actively participate in their therapy journey from the comfort of their homes.

The incorporation of technology into therapy has also accelerated the adoption of blended care, a model that has gained momentum, particularly in response to the COVID-19 pandemic. Blended care combines in-person and remote elements, offering clients a flexible and accessible approach to therapy. Technology plays a pivotal role by bridging the gap between physical and virtual interactions. Therapists can leverage digital tools to craft personalized treatment plans tailored to each client's unique needs and goals.

One of the key advantages of technology integration is the ability to provide clients with tools that therapists can set and monitor, customized to address specific conditions. These tools empower clients to actively participate in their therapeutic journey, even outside the therapist's office. Clients can engage in therapeutic exercises, practice coping strategies, and monitor their progress in real-time. These digital tools often include features that enable therapists to track client activities, review performance data, and adjust treatment plans accordingly. This not only enhances client engagement but also strengthens the therapeutic alliance between therapist and client as they collaborate closely to achieve shared treatment goals.

However, while technology offers immense potential for blended care, it is essential to strike a balance between digital interventions and the personal touch of traditional therapy. Face-to-face interactions remain valuable for building rapport, establishing trust, and addressing complex emotional issues that necessitate a personalized approach. Thus, the ideal blend of in-person and remote therapy components should be determined based on individual client preferences and needs.

In summary, the integration of technology into therapy has revolutionized the delivery of mental health services, adapting to the changing landscape driven by the COVID-19 pandemic. Blended care, enabled by technology-driven tools and remote therapy options, holds promise for enhancing therapeutic outcomes, expanding access to mental health care, and empowering clients to actively engage in their healing process. As technology continues to evolve, mental health professionals will explore innovative ways to leverage its potential, prioritizing the well-being and recovery of their clients.

Moreover, the case studies underscore the importance of customization and tailoring interventions to individual preferences and needs, aligning with the principles of patient-centered care (Grover et al., 2022). Each participant in the case studies exhibited unique experiences and preferences when using the moonbird device, reinforcing the need for a personalized therapy approach. Therapists collaborate closely with their clients to understand their specific requirements and preferences, customizing breathing exercises to align with their individual goals and needs.

This collaborative approach empowers both therapists and clients during therapy, enabling active involvement in decision-making regarding therapy provision. Clients take greater ownership of their therapy journey, potentially leading to higher compliance and greater effectiveness. In this patient-centered and collaborative approach, therapists and clients work together to create a treatment

plan that resonates with the client's unique needs and lifestyle. The technology-supported breathing exercises through the moonbird device become a valuable tool in this process, offering clients autonomy and ownership over their therapeutic journey. Consequently, clients may feel more motivated and engaged, leading to a deeper commitment to therapy and ultimately improving mental health outcomes.

Recent studies have explored the integration of breathing techniques into trauma-focused CBT (TF-CBT) for patients with posttraumatic stress disorder (PTSD). These studies demonstrated the benefits of incorporating breathing techniques as complementary elements in TF-CBT, showing trends toward faster symptom reduction and improved mental quality of life (Haller et al., 2023; Rosaura Polak et al., 2015). The findings emphasize the potential advantages of implementing guided breathing exercises, such as those facilitated by the moonbird device, within CBT.

The moonbird device's flexibility aligns well with the personalized approach to therapy advocated in previous research. These findings, combined with existing research, underscore the promising role of breath pacers, like the moonbird device, as valuable tools in digital health applications for mental well-being. They reinforce the implications of our case studies and contribute to the advancement of therapeutic practices and technology-assisted interventions in mental health care.

Strengths and limitations

Presenting case studies across various mental health conditions expands our understanding of the moonbird's potential impact on different individuals. The mixed methods approach, incorporating both patient and therapist perspectives, provides a comprehensive view of the effects of the breathing sessions. However, the reliance on subjective experiences and motivational data from patients may introduce potential biases and should be considered. Further comprehensive data analysis, including comparisons across different measurement moments, could enrich the understanding of patient experiences. Additionally, the absence of long-term follow-up limits the assessment of sustained effects beyond the testing period.

Despite these limitations, this study lays the groundwork for future randomized controlled trials that may include objective measures and long-term follow-up. The case studies contribute to the growing field of digital health interventions in therapy, showcasing the unique combination of breathing exercises and technology offered by the moonbird device. This research highlights the potential benefits of such devices across various mental health conditions and underscores the importance of customization and individual preferences in therapeutic interventions.

Conclusion

This study demonstrates the potential and effectiveness of using the moonbird device as an adjunctive tool in Cognitive Behavioral Therapy for various mental health conditions. It offers practical examples of how technology can support breathing exercises, providing valuable guidance for therapists. The findings emphasize the importance of personalized therapy approaches that empower clients to actively engage in their healing process. The integration of the moonbird device showcases how technology can enhance treatment outcomes and improve the therapy experience. This collaborative approach between technology and personalized therapy holds promise for supporting mental well-being and advancing therapeutic practices.

Authors' note

Ethics statement: In this feasibility study, we have complied with APA ethical standards in the treatment of our sample. The highest ethical standards were consistently upheld, following both institution's guidelines and the General Data Protection Regulation (GDPR). While the study was approached as an extension of routine clinical practice, participants were fully informed of their rights and provided written consent for both participation and data usage. Ensuring privacy, only EP (Faresa) had access to participants' identities. Pseudonyms were used in reporting to moonbird and other parties. The non-intrusive nature of the technology posed no risks, emphasizing participant autonomy, privacy, and transparency throughout. Moonbird's adherence to CE marking standards further reinforces its credibility. Although our primary aim wasn't publication, the significant outcomes and a gap in the existing research motivated us to share our insights, receiving positive feedback at the European Congress of Behavioral Therapy in Barcelona in October 2023 (EABCT 2023).

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Conflict of interest: SB and EH are respectively co-founder and researcher at Moonbird B.V. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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HELP SEEKING BEHAVIORS IN ANXIETY DISORDERS: A SYSTEMATIC SCOPING REVIEW

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Abstract

Anxiety is one of the most common mental health problems globally. Although it is so widespread, only 43% of people suffering from anxiety disorders receive help. A systematic review was conducted of 39 studies for a better understanding of the help seeking behaviors and influencers. Help seeking is associated with sociodemographic data (such as ethnicity), level of mental health literacy, financial status, perceived stigma, and other factors. The most vulnerable regarding help seeking and treatment receiving mental health help for anxiety are minority groups. There is a paucity of studies regarding how to influence the factors associated with help seeking behaviors. More research is needed so that mental health care providers can provide help adapted to patients' specific needs.

Keywords: anxiety, help seeking, mental health, facilitators, barriers.

Although it is normal to occasionally experience anxiety or worry as a normal part of life, people which suffer from anxiety disorders (AD) have repeated, frequent, intense and persistent states of fear and worry regarding everyday situations. These states interfere with daily activities, are overreactive and uncontrollable. In many cases of anxiety disorders, somatic symptoms (chest pain, shortness of breath, numbness of limbs, etc.) may also occur (American Psychiatric Association, 2013).

There are many types of AD according to The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5; American Psychiatric Association, 2013) such as: Agoraphobia, Panic Disorder, Generalized Anxiety Disorder, Selective Mutism, Separation Anxiety Disorder, Social Anxiety Disorder (Social Phobia), Health Anxiety Disorder, Specific Phobia and others. AD have the highest prevalence of all mental disorders and imply a high level of social and individual

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disease burden (Jacobi et al., 2014). The prevalence of anxiety disorders reaches a level of 3.6% according to the World Health Organization (WHO, 2017). From 1990 till 2019 the incidence of AD increased by 47% reaching a level of 45.82 million people globally (Xiong et al., 2022). From 2018 to 2019 there were 0.6 million new AD diagnosed and the number of disability-adjusted life-years has increased by 0.3 million globally (GBD, 2019).

There are numerous evidence-based treatments that have been proven to be effective in treating different types of AD. These treatments include different types of psychotherapy, pharmacological or complementary and alternative medicine treatments (Azab et al., 2022). After the synthetization of the first drugs of the benzodiazepine class (Sternbach, 1979), this type of active substance is frequently used by doctors to treat AD. Alongside benzodiazepine-based treatments, we can also mention SSRIs (Selective serotonin reuptake inhibitors), SNRIs (Serotonin and norepinephrine reuptake inhibitors) and other classes of pharmacotherapy, but the studies showed that these substances have numerous adverse effects (Bandelow et al., 2017). Unlike medication, the psychotherapeutically approaches (e.g. cognitive-behavioral therapy, integrative or psychodynamic therapy) are also efficient and are free of adverse effects (Mangolini et al., 2019). Recently a large number of studies have investigated the efficacy of internet delivered therapies but there is no evidence that they are as effective as face to face delivered therapies (Bandelow et al., 2017). Complementary and alternative medicine treatments (e.g., aromatherapy, acupuncture, and herbal medicine) recently have gained a lot of popularity because of the alleged harmlessness despite of lack of evidence of their effectiveness (Mangolini et al.,2019).

Although CBT and pharmacological treatments are successful in treating AD (Carpenter et al., 2018) there are numerous studies that concluded that most individuals do not seek help (Hoffman et al., 2008). A study made on the German population showed that anxiety can be very impairing, having one of the most elevated numbers of disability days. Only 43% of people who suffer from AD receive treatment (Jacobi et al., 2014). AD is shown to be according to the Global Burden of Disease Study (GBD, 2019) AD is the second mental health related cause of years lived with disability (Xiong et al., 2022). It is shown that AD has an early life onset, having an intermittent and recurring course (Kessler et al., 2009).

The most used framework for describing help-seeking and help beliefs is The Health Belief Model developed by Rosenstock in 1966. This theoretical model explains how certain barriers can impact help-seeking behaviors (Rosenstock, 1974). The conceptualization of help-seeking as a tree stage process was developed by Broadhurst in 2003 and includes: a) problem definition and identification; b) the decision to seek help; and c) actively seeking help (Broadhurst et al., 2003). Regarding the poor accessibility of help-seeking for AD the following reasons are perceived the most used explanations for why people do not access professional help, such as: wanting to deal with the problem alone, perceived ineffectiveness, could not afford professional help (Langley et al., 2018; Heining et al., 2021).

Help-seeking behaviors are associated with sociodemographic factors (age, gender, income, etc.), with factors that enable help-seeking behavior such as literacy (knowledge of mental health) and need factors such as severity of the disorder, comorbidity with other disease, or the level of functional impairment of the individual (Goodwin et al., 2002).

Barriers describe factors that can occur in the help-seeking process (Coles et al., 2010). There can be perceived barriers (i.e., obstacles that people encounter in the help-seeking process) and unperceived barriers (i.e., people that do not seek help do not perceive any barriers). The most common perceived barriers encountered by the ones that seek help are the lack of knowledge about mental disorders, lack of money, stigma, and belief that they can manage the problem on its own (Coles et al., 2010).

Objectives

However, it is unclear what drives people who suffer from AD to a help-seeking behavior and what are the factors that influence this behavior. The aim of the study is to conduct a systematic review of the studies that have investigated help-seeking behaviors in AD and find what drives people into a help-seeking behavior and what are the characteristics of the ones that seek help.

This systematic review was conducted to identify the current gaps in research regarding help-seeking behaviors in AD and to chart the current knowledge in this field.

Methods

Eligibility criteria

The protocol used for the current systematic review is the one elaborated by Preferred Reporting Items for Systematic Reviews and Meta-analysis Protocols – Scoping Reviews (PRISMA-ScR). The PRISMA-ScR protocol has been revised by the researchers to be adapted to the current study.

This systematic review included papers that collected data on adults seeking help for AD (i. e. emergency room (ER), family doctors, psychologists, psychiatrists, etc.) needed to focus on young-adults, adults or elderly. We included papers written in English. There was not a specific time frame selected, so all papers that were written on this subject were included. Papers were excluded if there was no analysis on AD groups, so papers needed to report data separately for AD, also we excluded papers that did not focus on help-seeking or treatment preferences for people diagnosed with AD. Another exclusion criterion was if people were already included

in any treatment form at the time the studies were conducted. Quantitative and qualitative papers were considered eligible.

Search

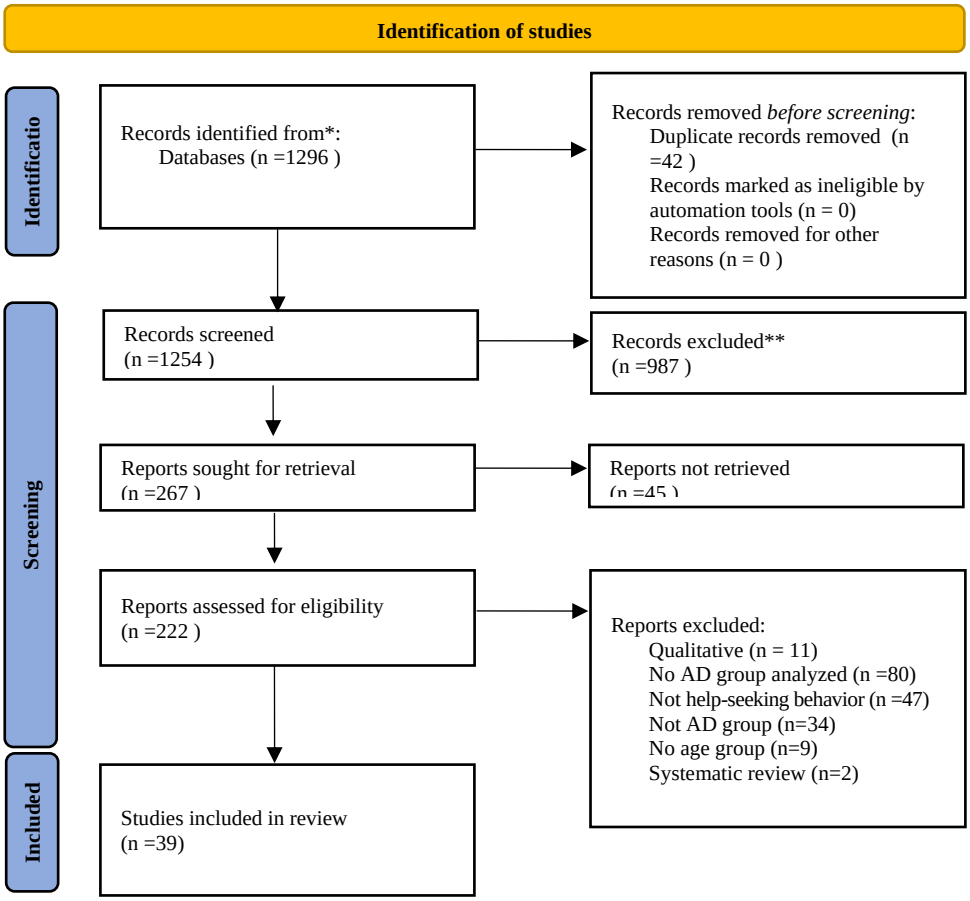
For the identification of potentially relevant documents, we searched the National University of Singapore Library database website (https://nus.summon.serialssolutions.com/). The search was conducted in March and April 2023. The search strategy was refined by the two authors of the current review. After the search was complete, the relevant articles were exported into Microsoft Word, and the duplicates were removed.

After extensive drafting and discussion, the authors developed and implemented the strategy. The gray literature was not included. The authors screened 15 publications and used the keywords found in the help-seeking literature to refine a search strategy. The search strategy was then applied in NUS Library database and the authors evaluated the titles, abstracts, and full text articles for relevant publications according to the eligibility criteria. Disagreements on publication selection were resolved by discussion and consensus.

The following keywords were searched on NUS Library (https://tinyurl.com/23hbbx97): "anxiety disorder*" OR "panic attack*"AND "treatment seek*" OR "treatment-seek*" OR "continuity of care" OR "health behave*" OR "treatment barrier*" OR "help seek*" OR "help-seek*" OR "helpseek*" OR "mental health service*" OR "treatment util*" OR "treatment use" OR "service use" OR "perceived need" OR "service util*" OR "primary care "AND "beliefs" OR "concerns" OR "intention*" OR "preference*" OR "need for treat*".

Selection of sources of evidence

The NUS Library Database search provided a total of 1296 articles from which 42 duplicates were removed, leaving a total of 1254 articles for abstract screening. After the abstract screening process, 987 articles were removed. Out of the total of 267 articles left for further screening 45 articles were not retrieved. A total of 222 articles were left for full text article screening. We discarded 183 articles for the following reasons a) 11 articles removed because they were qualitative studies, b) 80 articles were removed because they had no separate analysis on AD group, c) 47 were removed because they did not analyze help-seeking behavior, d) 34 did not have any separate AD group, e) 9 articles did not respect the eligibility criteria regarding the age of the participants they screened, and f) 2 articles were systematic reviews. After the final screening we found a total of 39 eligible articles that respected all the required eligibility criteria. **Figure 1.** is showing an overview of the study selection process.



*National University of Singapore Library Database
** Records were excluded after the abstracts of the studies were screened.

Figure 1. PRISMA flowchart of study selection process

Data charting process

To determine which variables can be extracted from the publications a data-charting form was developed by the authors. The data-charting process was done, then, independently by each author. The results of each independent search were discussed and combined, while the data charting was updated on a regular basis.

The data extracted from the articles was the following: demographic data (race, ethnicity, gender, income, etc.), type of care they prefer (emergency room - ER, psychiatrist, psychologist, etc.) barriers and facilitators to engagement (barriers, mental health literacy, attitudes, type of treatment preferred).

Synthesis of results

The studies were grouped by the objective of the study and then summarized by the type of data the studies collected. We have used other systematic reviews found to compare the articles indicated by it and our findings. The studies that met our inclusion criteria from other systematic reviews were also included in our current systematic review.

Results

As seen in **Table 1**., most studies in help-seeking literature focused on anxiety in general and not a specific type of anxiety (AD 23 studies vs GAD 15 studies). Also, there was only one study that compared two countries (Canada vs Australia regarding type of service use in AD). Regarding the aboriginal vs ethnic groups, only 4 studies focus on ethnic groups. Most studies were conducted on US, Canadian, or Australian populations. There are 23 studies that focused on the type of service used by AD population, and few studies focused on barriers of treatment, perceived need or factors that influence help-seeking behaviors in AD population.

The information from **Table 1** was then used for a descriptive analysis of the studies. Data was summarized by one or more of the following subjects: 1) type of service used; 2) help-seeking factors and perceived barriers.

Data was extracted, summarized, and tabulated by one of the reviewers. We did not use a standard data extraction form, because of the variety of study designs encountered.

Table 1. Characteristics of the sample of studies

Study Caracteristics		*Total*	*Studies Reference*
Country	USA	16	Bystrisky et al. (2012); Calleo et al. (2009); Choi et al. (2014); Harman et al. (2002); Hazlett-Stevens et al. (2002); Mannes et al. (2019); Mays et al. (2018); Olfson et al. (2000); Onoye et al. (2013); Porensky et al. (2009); Rollman et al. (2005); Salsberry et al. (2005); Samander et al. (2022); Siegel et al. (2013); Wagner et al.(2005); Wang et al. (2000).
	Canada	9	El Gabalawy et al. (2016); Gentil et al. (2021); Ladouceur et al. (2005); Mackenzie et al. (2012); Roberge et al. (2011); Roberge et al. (2014); Roberge et al. (2015); Scott et al. (2010); Tempier et al. (2009).
	Australia	6	Griffiths et al. (2017); Ho et al. (2008); Issakidis et al. (2002); Langley et al. (2018); Park et al. (2019); Tempier et al. (2009).
	Finland	2	Honkonen et al. (2007); Kujanpaa et al. (2016).

Study Caracteristics		*Total*	*Studies Reference*
	France	1	Dauriac- Le Masson et al. (2020).
	Denmark	1	Fink et al. (2010).
	Germany	1	Heining et al. (2021).
	Spain	1	Herrera-Mercadal et al. (2015)
	South Korea	1	Joo et al. (2023).
	Thailand	1	Pengpid et al. (2020).
	South Africa	1	Seedat et al. (2009).
	2000	2	Olfson et al. (2000); Wang et al. (2000).
	2002	3	Harman et al. (2002); Hazlett-Stevens et al. (2002); Issakidis et al. (2002).
	2005	4	Ladouceur et al. (2005); Rollman et al. (2005); Salsberry et al. (2005); Wagner et al. (2005).
	2007	1	Honkonen et al.(2007).
	2008	1	Ho et al. (2008).
	2009	4	Calleo et al. (2009); Porensky et al. (2009); Seedat et al. (2009); Tempier et al. (2009).
	2010	2	Fink et al. (2010); Scott et al. (2010).
	2011	1	Roberge et al. (2011).
	2012	2	Bystrisky et al. (2012); Mackenzie et al. (2012).
Year	2013	2	Onoye et al. (2013); Siegel et al.(2013).
	2014	2	Choi et al. (2014); Roberge et al. (2014).
	2015	3	El Gabalawy et al. (2015); Herrera-Mercadal et al. (2015); Roberge et al. (2015).
	2016	1	Kujanpaa et al. (2016).
	2017	2	Griffiths et al. (2017); Langley et al. (2018).
	2018	1	Mays et al. (2018).
	2019	2	Mannes et al. (2019); Park et al. (2019).
	2020	2	Dauriac- Le Masson et al. (2020); Pengpid et al. (2020).
	2021	2	Gentil et al. (2021); Heining et al. (2022).
	2022	1	Samander et al. (2022).
	2023	1	Joo et al. (2023).
Target Population	Ethnics	4	Ho et al. (2008); Mays et al. (2018); Samander et al. (2022); Siegel et al. (2013).
Disease of Interest	Non Specified Anxiety Disorder	23	Choi et al. (2014); Dauriac-Le Masson et al. (2020); El Gabalawy et al. (2015); Gentil et al. (2021); Harman et al. (2022); Heining et al. (2022); Ho et al. (2008); Honkonen et al. (2007); Issakidis et al. (2002); Joo et al.(2023); Langley et al. (2018); Mackenzie et al. (2012); Mays et al. (2018); Onoye et al. (2013); Pengpid et al. (2020); Roberge et al. (2011); Roberge et al. (2014); Salsberry et al. (2005);

Study Caracteristics		*Total*	*Studies Reference*
Objective of the Study	General Anxiety Disorder	15	Samander et al. (2022); Scott et al. (2010); Seedat et al. (2009); Siegel et al. (2013); Tempier et al. (2009). Bystrisky et al. (2012); Calleo et al. (2009); Heining et al. (2021); Herrera-Mercadal et al. (2015); Kujanpaa et al. (2016); Ladouceur et al. (2005); Mackenzie et al. (2012); Mannes et al. (2019); Mays et al. (2018); Porensky et al. (2009); Roberge et al. (2014); Roberge et al. (2015); Rollman et al. (2005); Wagner et al. (2005); Wang et al. (2000).
	Health Anxiety	1	Fink et al. (2010).
	Social Anxiety	9	Bystrisky et al. (2012); Griffiths et al. (2017); Heining et al. (2021); Mackenzie et al. (2012); Mays et al. (2018); Olfson et al. (2000); Park et al. (2019); Roberge et al. (2014); Wagner et al. (2005).
	Panic Disorder	9	Bystrisky et al. (2012); Hazlett-Stevens et al. (2002); Heining et al. (2021); Mackenzie et al. (2012); Mays et al. (2018); Roberge et al. (2014); Rollman et al. (2005); Wagner et al. (2005); Wang et al. (2000).
	Agoraphobia	2	Heining et al. (2021); Mays et al. (2018).
	Complementary and Alternative Medicine	2	Bystrisky et al. (2012); Pengpid et al. (2020).
	Type of Service Use	23	Calleo et al. (2009); Choi et al. (2014); Dauriac- Le Masson et al. (2020); El Gabalawy et al. (2016); Fink et al. (2010); Harman et al. (2002); Hazlett-Stevens et al. (2002); Heining et al. (2021); Issakidis et al. (2002); Kujanpaa et al. (2016); Mannes et al. (2019); Park et al. (2019); Porensky et al. (2009); Roberge et al. (2011); Roberge et al. (2014); Roberge et al. (2015); Rollman et al. (2005); Salsberry et al. (2005); Samander et al. (2022); Seedat et al. (2009); Siegel et al. (2013); Tempier et al. (2009); Wang et al. (2000).
	Recurring Use	3	Gentil et al. (2021); Ladouceur et al. (2005); Onoye et al. (2013).
	Help-seeking Factors	6	Griffiths et al. (2017); Herrera-Mercadal et al. (2015); Ho et al. (2008); Honkonen et al. (2007); Olfson et al. (2000); Wagner et al. (2005).
	Barriers	4	Heining et al. (2021); Ho et al. (2008); Langley et al. (2018); Olfson et al. (2000).
	Covid-19 Influence	1	Joo et al. (2023).
	Non Specified Type of Service Used	3	Mackenzie et al. (2012); Mays et al. (2018); Scott et al. (2010).

Type of service preference

Twenty-three studies focused on finding out what type of service is preferred by individuals that are diagnosed with any type of AD. Researchers reported that between 10.8% (as reported by Issakidis et al., 2002) and 87.4% (as reported by Olfson et al., 2000) of people prefer going to ER or General Practitioner (GP), and between 6.8% (Roberge et al., 2011) and 21% (Wagner et al., 2000) prefer going to a Mental Health Professional (MH).

There are a significant number of studies that analyzed treatment preference. From the AD diagnosed people that seek help, the majority prefer medicine as a treatment for their AD, percents varying between 36.9 % (Issakidis et al., 2002) and 21% (Wang et al., 2000). This difference might be explained by the origin of study population Australia respectively USA. Psychotherapy as a preferred treatment for AD was indicated by a percentage between 11% and 16.7% of the respondents (Heining et al., 2021; Roberge et al., 2014; Samander et al., 2022).

Two studies made on USA born people reported that the percentage of people accessing ER depends greatly on the type of AD studied. 41% respectively 56.3% of people diagnosed with general anxiety disorder visited the ER, whereas the percentage of people diagnosed with panic disorder that visited ER is 32% respectively 34.1% (Rollman et al., 2005; Wang et al., 2000).

Regarding the use of complementary and alternative medicine, we only found 2 studies. One study focused on monk healers in Thailand, showing that people attending monk healers have a higher prevalence of common mental illness then primary health care centers, 31.1% vs 22.3% (Pengpid et al., 2020). The prevalence of GAD diagnosis amongst people attending monk healers was 8.1% whereas GAD diagnosed people that attended primary care health center was 3.5% (Pengpid et al., 2020).

The other study regarding complementary and alternative medicine focused on the use of herbal medicine, acupuncture, massage, and other forms of complementary and alternative medicine. Patients with GAD have a higher use of this type of service, as compared to patients with other diagnostics, (i.e., 33.5% vs 26.6% - Bystrisky et al., 2012).

Help-seeking factors and barriers

Seven studies focused on factors and barriers that influence help-seeking decisions. There are four studies that focused on barriers of help-seeking behavior and how they influence the help-seeking decision (Ho et al., 2008; Heining et al., 2021; Langley et al., 2018; Olfson et al., 2000). Literacy (i.e., knowledge about mental health) was associated with help-seeking behaviors. The lack of literacy explained between 39% and 43% of seeking help variance (Olfson et al., 2000; Ho et al., 2008). Also, lack of money, or the idea of expensiveness of service, has been found by several studies as a barrier for treatment seeking. The percentage that

affects people varies between 24.5 % (as reported by Olfson et al., 2000) and 51.9% (as reportet by Langley et al., 2018). Trying to solve the AD on their own and perceived stigma are also barriers mentioned for not seeking help, with the percentage variating between 15.2% and 49.40% (Olfson et al., 2000; Langley et al., 2018; Heining et al., 2021; Ho et al., 2008) respectively 6.7% and 31.3% (Olfson et al., 2000; Langley et al., 2018; Heining et al., 2021).

A study made in Finland (Hohnkonen et al., 2007) investigated the differences between employed, unemployed and economically inactive people (students, housewives, persons on disability pension and other). Reports show that people access a form of treatment in a percentage of 30.6% for the employed respectively 33.5% for the economically inactive, whereas the percentage of people that are unemployed and that access treatment is significantly greater reaching 48% (Hohnkonen et al., 2007).

Regarding an online based intervention for anxiety, the most common barriers for not seeking help were the lack of internet access 12.13%, already taking medical treatment 5.24% and that they have seen a psychotherapist for the problem in the last 12 months 2.29% (Herrera-Mercadal et al., 2015). Another barrier worth mentioning is the perceived inefficiency of treatment which influences 8.7% of the population (Heining et al., 2021).

Covid-19 pandemics influenced the help-seeking behavior, as shown in a South Korean nationwide health insurance study. The number of patients hospitalized and admitted in psychiatric hospitals decreased after the Covid-19 pandemic started until March 2020. From April until July 2020 the numbers of psychiatric inpatients and admission started to increase. During the Covid-19 pandemics monthly AD diagnosed inpatients reached a level of 18.6%, psychiatric admissions 23%. However, the monthly AD outpatients remained relatively constant, around 5.9% (Joo et al., 2023).

Regarding the factors that help decision making and seeking help for AD diagnosis, a study made on Chinese ethnics in Australia has found that literacy (recognizing anxiety as a mental health problem) influenced 39.1% of the population into seeking help. Also, it is worth mentioning finding someone that speaks the same language 21.7%, symptoms get too severe to handle on one's own 19.6%, found out were to seek help 8.7%, others encouraged help-seeking process 6.5% (Ho et al., 2008).

We found only one study that focused on how a program of psychoeducation can influence help-seeking factors for people suffering from Social Anxiety Disorder from the perspective of literacy, stigma, and attitudes towards help-seeking. People that went to psychoeducation show grater help-seeking knowledge than the control group 10.5% respectively 8.7% regarding mental health literacy, 22 % respectively 19.5% regarding perceived stigma about mental health anxiety diagnostic and 6.4% respectively 5.5% regarding attitudes towards help-seeking (Griffiths et al., 2017).

Regarding ethnic populations, the studies in this field show that the percentage of USA born blacks (Africans and Caribbean) tend to use more frequent

mental health services than foreign born blacks (African and Caribbean). The lifetime prevalence of help-seeking for black USA born population diagnosed with AD differs 4.0% of African black, 12.5% of Caribbean black, whereas, for foreign born black population the percentage is around 15%. There are significant variations in mental health use by black men. USA born Caribbean black man tend to have a greater prevalence of lifetime use of health services than African black men (Mays et al., 2018).

Discussion

Our study aimed to explore what are the preference of treatment for AD and what are the known barriers and facilitators of the help-seeking process, for people that had not been diagnosed before with AD. Most studies that were screened for this study did not focus on AD, but on anxiety and depression or on other disorders in which anxiety was considered a comorbidity.

We identified a total of 39 studies addressing help-seeking behaviors in AD that were published between 2000 and 2023. Most studies focused on the type of service used in AD, leaving a paucity of studies about factors of influence of the help-seeking behavior such as literacy, barriers, perceived need, and others as seen in **Table 1**.

Although the type of service preferred by people is very important in understanding help-seeking behavior, this information only covers a part of the help-seeking domain. Numerous studies concluded that most individuals do not seek help (Hoffman et al., 2008). Also, this study reveals that most of the studies do not separate AD from depression although they are separate in the way they affect a person or how these psychological disorders manifest.

There are several factors that greatly influence the results of the studies presented, of these it is worth mentioning differences between sample size. Some of the studies were national level epidemiological studies and others were having as study sample limited population. So, the sample size was between 74.000 and 49 people. Another factor worth considering was the diversity of countries that done research in the help-seeking behavior domain, so ethnicity could influence the results. Also, we can mention the number of factors that studies were measuring, some of them had a larger diversity of factors explaining help-seeking behaviors than others, or the paucity of studies done per year.

As shown in the 3rd chapter, Results, the studies are very different regarding the research objectives. Most studies focus on the type of service preferred by AD diagnosed patients and few of them focus on barriers and facilitators for the help-seeking process. Only one study focused on methods to influence these, and although a psychoeducation program increases mental health literacy, attitudes toward help-

seeking and decreasing stigma, there has not been demonstrated a significant increase in help-seeking intentions (Griffiths et al., 2017).

There are few studies that consider categorizing AD by specific diagnosis. As seen in two studies that compared ER visits amongst people diagnosed with GAD and PD. People diagnosed with GAD tend to have more visits to the ER than PD diagnosed people (Rollman et al., 2005; Wang et al., 2000).

Regarding the ethnicity of the samples, we can observe that most of the studies were conducted in USA, Australia and Canada, so we cannot extrapolate the behavior regarding help-seeking or type of service used worldwide, because factors such as literacy, amount of money and stigma, that are the most influencing regarding decision making into seeking or not seeking help vary from country to country. Also, the paucity of studies done on ethnical populations leaving in a certain country (3 studies on ethnic population living in the USA and 1 in Australia) cannot predict the help-seeking behaviors of other ethnicity, as shown in the studies done on different ethnic groups leaving in the same country, the USA, there are significant differences between Caribbean black and African black, or Latin population regarding type of service used. Studies showed that the percentage of utilization of mental health services is lower for ethnic groups than general population (Mays et al., 2018; Samander et al., 2022; and Siegel et al., 2013). Also, the place of birth for ethnic populations influences the mental health service utilization. African black and Caribbean black born and raised in the USA have a greater percentage of service utilization than foreign born populations (Mays et al., 2018). However, none of the above-mentioned studies focused on barriers or factors influencing the help-seeking process.

Service use for AD diagnosed people was most likely for middle aged adults and unlikely for older adults, except PD. Regarding sex differences, women were favored for help-seeking more than man, showing a small variability with age. Comorbidity with other diseases increases health service utilization (Mackenzie et al., 2012).

Limitations

This systematic review has some limitations. Not all research papers were free for access, so some full text articles were not found. Some of the relevant papers might have been omitted by the two reviewers. The review did not have a specific time frame so, diagnostics were based on the DSM V criteria, that have changed over time, from DSM III to DSM V. Also, another limitation could be that grey literature was excluded and that the search language of the articles was English. Also, most studies were made on American, Canadian, and Australian populations, leaving a paucity of information regarding other countries and the influence of different ethnicity over the studied results.

Future research directions

We can observe some patterns in patients help-seeking habits and beliefs regarding AD. There can be seen many factors that play an important role in determining the uniqueness of everyone regarding his or her needs. This review focused on young adults, adults, and elderly populations. Nevertheless, the youth population should not be excluded as research on their help-seeking habits and beliefs is much needed. Also, cultural background can strongly influence the help-seeking behavior and beliefs, so multicultural investigations are needed.

As seen in this study there are numerous factors and beliefs that influence the help-seeking behavior regarding AD, such as literacy, stigma, cost of treatment and other, however, what is needed to optimize the service utilization is unclear yet. These are important, and to be further researched so that mental health care providers can provide help adapted to patients' needs.

Conclusions

Regarding all the information that has been presented, we need to understand and discover more factors that influence help-seeking behavior so that programs regarding help-seeking can be implemented and more people can seek help for AD. Also, there are a large number of studies that do not separate AD from depression regarding help-seeking studies, and it can be of utmost importance to have this delimitation because they are two separate diseases and the way they manifest or influence the behavior of people is different.

Authors' note

Declarations: Portions of the findings were presented as a poster at the EABCT 2023 Annual Congress.

Conflict of interest: None.

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DO ADOLESCENTS REALLY RECOVER FROM ANOREXIA? OR THE LACK OF STANDARDISED DEFINITION MAY MASK THEIR PROCESS?: A SYSTEMATIC REVIEW

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Abstract

Anorexia Nervosa (AN) is an eating disorder that causes physical, behavioural and psychological deterioration. Although diagnostic criteria are clearly defined, there has been no consensus on what recovery is. This study aimed to review prior studies indicating recovery criteria, as well as recovery rates of patients with adolescent-onset AN.

Related studies were searched through databases MEDLINE, PsycINFO and CINAHL. A total of 15 English studies with patients had adolescent-onset and DSM-5/ICD-11 diagnoses. A systematic review was conducted by following the PRISMA expanded checklist and qualities of eligible articles were evaluated via the Quality Criteria Checklist (QCC).

Of the 15 studies, two studies mentioned only physical dimension of recovery, whereas rest of the 13 studies covered behavioural and psychological dimensions. EDE-Q was found as the most frequently used scale. Follow-up years of the patients fluctuated from one to 30 years, and the recovery rate varied from 30.6% to 72%.

There are some difficulties faced in defining recovered patients. Since no consensus was achieved, every researcher set their recovery criteria. Until the policymakers of field standardize definition of recovery from AN, researchers should be aware of the fact that inconsistencies in definition can affect results of their research.

Keywords: eating disorders, anorexia nervosa, adolescents, recovery, outcome.

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Anorexia nervosa (AN) is an eating disorder (ED) characterized by deterioration in eating and eating-related thoughts and behaviours, which leads to physical (i.e. cardiovascular, dermatologic, endocrine, gastrointestinal) and psychological (i.e. depression, insomnia, irritability, impaired concentration) complications, the extent and severity of which patients are mostly unaware of (Moore & Bokor, 2023). Follow-up studies define multiple outcomes with different prevalence for adolescents with AN, consisting of persistence of AN, meeting diagnostic criteria for any other EDs or psychiatric condition, (partial or full) remission, (partial or full) recovery, relapse or death (Andrés-Pepiñá et al., 2020; Dobrescu et al. 2020; Graell et al., 2018; Steinhausen, 2002). Defining remission is more straightforward when it is compared to recovery since the DSM-5 suggested a definition of it. When the patients restore their weight but bear the trace of other behavioural and psychological sufferings, they are accepted as in partial remission. In addition, when none of the diagnostic criteria is met, it is called a full remission (American Psychiatric Association & Association, 2013). If the absence of diagnostic criteria is a remission, what is recovery? There is a longstanding lack of consensus on the definition of recovery which leads to a lack of harmonization in clinical practice and research studies (Bardone-Cone et al., 2018; Khalsa et al., 2017; Lock et al., 2013). Although Lock et al. (2013) indicated that the definition of recovery might be related to the aim of the treatment and the studies, clinicians require a standardised definition to understand the end goals of the interventions, answer patients' and carers' questions and provide hope for the sufferers that think recovery is impossible (Bardone-Cone et al., 2010; Bardone-Cone et al., 2018; Lock et al., 2013; Morgan & Hayward, 1988)

There are two types of studies conducted as follows 1) quantitative studies and 2) qualitative to define recovery, and it is suggested to perceive them as a bridge for each other instead of separate approaches (Bardone-Cone et al., 2018). Quantitative studies follow two empirical methodologies to validate the definition of recovery (Bardone-Cone et al., 2018) whereas qualitative studies investigate patients' and their relatives' perspectives (Bachner-Melman et al., 2018; Bardone-Cone et al., 2018; de Vos et al., 2017). As a first methodology for quantitative studies, the researcher compares disordered eating psychopathologies (i.e. body image, food, eating or shape/weight obsessions, thin idealization) among the groups, consisting of the ones that fit the recovery criteria proposed by that study, the ones with current EDs and the ones without EDs. At the end of the comparisons, if the recovered patients present significantly better scores than patients with ED and do not differ from participants without ED, these results are accepted as evidence to validate the definition of recovery (Bachner-Melman et al., 2006; Bardone-Cone et al., 2010; Bardone-Cone et al., 2018). The second used way to test validity is to compare relapse rates of AN by using longitudinal studies. In this methodology, the recovery criteria that give low relapse rates are accepted as a useful and meaningful

definition for recovery (Bardone-Cone et al., 2010; Kordy et al., 2002). The earliest studies in this field associated recovery with a lack of physical (i.e. low BMI and disrupted menses) (Morgan & Russell, 1975) and behavioural (dietary restriction, compensatory behaviours, binge eating) symptomology; however, recent studies agreed on the necessity of psychological and cognitive evaluations to define recovery (Bardone-Cone et al., 2010; Bardone-Cone et al., 2018; Couturier & Lock, 2006; Khalsa et al., 2017). Although weight gain is a critical factor in improving ED pathology (Couturier & Lock, 2006; Lock et al., 2013) and earlier weight restoration decreases eating-related concerns and restrictive dietary patterns significantly, gaining weight alone remained incapable of improving weight and shape-related concerns (Accurso et al., 2014).

Recently, Khalsa et al. (2017) proposed a definition for both full and partial recovery from EDs; however, the importance of including support from higher authorities (i.e. Academy for Eating Disorders, Eating Disorder Research Society, National Eating Disorders Association etc.) was emphasized in their study. In the annual meeting of the International Eating Disorder Research Society (EDRS) (2018), the need for a standardised definition of recovery was discussed and participants agreed on the importance of a specific definition for recovering from EDs that combines the absence of diagnostic criteria and functional recovery across multiple domains such as psychological, emotional and social ones for over 12 months. In addition, they suggested further studies to investigate commonly used definitions and gain a better understanding of the differences in psychometrically and self-assessed acceptance of recovery (Wade & Lock, 2020).

Since there is no consensus on the definition of recovery from EDs (therefore AN), this study aims to examine which criteria have been used by researchers to accept adolescents with AN as recovered and present how recovery rates have fluctuated. In addition to previous reviews (Bardone-Cone et al., 2018; Khalsa et al., 2017), this study aims to decrease heterogeneity/differences in participant characteristics by focusing on adolescence age-onset AN, based on DSM-5/ ICD-11 diagnosis.

Methodology

The PRISMA 2020 expanded checklist was followed while conducting this systematic review (Page et al., 2021).

Search Strategy

To establish relevant studies, two different platforms and three databases were searched: MEDLINE (Ovid), PsycINFO (Ovid), and CINAHL (EBSCOhost)

from the beginning of November to the 28th of June (2022). The terms: “recover*”, “anorexia*” and “adolescen*” were utilized for both free-text and subheading searching, and the asterisk (*) was used to cover multiple suffixes of the terms. The detailed table for the search strategy is given below.

Table 1. The detailed search strategy

Ovid MEDLINE(R) ALL			**Ovid APA PsycInfo**			**EBSCOhost CINAHL**		
1	adolescen*.tw.	321982	1	adolescen*.tw.	283485	**S1**	(MH”Adolescence”)	583,497
2	young people.tw	34171	2	young person*.tw.	2993	**S2**	TI (adolescen* or teen* or youth* or "young person*" or "young people*") OR AB (adolescen* or teen* or youth* or "young person*" or "young people*")	223,677
3	young person.tw	1244	3	young people.tw.	33169	**S3**	TI anorexia* OR AB anorexia*	8,865
4	teen*.tw.	33430	4	teen*.tw.	24909	**S4**	(MH "Anorexia Nervosa") OR (MH "Anorexia")	7,144
5	youth*.tw.	88771	5	youth*.tw.	116166	**S5**	TI recover* OR AB recover*	118,467
6	adolescent/ or child/	3058135	6	early adolescence/	2585	**S6**	(MH "Recovery")	37,181
7	1 or 2 or 3 or 4 or 5 or 6	3156609	7	1 or 2 or 3 or 4 or 5 or 6	376442	**S7**	S1 OR S2	645,069
8	anorexia*.tw.	32477	8	anorexia*.tw.	17103	**S8**	S3 OR S4	10,693
9	Anorexia Nervosa/ or Anorexia/	19214	9	anorexia nervosa/	11997	**S9**	S5 OR S6	135,370
10	recover*.tw.	754946	10	8 or 9	17657	**S10**	S7 AND S8 AND S9	286
11	7 and 9 and 10	683	11	recover*.tw.	92717			
			12	7 and 10 and 11	361			

2.2. Inclusion and Exclusion Criteria

After the studies were identified from databases, all studies were added to EndNote 20 (version 20.3.0.177.87.) software to delete duplicated ones and scan titles and abstracts to determine eligibility. In addition, the full texts of the articles that could not be eliminated by looking at the title and abstract went through further examination for conformity. Table 2 summarizes the inclusion and exclusion criteria followed during this review.

Table 2. Inclusion and Exclusion Criteria

INCLUSION CRITERIA	EXCLUSION CRITERIA
- **Participants** Studies in which AN-onset is based on adolescence term* and AN was diagnosed according to DSM-V and/or ICD-11 Both genders (male/ female) Studies with mixed ED patients	- **Participants** Studies in which the diagnosis of AN is not formal (i.e. clinician subjective thoughts) or based on previous DSM (DSM-IV, DSM-III) or ICD (ICD-10) forms Studies with a lack of information related to the age of AN-onset Animal studies
- **Study** Journal Articles that give criteria of recovery **with quantitative methodologies****	- **Study** Journal Articles that define recovery by using only qualitative methodologies (i.e. patients' and/or parents' perspectives), reviews (both literature and systematic), books and dissertations The studies used the term of "weight-recovery/recovered" or "menstrual recovery" instead recovered/recovery***
Date: Studies from 2013 to 2022****	**Date:** Studies before 2013
- **Language: English studies**	- **Language:** Non-English studies

*Adolescence age was accepted as 10-19 years (World Health Organization, 2022a). **Since receiving or not receiving therapy did not affect the definition of recovery, whether the participant group received psychotherapy or not was not evaluated while compiling the articles giving the definition. ***As it has been previously recognised that physical recovery is insufficient to ameliorate body and shape concerns, articles that use the terms of "weight-recovery/recovered" or "menstrual recovery" were excluded (Accurso et al., 2014). ****To cover more recent studies, and decrease the differences in participant characteristics, only the studies that made the diagnosis by the updated version of the manuals (DSM-V and ICD-11) were included. Since the DSM-V and ICD-11 were published in 2013 and 2019, respectively, studies before 2013 were excluded.

Data Extraction

During the data extraction process, all the relevant information regarding the eligibility criteria (i.e. who are the patients, what is the AN age-onset, how patients were diagnosed etc.) and the concept of recovery (i.e. how was it defined, when patients were followed and what was the rate of recovery) were gathered primarily and presented in Table 4.

2.4. Quality Assessment

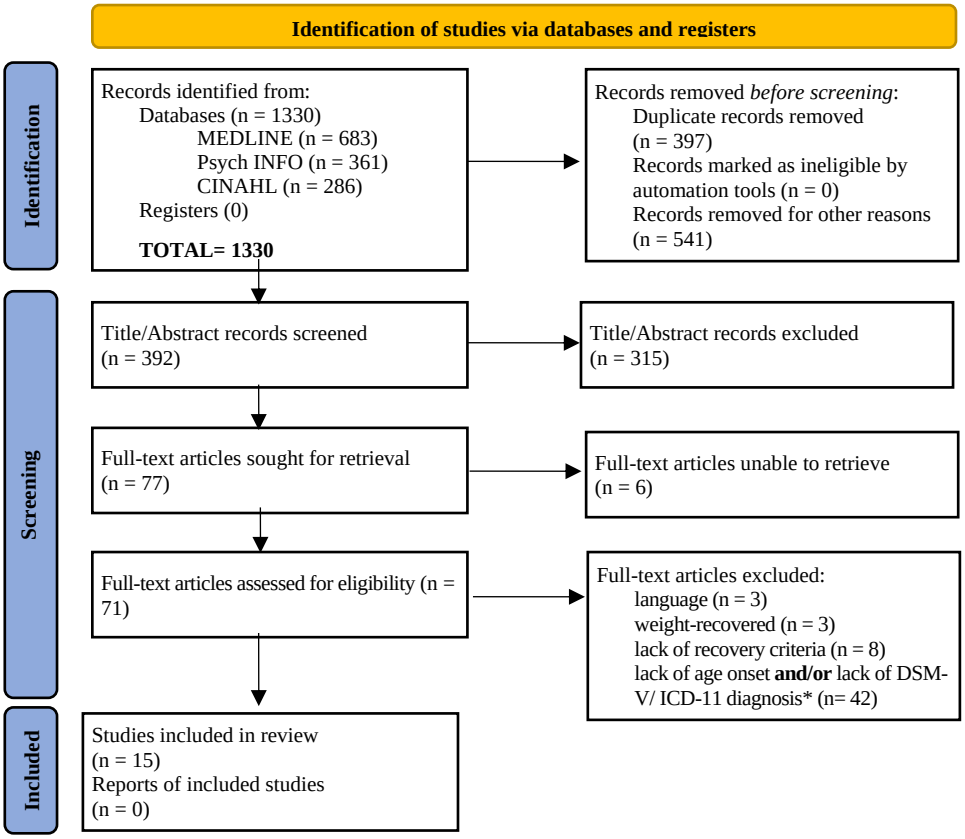
The quality assessment of each eligible article was performed by using the Quality Criteria Checklist (QCC) (Academy of Nutrition and Dietetics, 2022). In more detail, all questions within the scale have 4 options: Yes, No, Unclear and N/A. After

the first 4 relevancy questions were answered, 10 validity questions were followed for each eligible study. The articles with six or more "No" answers to validity questions were designated with a minus symbol (-). When the answers to the 2nd, 3rd, 6th and 7th questions did not indicate that the study was exceptionally strong, they were indicated as neutral (∅). Articles containing at least one "Yes" answer, in addition to the 2nd, 3rd, 6th and 7th questions, were marked with a plus symbol (+).

Results

Study Selection

15 studies were found eligible for this and the details of the screening process were presented in Figure 1.



*The number of articles caused by lack of AN age-onset and DSM-V diagnosis were not reported separately due to the existence of articles that did not meet both criteria.

Figure 1. PRISMA flow diagram of screening and inclusion of eligible studies.

Table 3. Characteristics and Key Findings of The Eligible Studies

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
Breithaupt, L., et al. (2022) **Design:** Cohort Study **Country:** **Conducted:** New England, USA **Published:** United Kingdom	**Total (n):** 82 AN-R (n): 29 Age: 19.5 ± 2.3 Illness duration: 5.6 ± 5.2 AN-BP (n): 11 Age: 21.6 (1.3) Illness duration: 9.1 ± 0.6 Atypical AN-R (n): 19 Age: 19.9 ± 3.0 Illness duration: 5.4 ± 6.5 Atypical AN-BP (n): 7 Age: 20.1 ± 1.3 Illness duration: 7.6 ± 9.1 ARFID (n): 16 Age: 15.3 ± 4.9 Illness duration: 1.3 ± 0.7 Participants were recruited through advertisements, flyers, health care providers, outpatient practices, and higher level of care programs.	**Not Specified** as years, but enough knowledge was given to affirm "adolescent-onset".	**EDE 17.0** **LIFE-EAT-3**	**Physical:** Not specified. **Behavioural and/ or Psychological:** Absent or minimal/residual symptoms and no functional impairment due to ED cognitions and/or behaviours. **Scale:** LIFE-EAT-3 PSR score of 1 or 2. **Duration:** Not specified.	2 follows up were conducted: at 9th and 10th months after baseline.	The likelihood of stable recovery was stated as varying between 0.00 and 0.36. Persistence in recovery (from 9 months to 10 months) was unlikely across all individuals: AN-R, 0.08; AN-BP, 0.00; Atypical AN-R, 0.24; Atypical AN-BP, 0.33; ARFID, 0.36.
Wentz, E., et al. (2021) **Design:** Cross-sectional study **Country:**	**Total (n):** 72 AN (n): 34 Age: 44.2 Comparison Group (n): 38	**Not Specified** as years, but indicated as attending to eight-grade	**MINI 6.0, SCID-I, DSM-V checklist** **GAF** **Morgan-Russell Scale**	**Physical:** No weight deviation. **Behavioural and/ or Psychological:** Being free of all criteria of AN, BN or BED. Not having compensatory behaviours and absence of weight phobia.	30 years (30.13 ± 1.62)	20 out of 34 AN patients recovered (58.8%).

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
Conducted: Gothenburg, Sweden **Published:** Germany	Age: 44.3 Participants were recruited from Gothenburg, Sweden cohort*.	when they diagnosed.	**SF-36**	**Scale:** Not specified. **Duration:** Minimum of 6 consecutive months. **Other:** Recovery was indicated as "full symptom recovery".		
Kerr-Gaffney, J. et al. (2021) **Design:** Cross-sectional study **Country:** **Conducted:** England, UK **Published:** England, UK	**Total (n):** 218 AN (n): 64 Age: 21.53 ± 4.15 Recovered (n): 46 Age: 22.21 ± 3.47 ASD (n): 41 Age: 20.56 ± 8.42 TD (Controls) (n): 67 Age: 21.16 ± 3.60 Participants were recruited from three pre-existing data sets – no further information provided throughout the article.	AN Group: 16.80 ± 3.62 Recovered Group: 15.56 ± 2.52 ASD and TD Groups: N/A	**ADOS-2 or AQ-10, SRS-2:** AN, REC, ASD, TD **WASI-II (or WAIS-R, WAID-III, WAIS-IV, WISC-III) or NART:** AN, REC, TD **SCID-5-RV:** AN, REC, TD **EDE-Q:** AN, REC, TD **HADS:** AN, REC, TD **BAI/BDI:** AN, REC, TD **BYI-II:** ASD	**Physical:** BMI between 18.5 and 27 kg/m2 (%IBW > 85 for participants under 18 years). **Behavioural and/ or Psychological:** Not specified. **Scale:** Not specified. **Duration:** Minimum of a year.	N/A	N/A
Castro-Fornieles, J. Et al. (2021) **Design:** Cross-sectional study **Country:** **Conducted:** Barcelona, Spain **Published:** Germany	**Total (n):** 54 ED Group (n): 11 Age: 37.3 ± 5.7 Age at first diagnosis: 14.7 ± 2.0 Recovery Group (n): 15 Age: 35.6 ± 2.5 Age at first diagnosis: 14.1 ± 1.7	ED Group: 13.5 ± 1.3 Recovered Group: 13.4 ± 1.8 Control Group: N/A	**SCID-I, DSM-V Checklist** **EDE** (Spanish version) **OBI**	**Physical:** Not specified. **Behavioural and/ or Psychological:** Not having current ED diagnosis. **Scale:** Not specified. **Duration:** Not specified.	20 (17-25) years	15 out of 26 AN patients recovered (%57.69).

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
	Control Group (n): 28 Age: 36.5 ± 3.0 Patients were recruited from the Department of Child and Adolescent Psychiatry and Psychology of the Hospital Clinic of Barcelona's records (from 1987 to 1993).					
Silen et al. (2021) **Design:** Cohort study (population based) **Country:** **Conducted:** Helsinki, Finland **Published:** New Jersey, US	**Total (n):** 145 AN (n): 46 Illness duration: 4.6 ± 3.4 BN (n): 18 Illness duration: 4.2 ± 2.9 BED (n): 6 Illness duration: 4.0 ± 2.4 OSFED (n): 33 Illness duration: 3.9 ± 2.5 UFED (n): 42 Illness duration: 3.2 ± 2.5 Any ED Illness duration: 4.0 ± 2.9 Participants were recruited from the FinnTwin12 birth cohort** (wave 4).	Any type of EDs: 16.5 ± 2.9 (Detailed information for subtypes was not provided and only 140 patients' knowledge about the age-onset of EDs was present.)	**SCID-I, DSM-V Checklist**	**Physical:** BMI ≥ 18.5 kg/m2 **Behavioural and/ or Psychological:** Participants themselves had to express that they thought they no longer suffered from an ED (both behaviourally and psychologically) to be accepted recovered. **Scale:** Not specified. **Duration:** Not specified. **Other:** Recovery was indicated as "full recovery".	4.0 ± 2.9 (0.5 - 13) years	5-year recovery rates were indicated as 40.7% from any ED, in more detail, 41.5% from AN, 23.1 % from BN, 40.0% from BED, 43.1% from OSFED, 42.6 from UFED.
Garriz, M. et al. (2021)	**Total (n):** 58 Current AN (n): 11 Age: 37.73 ± 5.75	Current ED Group: 13.18 ± 1.83	**SCID-I, DSM-V Checklist**	**Physical:** BMI > 18.5 kg/m^2 **Behavioural and/ or Psychological:** No longer meeting the criteria for an ED.	22 (17-29) years	18 out of 29 patients recovered (62.06%).

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
Design: Case Control Study **Country:** Conducted: Barcelona, Spain **Published:** Germany	Recovered AN (n): 18 Age: 35.89 ± 2.76 Control Group (n): 29 Age: 36.55 ± 2.55 Patients were recruited from the Department of Child and Adolescent Psychiatry and Psychology of the Hospital Clinic of Barcelona's records (from 1987 to 1993).	Recovered Group: 13.61± 1.24	**PDQ-4+** (Spanish version) **OBSI-R** **EDI-2**	Abstinence from bingeing, purging and fasting. **Scale:** EDE sub-scale scores all within 1 SD of healthy, age-matched population norms. **Duration:** Minimum of 3 months. **Other:** Recovery was indicated as "full recovery".		
Dobrescu, S. R. Et al. (2020) **Design:** Cohort Study **Country:** **Conducted:** Gothenburg, Sweden **Published:** England, UK	**Total (n):** 98 AN (n): 47 Age: 44.42 ± 1.84 Control (n):51 Age: 44.22 ± 1.77 Participants were recruited Gothenburg, Sweden cohort* (study 5).	14.3 (10.0 - 17.2), without considering dropouts.	**MINI 6.0., SCID-I, DSM-V Checklist** **GAF** **Morgan-Russell Scale** **SF-36**	**Physical:** Sustained absence of weight deviation. **Behavioural and/ or Psychological:** Being free of all criterion symptoms of AN, BN and BED, absence of compensatory behaviours, and deviant attitudes regarding weight and shape, including weight phobia. **Scale:** Not specified. **Duration:** Minimum of 6 months. **Other:** Recovery was indicated as "full recovery".	30 years (30.13 ± 1.62)	30 out of 47 AN patients recovered (%64).
Dinkler, L. et al. (2019) **Design:** Cross-sectional study **Country:** **Conducted:** Gothenburg, Sweden **Published:** New Jersey, USA	**Total (n):** 57 Recovered AN Group without ASD (n): 20 AGE: 44.2 ± 1.9 Recovered AN Group with ASD (n): 6 Age: 44.9 ± 2.3 Comparison Group (n): 31 Age: 44.2 ± 1.7	Recovered AN Group without ASD: 14.1 ± 1.9 Recovered AN Group with ASD Age of AN onset: 15.2 ± 1.2	**MINI 6.0, SCID-I, DSM-V Checklist** **GAF** **Morgen-Russell Scale** **SF-36** **WAIS-R** **Facial Emotional Recognition Task**	**Physical:** Sustained absence of weight deviation (BMI > 17.5 kg/m2). **Behavioural and/ or Psychological:** Being free of all criterion symptoms of AN, BN and BED, absence of compensatory behaviours, and deviant attitudes regarding weight and shape, as well as weight phobia. **Scale:** Not specified. **Duration:** Minimum of 6 months	30 years (30.13 ± 1.62)	N/A

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
	Participants were recruited from Gothenburg, Sweden cohort* (study 5).	Recovered AN Group: 14.4 ± 1.8		**Other:** Recovery was indicated as "long term recovery".		
Kurotori et al. (2019) **Design:** Cohort Study (retrospective chart review) **Country:** **Conducted:** Japan **Published:** New Zealand	**Total (n):** 92 R-AN (n): 79 Age at admission: 12.7 ± 1.4 ARFID (n): 13 Age at admission: 10.7 ± 2.5 Participant related knowledge was gathered from Jichi Children's Medical Centre, Tochigi's records between April 2007 and March 2017.	**Not specified** as years, but enough knowledge was provided to estimate.	**N/A**	**Physical:** BMI > 3rd percentile (based on the Japanese Society for Paediatric Endocrinology [JSPE] BMI-for-age growth table) **Behavioural and/ or Psychological:** Meeting the full remission criteria (restoring behavioural and eating patterns and maintaining target weight for ≥2 weeks) or none of the ARFID or R-AN criteria according to the DSM-5. **Scale:** Not specified. **Duration:** Minimum of 6 months, after which no further treatment was provided. **Other:** Recovery was indicated as "full recovery".	ARFID: 15.3 ± 9.1 months AN: 18.4 ± 15.0 months	ARFID: 10 out of 13 patients recovered (77%). AN: 34 out of 79 R-AN patients recovered (43%).
Halvorsen, I. et al. (2018) **Design:** Cross-sectional study **Country:** **Conducted:**Oslo, Norway **Published:** England, UK	AN (n): 37 Age at admission: 15.7 ± 1.9 Age at follow-up: 20.2 ± 2.6 Participants that received inpatient Family Based Treatment between May 2008 and June 2014 were recruited from the Regional Department for Eating Disorders at Oslo University Hospital.	13.2 ± 1.9	**MINI 6.0** **EDE 16** **EDE-Q** **The Clinical Impairment Assessment** **The Beck Depression Inventory** **The State and Trait Anxiety Inventory**	**Physical:** BMI ≥ 18.5 kg/m2 **Behavioural and/ or Psychological:** No episodes of binge eating or purging/other compensatory behaviour. **Scale:** EDE-Q global score ≤2.5. **Duration:** Minimum of 3 months. **Other:** Recovery was specified differently for weight and full recovery. The criteria given above emphasises "full recovery".	4.5 ± 1.8 (1.3 - 7.1) years	12 out of 37 patients recovered (36%).

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
Swenne, I. et al. (2017) **Design:** Cohort Study **Country:** **Conducted:** Uppsala, Sweden **Published:** England, UK	AN (except weight-criteria) (n): 201 Age: 15.0 ± 1.7 Duration of symptoms (months): 9.6 ± 8.7 (2-60) Participants were assessed from the Eating Disorder Unit at the Department of Child and Adolescent Psychiatry of the Uppsala University Hospital's records (from August 2010 to July 2015).	**Not specified** as years, but enough knowledge was provided to estimate.	**EDE-Q** **MADRS-S**	**Physical:** Not specified. **Behavioural and/ or Psychological:** Not fulfilling criteria for an ED at a clinical interview. **Scale:** EDE-Q score < 2.0. **Duration:** Not specified.	1 year	According to the EDE-Q, 130 (65%) patients recovered at 1 year. However, the number of recovered patients were found as 106 (53%), when clinical interviews were preferred to decide recovery status.
Mustelin, L. et al. (2016a) **Design:** Cross-sectional (prevalence) study **Country:** **Conducted:**Helsinki, Finland **Published:** England, UK	AN (n): 92 Age: 24.4 ± 0.9 Participants were recruited from the FinnTwin16 birth cohort*** (wave 4). Mean age represents all the members of wave 4 (n=2825). This studies' participants current ages weren't indicated.	17.4	**SCID-I, DSM-V Checklist** **RAPI** **Mm-MAST**	**Physical:** Restoration of weight and menstrual function (if applicable). **Behavioural and/ or Psychological:** Absence of binges and purges. **Scale:** Not specified. **Duration:** Minimum of a year. **Other:** Recovery was indicated as "clinical recovery".	5 years	72% of the patients recovered.
Mustelin, L. et al. (2016b) **Design:** Cross-sectional study (community-based) **Country:**	**Total (n):** 182 AN (n): 92 BN (n): 58 Participants were recruited from the FinnTwin16 birth cohort*** (wave 1,4, and 5).	18 Age-onset was reported at wave 1.	**SCID-I, DSM-V Checklist**	**Physical:** Restoration of weight and menstrual function (if applicable). **Behavioural and/ or Psychological:** Absence of binges and purges. **Scale:** Not specified. **Duration:** Minimum of a year.	2 follow-ups were conducted: 1. When the patients are 22-27 years	120 out of 182 women recovered (66%). (Recovered AN and BN patients were not specified.)

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
Conducted: Helsinki, Finland **Published:** New Jersey, USA	Mean age was 24.4 ± 0.9 at wave 4 and 34.8 ± 1.2 at wave 5.			**Other:** Recovery was indicated as "clinical recovery".	(approximately 6-11 years after). 2. When the patients are 31-37 years (approximately 15-21 years after).	
Talbot, A. et al. (2015) **Design:** Cross-sectional study **Country: Conducted:** Australia **Published:** USA	**Total (n):** 92 AN (n): 24 Age: 21.0 (18-27) Weight Recovered Group (n): 10 Age: 21.5 (19-25) Fully Recovered Group (n): 15 Age: 24.0 (21-32) Healthy Control Group (n): 43 Age: 19.0 (18-25) Patients were recruited from 2 university hospitals – no further information related to hospitals given.	AN Group: 16.5 (15–19) Weight-Recovered Group: 15.0 (13–16) Fully Recovered Group: 16.0 (14–17)	**EDE-Q** **RCFT** **MFFT** **NART** **DASS-21** **PI-WSUR** **FMPS** **EDQOL**	**Physical:** BMI > 18.5 kg/m^2 **Behavioural and/ or Psychological:** No longer meeting DSM-IV-TR and DSM-5 criteria for AN, not having ED-behaviours (binging, purging, restricting, and driven or compulsive exercise) **Scale:** EDE-Q within one standard deviation on all sub-scales of population norms. **Duration:** Minimum of 3 months. **Other:** Recovery was indicated as "full recovery".	N/A	15 out of 49 AN patients recovered (30.6%).
Silen, Y. et al. (2015) **Design:** Cross-sectional study	**Total (n):** 47 Admission Age: 14.6 ± 1.2 Typical AN (n): 34 Admission Age: 14.3 ± 1.0	**Not specified** as years, but enough knowledge was	**Morgan-Russell Scale**	**Physical:** Weight maintained at BMI ≥ 17.5 kg/m2 or weight within 15% IBW and regular menstrual cycles **Behavioural and/ or Psychological:** Not specified.	N/A	60% of the patients recovered.

STUDY	PARTICIPANTS	AGE of ED ONSET	MEASUREMENT TOOLS	RECOVERY CRITERIA	FOLLOW UP	RECOVERY RATE
Country: **Conducted:**Helsinki, Finland **Published:** England, UK	Atypical AN (n): 13 Admission Age: 15.2 ± 1.5 Participant related knowledge was gathered from the Helsinki University Central Hospital records (from March 2012 to April 2013). Due to the fact that the data were examined retrospectively, current ages of the patients are unknown.	provided to estimate.		**Scale:** 'Good outcome' on Morgan and Russell Scale **Duration:** Stated as 'over many consecutive months'		

AN: Anorexia Nervosa, ARFID: Avoidant and Restrictive Food Intake Disorder, ASD: Autism Spectrum Disorder, BED: Binge Eating Disorder, BN: Bulimia Nervosa, EDE: Eating Disorder Examination, EDE-Q: Eating Disorder Examination Questionnaire, IBW: Ideal Body Weight, N/A: Not Applicable, OSFED: Other Specified Feeding and Eating Disorders, TD: Typically Developing Control Group, UFED: Unspecified Feeding and Eating Disorders

*Gothenburg AN study covers patients who were born in 1970 and adjacent years, attending eighth grade at the time of the original study. All participants were examined for AN, and 51 AN cases were detected. In addition, nurses were asked to constitute a healthy control group – matching for age, sex, schooling and without AN diagnosis (n=51). Both groups were followed after 6 (study 2, mean age 21 years), 10 (study 3, mean age 24 years), and 18 (study 4, mean age 32 years) years. Study 5 was conducted after 30 years by Dobrescu et al. in 2020 when the mean age was 44 years.

**The FinnTwin12 Birth Cohort covers Finnish twins who were born in 1983 – 1987, followed at ages 12 (wave 1), 14 (wave 2), 17.5 (wave 3) and 22 (wave 4) years.

***The FinnTwin16 Birth Cohort covers Finnish twins who were born in 1975-1979 and their families, followed when the twins are 16 (wave 1), 17 (wave 2), 22-27 (wave 3) and 31-37 (wave 4) years.

Table 4. The Scrutinization of Recovery Criteria

	Breithaupt, L., et al. (2022)	Wentz, E., et al. (2021)	Kerr-Gaffney, J. et al. (2021)	Castro-Fornieles, J. Et al. (2021)	Silen et al. (2021)	Garriz, M. et al. (2021)	Dobrescu, S. R. et al. (2020)	Dinkler, L. et al. (2019)	Kurotori et al. (2019)	Halvorsen, I. et al. (2018)	Swenne, I. et al. (2017)	Mustelin, L. et al. (2016a)	Mustelin, L. et al. (2016b)	Talbot, A. et al. (2015)	Silen, Y. et al. (2015)
Physical	-	+	+	-	+	+	+	+	+	+	-	+	+	+	+
Behavioural and Psychological	+	+	-	+	+	+	+	+	+	+	+*	+	+	+	-
Scale	+	-	-	-	-	+	-	-	-	+	+	-	-	+	+
Duration	-	+	+	-	-	+	+	+	+	+	-	+	+	+	+

*****Behavioural and psychological criteria evaluation was based on patients' perspectives.

Key Findings

Recovery Criteria/ Definition

The definition of recovery was mostly given in the studies that aim to distinguish any knowledge related to recovered patients from AN compared with the healthy controls and/or currently ill patients or in the studies that follow the outcomes of AN. Recovery has been defined by physical and/or behavioural and cognitive dimensions, as summarized in Table 4. While various BMI levels were referenced for explaining the physical aspects of recovery, clinical interviews that looked at the presence of symptoms and scales related to ED behaviours and cognitions were used for the behavioural and psychological ones. In addition, although some studies stipulated that the criteria they mentioned for recovery should continue for a certain period of time, some did not.

Physical Dimension

Three of the studies did not mention the physical dimensions of the recovery (Breithaupt et al., 2022; Castro-Fornieles et al., 2021; Swenne et al., 2017) whereas two of them only set physical criteria for defining the recovery (Kerr-Gaffney et al., 2021; Silén et al., 2015). According to Kerr-Gaffney et al. (2021), recovered patients should have a BMI between 18.5 - 27 kg/m2 or %IBW more than 85% (for participants under 18 years). When it comes to Silen et al. (2015), the recovery definition was based on the good outcome from the Morgan-Russell Scale, which requires a BMI equal to or more than 17.5 kg/m2 (BMI $\geq$ 17.5 kg/m2) or weight within 15% of the ideal body weight together with the regular menstrual cycles.

In addition to Silen et al. (2015), only two studies required restoration of menses for applicable cases and physical criteria for recovery were defined as restoration of weight and menstrual function (Mustelin et al., 2016a; Mustelin et al., 2016b).

In three studies, the physical aspect of recovery was explained as a lack of weight deviation (Dinkler et al., 2019; Dobrescu et al., 2020; Wentz et al., 2021). Although Wentz et al. (2021) and Dobrescu et al. (2020) did not point out any specific numerical value to make that criterion more definitive, Dinkler et al. (2019) explained the absence of weight deviation with a BMI of more than 17.5 kg/m2 (BMI > 17.5 kg/m2). Furthermore, four studies required slightly higher BMI values. While Garriz et al. (2021) necessitated a BMI of more than 18 kg/m2 (BMI > 18kg/m2) for the physical aspect of recovery; Silen et al. (2021), Halvorsen et al. (2018) and Talbot et al. (2015) preferred BMI equal to or more than 18.5 kg/m2 (BMI $\geq$ 18.5 kg/m2).

Lastly, Kurotori et al. (2019) correlated BMI with percentiles rather than numerical setpoints due to the younger-aged sample characteristics and maintaining a BMI over the 3rd percentile, as present in the Japanese BMI-for-age-growth-chart that relies on age and gender, was accepted as the physical part of the recovery (Kurotori et al., 2019).

Behavioural and Psychological Dimension in conjunction with related scales

Since two of the studies emphasised only physical aspects of the recovery (Kerr-Gaffney et al., 2021; Silén et al., 2015), there are 13 studies left that examined behavioural and psychological dimensions of being recovered and 8 out of 13 studies required the absence of diagnosis as the criterion for recovery.

Talbot et al. (2015) expressed this requirement as no longer meeting the DSM-IV and DSM-5 diagnosis for AN and supported their criteria by requiring not having ED behaviours (such as restricting, binging, purging, driven and compulsive exercising) and EDE-Q scores within one standard deviation on all sub-scales of population norms. However, when it comes to Kurotori et al. (2019), recovery was explained as not meeting the criteria for AN-Restrictive and ARFID and achieving full remission, which means restoring behavioural eating patterns. Dinkler et al. (2019), Dobrescu et al. (2020) and Wentz et al. (2021) required being free from all diagnostic criteria of AN, BN and BED, rather than just not meeting the criteria for AN. In these three studies, exemption of diagnosis was also supported by the requirement of a lack of compensatory behaviours and deviation in weight and shape-related attitudes (including weight phobia).

In addition, Swenne, Parling and Salonen (2017), Garriz et al. (2021) and Castro-Fornieles (2021) broadened the absence of diagnosis to not fulfilling any of the EDs criteria. Thus, the lesser-mentioned subtypes of ED like Other Specified Feeding or Eating Disorder (OSFED), UFED (Unspecified Feeding or Eating Disorder) and Avoidant/Restrictive Food Intake Disorder (ARFID) were covered. Furthermore, in addition to having a lack of ED diagnosis, Swenne, Parling and Salonen (2017) required the EDE-Q global score of less than 2.0 and Garriz et al. (2021) anticipated being within 1 SD in all EDE subscales to be accepted as recovered. Moreover, Halvorsen et al. (2018) also required the combination of the absence of bingeing and compensatory behaviours with EDE-Q scores less than or equal to 2.5 SD from the recovered patients.

Unlike other studies, Breithaupt et al. (2021) elected LIFE-EAT-3 PSR Score equal to one or two in addition to the absence or residual symptoms and lack of ED-related functional impairment to define recovery criteria. In addition, in Silen et al.'s study (2021), the information related to behavioural and psychological aspects of recovery was taken by asking the patients whether they were feeling recovered or not rather than yielding on structured interviews or questionaries.

Lastly, the physical recovery criteria were supported by only the behavioural aspects of recovery (absence of bingeing and purging), and the psychological aspects were not considered in the remaining two studies (Mustelin et al., 2016a; Mustelin et al., 2016b).

Duration of Criteria

11 studies demanded continuity of improvements (in various recovery dimensions) over a certain period – fluctuating from 3 months to a year – to accept patients as recovered.

From the physical point of view, the maintenance of weight restoration was requested for six months and a year by Kurotori et al. (2019) and Kerr-Gaffney et al. (2021), respectively. In addition, according to Kurotori et al. (2019), the countdown of these six months should be started after the treatment is terminated. On the other hand, Silen et al. (2015) required the continuity of weight restoration over many consecutive months instead of being more specific about providing duration.

Some studies emphasised the requirement of duration related to the behavioural dimension of recovery. In more detail, Garriz et al. (2021), Halvorsen et al. (2018) and Talbot et al. (2015) required the absence of ED-related behaviours (i.e. bingeing, purging, restricting, compensatory behaviours) for a minimum of 3 months, whereas Mustelin et al. (2016a) and Mustelin et al. (2016b) necessitated a year to consider patients as recovered. On the other hand, Wentz et al. (2021), Dobrescu et al. (2020) and Dinkler et al. (2019) were more stringent. They required a minimum of 6-month ED diagnosis exemption when defining the recovery criteria's behavioural and psychological aspects.

Length of Follow-Up and Recovery Rate

Due to the variances in study designs and aims, reporting follow-up years and recovery rates could not become applicable to all studies. The appropriate studies covered both short-term and long-term follow-up durations, which range from less than a year (Breithaupt et al., 2022) to 30 years (Dinkler et al., 2019; Dobrescu et al., 2020; Wentz et al., 2021).

In addition to Breithaupt et al. (2022), the studies of Swenne, Parling and Salonen (2017), Kurotori et al. (2019), Silen et al. (2021), Halvorsen et al. (2018) and Mustelin et al. (2016a) can be accepted as having a short-term follow-up with the mean follow-up years of 1, 1.5 (18 months), 4, 4.5 and 5 years, respectively. In contrast, Castro-Fornieles et al. (2021) and Garriz et al. (2019) followed the patients later on an average of 20 and 22 years, which can be considered long-term.

On the other hand, participants in Mustelin et al.'s study (2016a) were followed up two times: 1) when they were 22-27 years and 2) when they were 31-37 years. As the baseline age was given as 16 years, the follow-up years were estimated between 6-11 years for the first and 15-21 years for the second ones (Mustelin et al., 2016a).

The recovery rate was calculated manually in three studies (Castro-Fornieles et al., 2021; Gárriz et al., 2021; Talbot et al., 2015) as they gave the number of recovered patients in the AN group instead of giving a percentage. As a result of this, the recovery rate from AN was found to fluctuate from 30.6% (Talbot et al., 2015) to 72% (Mustelin et al., 2016b).

The second highest rate was seen in Mustelin et al.'s study (2016a) at 66%, while the second lowest rate was 36% (Halvorsen et al., 2018). In addition, recovery rates in Wentz et al. (2021) and Castro-Fornieles et al. (2021)'s studies were similar, at rates of 58.8% and 57.69%, respectively. However, in Silen et al. (2021) and Kurotori et al. (2019)'s studies the recovery rates were slightly lower as follows: 41.5 and 43%, unlike the studies of Garriz et al. (2021), Dobrescu et al. (2020) and Silen et al. (2015) with slightly higher recovery rates: 62.02%, 64% and 60%.

In addition, Swenne, Parling and Salonen (2017) reported that recovery rates varied depending on how they were evaluated. In more detail, while 65% of patients recovered when EDE-Q was used, this rate decreased to 53% when a clinical interview was preferred.

Discussion

The primary aim of the study was to present the criteria of recovery that were preferred by researchers while defining patients with adolescent-onset AN as recovered. As seen in the 15 reviewed papers, the researchers set their own criteria for recovery while conducting studies due to a lack of a standardised definition of it.

Two studies (Kerr-Gaffney et al., 2021; Silén et al., 2015) mentioned only the physical dimension of recovery, whereas the rest of the 13 studies had a broadened perspective and covered behavioural and psychological dimensions in addition to the restoration of weight and menses. Furthermore, the measurement tools that were used while assessing ED pathology, course and/or outcome have changed between studies. Although EDE-Q (Luce and Crowther, 1999) became prominent compared to the other measurement tools (i.e. LIFE-EAT-3 (Breithaupt et al., 2022; Keller et al., 1997), Morgan-Russell Scale (Morgan & Hayward, 1988)), it has been used by only six studies asking for different scores. While some studies required EDE-Q scores within one standard deviation (SD) on all sub-scales of population norms (Gárriz et al., 2021; Talbot et al., 2015) for some 2 (Swenne et al., 2017) and 2.5 (Halvorsen et al., 2018) SDs were thought adequate enough to accept patients as recovered. In addition, only one study emphasized the patients' perspective on recovery status by asking whether the patients thought of themselves as recovered or not (Silén et al., 2021).

In this systematic review, the recovery rate fluctuated from 30.6% to 72% as regards the applicable studies. The study with the highest rate of recovery (72%) defined recovery as an absence of binges and purges in addition to the restoration of weight and menses (for applicable cases) at least for a year and patients were followed up after an average of five years than their onset of AN (Mustelin et al., 2016b). In contrast, the lowest rate (30.6%) is seen the Talbot et al.'s study (2015), where the recovery was defined more inclusively.

Physical Dimension of Recovery

Like many of the studies included in this review, previous studies (Bardone-Cone et al., 2010; Dawson et al., 2013); suggest incorporating restoration of weight and menstrual cycle into a definition of recovery – but not solely, only as a part of a physical dimension of a more comprehensive definition. Although the reliability and generalisability of BMI for a physical recovery decision are highly questionable (Dawson et al., 2013), BMI (for adults) and percentage weight (for children and adolescents) were preferred mostly to express physical recovery (Bardone-Cone et al., 2010).

As seen in the eligible studies of this review, BMI was required between 17.5 kg/m2 to 18.5 kg/m2. These cut-offs are similar to the ones that were recommended in Bardone-Cone, Hunt and Watson's overview (2018) and Khalsa et al's systematic review (2017), except for some included studies that recommended a BMI of more than 19 kg/m2 or 20 kg/m2. In Dawson et al.'s study (2013), the experts' thoughts were divided when they asked whether the BMI should be equal to 18.5 kg/m2 or 20 kg/m2 for defining the physical aspect of recovery from AN. However, at the end of that study, a BMI equal to or higher than 18.5 kg/m2 was agreed upon by most (92%) experts in this field (Dawson et al., 2013).

When it comes to the restoration of menses, although most of the studies did not mention the return of menses, it was stipulated in 3 (out of 15) studies in this review, raising doubts on whether it is necessary. The return of menses was perceived as an unreliable factor for recovery due to the existence of women with amenorrhea without substantial weight loss and also emaciated ones without amenorrhea (due to personal differences or oral contraceptives) (Couturier & Lock, 2006; Dawson et al., 2013; Watson & Andersen, 2003).

Dawson, Rhodes and Touyz (2013) suggest evaluating BMI cut-offs and the requirement for regular menstruation individualistically. Considering that patients with AN symptomatology experience severe distress regardless of their weight status (Watson & Andersen, 2003), showing regard to the AED's biologically appropriate weight criteria: a) absence of restricting or dieting, bingeing, obsessive and compulsive exercising, b) supporting normal functioning and growth and c) being consistent with pre-morbid weight, gender, ethnicity, family history) instead of specified BMI cut-offs can be useful (Academy for Eating Disorders Nutrition Working Group).

Behavioural and Psychological Dimension of Recovery

Recovery was explained based on physical improvements previously; however, due to the continuity of symptoms and dysfunctions after physical recovery, studies agreed on supporting recovery criteria by including behavioural and psychological dimensions (Bardone-Cone et al., 2010; Couturier & Lock, 2006; Dawson et al., 2013; Khalsa et al., 2017). In this review, although recovery was

defined based on weight solely in two out of 15 studies, the rest of the 13 studies supported the idea of including behavioural and/or psychological improvements in the recovery criteria.

When it comes to the absence of a diagnosis criterion, a lack of consensus can also be seen in how it was defined. For instance, some studies required being free from criteria from AN only (Talbot et al., 2015); whereas, some preferred not meeting any criteria for AN, BN and BED (Dinkler et al., 2019; Dobrescu et al., 2020; Wentz et al., 2021) or EDs in general (Bardone-Cone et al., 2010; Castro-Fornieles et al., 2021; Gárriz et al., 2021; Swenne et al., 2017). This difference may be explained as related to participants' diagnosis of the studies. For example, the studies that research AN-BP may need to emphasize the lack of bingeing, in contrast to ones with AN-R that need to focus on restricting. On the other hand, there is also one questionable point on whether the criteria of recovery should be transdiagnostic or AN-specific. Bardone-Cone et al. (2010) intentionally proposed a transdiagnostic definition, due to the frequency of the transition between ED subtypes. When the transition/ relapse of AN is considered (Andrés-Pepiñá et al., 2020; Dobrescu et al., 2020; Wentz et al., 2021), it would be more useful to yield transdiagnostic criteria than AN-specific ones.

Assessment

Another point that requires clarity is the way of assessment. The studies mostly – but not restrictively – use EDE and its' questionnaire version, EDE-Q; however, no agreement was achieved on cut-offs that may present recovery. Some researchers focused on the global score of the EDE-Q (Halvorsen et al., 2018; Swenne et al., 2017), and some required cut-offs for each subscale (Gárriz et al., 2021; Talbot et al., 2015). Also, although this review presented that the required cut-offs ranged from being within 1 SD to 2.5 SD (Gárriz et al., 2021; Halvorsen et al., 2018; Swenne et al., 2017; Talbot et al., 2015), having scores of 2 SDs away from societies' norms was criticized for allowing continuity of pathologies (Wade & Lock, 2020). Apart from these, Swenne, Parling and Salonen (2017) emphasized the differences in recovery rates regarding the preference for clinical interviews (53%) or questionnaires (65%). To avoid misinterpretation, in-person examinations and questionnaires should be combined during recovery assessment (Dawson et al., 2013).

Duration

While defining recovery, it is suggested to cover a specific time frame in which improvements are sustained (Dawson et al., 2013). When the experts were asked to define the difference between remission and recovery, time was defined as the main difference (Dawson et al., 2015). But, how long duration is required to recover? Apart from the ones that do not specify a time frame, the suggestions ranged

from some consecutive months or at least three months to a year of the reviewed articles. According to Dawson et al.'s study (2015), three years were advised by 15% of experts (fellows of AED and members of EDRS); however, more than a year was suggested by the EDRS, more recently (Wade & Lock, 2020).

Beyond the Physical, Behavioural and Psychological Dimensions

Lack of recovery criteria related to general psychology

The studies that were included in this review did not emphasize the importance of general psychology or social functionality for assessing recovery. However, Dawson et al. (2015) conducted a study that sought an answer to the question about the best method to measure recovery. At the end of their study, experts from all around the world (fellows of the AED and members of the EDRS) agreed on the importance of incorporating psychosocial functioning and quality of life into measurements in addition to physical, behavioural and psychological dimensions (Dawson et al., 2013). More recently, the definition of recovery was discussed in the EDRS annual meeting, and experts also agreed to incorporate quality of life assessments (in terms of psychological, social and emotional domains) into a recovery definition (Wade & Lock, 2020). It might be advisable to reconsider the possible pros and cons of including general psychology. Currently, both the routine (66.4%) and urgent cases (59%) rates of receiving timely access to ED treatment are under national standards (95%) (Nuffieldtrust, 2023). Although including improvements in general psychology may decrease relapse rates (Rodriguez et al., 2005), prolonged therapy durations could cause further reduced access to treatment for the cases on waiting lists. At this point, it may be considered as a suggestion to perform two separate evaluations, one for ED pathology and the other for general psychology, and to plan the referral of patients with problematic scores related to general psychology but without ED pathology from ED-focused units to other relevant treatment units.

Limitations

There are some limitations to the methodology of this study. This review included only the studies with patients that are diagnosed with AN during their adolescent period. Future studies can reach more definitions of recovery used by the researchers by removing this criterion. Also, eligibility criteria remained incapable of restricting other factors that may affect recovery rates, such as ages at treatment and/ or follow-up, the type of received treatments and admission settings, the level of BMI at admission and discharge, symptom severity, personal traits, AN subtypes like AN-BP or AN-R (Andrés-Pepiñá et al., 2020; Breithaupt et al., 2022; Couturier & Lock, 2006; Fichter et al., 2017; Glasofer et al., 2020). Further studies interested in the recovery rate should also take into account the variations that may occur due

to these factors. Lastly, there might be unintentionally unnoticed studies during the screening process. Although each part of the review was carried out under the supervision of experts in the field, the study selection processes were conducted by only one author.

Conclusion

In the current circumstances, there is no consensus on defining recovery from AN. As seen in the reviewed articles, different definitions were used to accept patients as recovered such as evaluating only physical and/ or behavioural dimensions, setting varied cut-off points for scale-related measurements or preferring different expressions due to the differences in assessment tools. Perhaps the absence of clear indicators is a natural outcome of the myriad perspectives available to us in approaching the process of recovery. Although the researchers have conducted studies to build a consensus to define recovery and agreed on a multidimensional definition, none of their suggestions was placed in ED-related guidelines, resulting in a continuous lack of consensus. Until reaching an agreement, researchers interested in recovered patients or the outcomes of AN should be aware that inconsistencies in recovery definition can affect the results of their research.

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RELATIONSHIP OF ALEXITHYMIA WITH EMOTION REGULATION STRATEGIES AND MENTAL HEALTH IN SCHIZOPHRENIC PATIENTS

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Abstract

The main aim of the study is to analyze the emotional aspects of mental health in schizophrenia. We examined the relationship between levels of alexithymia, different strategies for emotion regulation, levels of stress and subjective well-being. Different studies show that in general people with high levels of alexithymia tend to exhibit a less adaptive profile of emotion regulation. Research on schizophrenia and emotions has revealed that schizophrenic patients lack the ability to recognize and express emotion, as well as understanding emotions in social context.

We focus on difficulties processing emotional experiences in schizophrenic disorder and how it is related to the functional difficulties patients experience. In addition we proposed that patients with high levels of alexithymia and poorer coping strategies will be less willing to seek help from professionals. Questions about attitudes toward health specialists were constructed. 30 patients with schizophrenia and 39 healthy controls completed the survey. Patients with higher levels of alexithymia had tendency to use strategies as expressive suppression, which was linked with higher levels of stress. High levels of alexithymia were linked with poorer quality of life and lower life satisfaction. The results will be used for improving therapeutic psychological approaches when working with patients, recommendations for psychological work were given.

Keywords*:* alexithymia, schizophrenia, emotion regulation strategies, mental health.

Severe mental disorders are associated with significant suffering for patients diagnosed with them. Compared to the other mental disorders, they are mostly associated with a deteriorated quality of life, disorders in interpersonal

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relationships, social isolation, suicidal risk, etc. In general severe mental disorders have lower rates of well-being compared to controls (Stanga et al., 2019). Schizophrenic disorder is one of the most commonly diagnosed severe mental disorders. Schizophrenia is a mental disorder often associated with high distress and impairment in the patient's social, personal, educational, work, and other areas of life. Statistics show that the probability of premature death among schizophrenics is 2 to 3 times higher than in the general population (Laursen et al., 2014). Most of the research focuses on cognitive deficits in schizophrenia, even though negative symptoms and emotion deficits have a higher impact on quality of life. Research on schizophrenia and emotions has revealed that schizophrenic patients lack the ability to recognize and express emotion, as well as understanding emotions in social context (Kring & Elis, 2013). Patients cannot maintain their emotional experiences and have flat affect, which means they do not express emotions. Despite that they share that they feel emotions of the same or even higher intensity than healthy controls. Difficulty processing emotional experiences is a key component of schizophrenic disorder and is related to the functional difficulties patients experience (Kohler & Martin, 2006). Research has generally found higher levels of alexithymia in schizophrenic disorder compared to healthy controls, and in recent years there has also been evidence that alexithymia can predict patients' level of psychosocial functioning (Kimhy et al., 2012), as well as in people who are at risk for developing psychosis (Kimhy et al., 2016). Studies found that negative symptoms (affect flattening, poor cognition, apathy, social isolation) have more predictive value than positive symptoms (hallucinations and delusions) for the quality of life and functionality of the patients (Leucht et al. 2018). In the study of Yi et al. (2023) researchers found that patient with higher scores of alexithymia had higher general PANSS score, negative, depressive, and cognitive PANSS subscores. Although schizophrenic patients have reduced expression of their emotional experiences and difficulties in understanding their and other's emotions, they do not experience fewer emotions compared to other people. Their difficulties are mainly related to their ability to understand and regulate their emotions. Meta-analyses have found that although patients do not report a reduction in positive experiences or activation to emotionally meaningful pleasurable stimuli, they do report experiencing more negative emotions in response to neutral and positive stimuli (Cohen & Minor, 2010). In addition, schizophrenic patients display substantial emotion regulation difficulties (Kimhy et al., 2020). According to a study by Strauss et al. (2013) schizophrenic patients fail to apply the cognitive reappraisal strategy when exposed to negative stimuli, resulting in them more often reporting experiencing negative emotions. Research has found that schizophrenics are more likely to use the emotional suppression strategy to regulate their emotions and less frequently cognitive reappraisal (van der Meer et al., 2009). Also, patients are less likely to engage in pleasure-seeking behaviors (Strauss et al., 2013). Emotion regulation involves the processes that people apply to influence their emotional state. Various studies have found that effective emotion regulation is associated with better psychosocial functioning

(Gross & Muñoz, 1995) and alexithymic traits are linked with lower willingness for seeking help from others (Haimadeh, 2018). The main aim of the present study is to analyze the emotional aspects of mental health in patients with schizophrenic disorder. The study will focus on the impact of affect regulation and subjective emotional experience of the patients. Willingness seeking for professional help will be also examined. The main aspects which were examined are alexithymia traits and coping strategies for emotional regulation. The hypotheses of the study were: Schizophrenic patients will have higher levels of alexithymia than healthy controls; Schizophrenic patients will report higher scores on the strategy "expression suppression" and lower scores on the strategy "„cognitive reappraisal"; Schizophrenic patients will have lower scores on subjective well-being; Patients will have more negative attitudes toward health professionals.

Method

Participants

We examined 30 patients with schizophrenia (F.20) – 8 women and 22 men and 39 healthy controls – 33 women and 6 men. The age is between 20 and 64 years old. The schizophrenic patients were on medical treatment at "St. Naum" hospital, diagnosed by a psychiatrist.

Measures

In the study we used the Bulgarian version of TAS 20 (Popov et al., 2016). The Bulgarian version of TAS 20 has two subscales: *Difficulties identifying and describing feelings and Externally oriented thinking.* It includes 20 self-report questions. We included also the Emotion regulation questionnaire (ERQ), which was not adapted for Bulgarian social context. In the pilot study we made a factor analysis of ERQ with 120 participants and the Cronbach's α was

0.8. We included it in the main study, but it requires future validation. For subjective well-being we used the Bulgarian version of SWLS scale which includes 5 general questions about global cognitive judgments of satisfaction with one's life (Ivanova et al., 2013). We also constructed questions about attitudes toward health specialists. The questions were about tendencies to seek a psychiatrist or a psychologist and importance of working with them.

Design and procedure

All participants completed an online questionnaire that asked them to judge their own personal experience. Patients were asked for an interview before the research and after that the researcher gave them the instructions for the study. The assigned information agreement. The researcher was in the room in order to

help the patient if needed. Also some of the patients didn't know how to use the computer, so the researcher helped them with reading the questions. The healthy controls received a link for the study.

Results

Significant difference was found between TAS subscale scores between the two groups. Schizophrenic patients had higher scores on *Difficulties Describing and Identifying Feelings* subscale (t (67) $=2,51$; $p<0,05$) and on *Externally Oriented Thinking* subscale (t (67) = 3,36; $p<0,01$). Schizophrenic patients also had higher scores on *General Alexithymia* (t (67) =3,01; $p<0,01$). For emotional regulation strategies, schizophrenic patients had higher scores on *Expression Suppression* subscale (t (67) = 2,48; $p<0,01$). There was no significant difference between Cognitive reappraisal strategy.

In general, healthy controls had higher scores on *Subjective well-being* than schizophrenia patients (t (67) = -2,07; $p<0,01$). Patients shared that they have poor life conditions and that they don't think that their life is good in general. Attitudes toward professional help were examined. We found that 13% of the patients see a psychologist regularly and 30% never worked with one. All of them work with a psychiatrist. 53% of them think that working with a psychologist is not important and 20% think that it is very important (Figure 1).

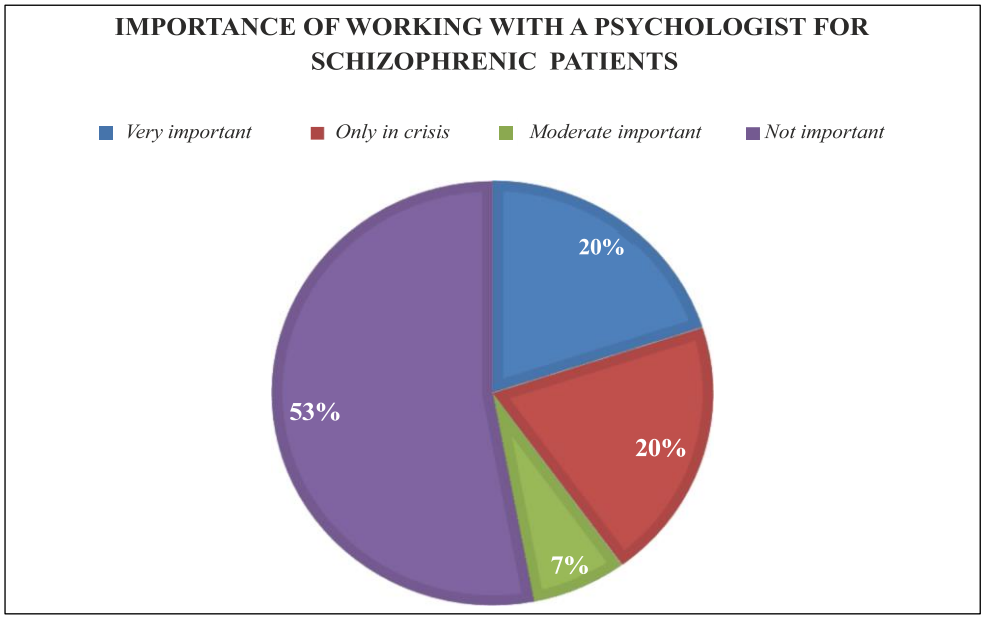

Figure 1. Attitudes towards psychologist

20% of patients say that the main aspect that helped them when visiting a psychologist is that there was someone to listen to them and understand them. Attitudes toward working with a psychiatrist were different (Figure 2). 18% thought that it is very important to visit a psychiatrist regularly and only 7% that it is not important at all. 50% will seek psychiatrist help only if they are in crisis.

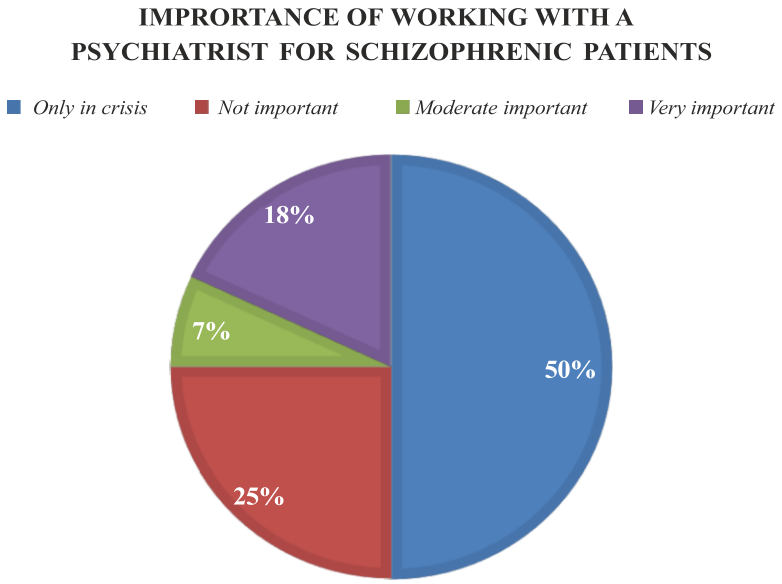

Figure 2. Attitudes towards psychiatrist

44% of healthy controls see a psychologist regularly and 23% have never worked with a psychologist or a psychotherapist. 72% think that it is very important to work with a psychologist and only no one thinks that it is not important at all.

Pearson correlations were utilized to test the potential relationships between alexithymia, coping strategies and levels of depression, anxiety, and stress among 69 participants – 30 patients and 39 healthy controls (Table 1). We made the correlations for the whole sample because of the small sample size of the patients and healthy controls. Difficulties describing and identifying feelings were positively correlated with expression suppression (r= 0.62, p< 0.05) and negatively with subjective well-being (r= - 0.44, p< 0.01). Externally-oriented thinking was negatively related with cognitive reappraisal (r= - 0.3, p< 0.05) and subjective well-being (r= - 0.45, p< 0.01). General TAS score was positively related with expression suppression (r= 0.58, p< 0.01) and negatively with subjective well-being (r= -0.48, p< 0.01).

Table 1. Pearson correlations between alexithymia scores, emotion regulation strategies, anxiety, stress and subjective well-being (69 participants)

Variable	Difficulties describing and identifying feelings	Externally-oriented thinking	General TAS score
Expression suppression	.62*	.23	.58**
Cognitive reappraisal	.02	-.3*	-.01
Depression	.52**	.25*	.47**
Anxiety	.33**	-.02	.28*
Stress	.35**	.03	.3*
Subjective well-being	.44**	-.45**	-.48**

*$p < .05$. **$p < .01$.

Discussion

Results confirm that schizophrenia patients tend to have higher levels of alexithymia than healthy controls. Higher levels of difficulties describing and identifying feelings are linked with using expression suppression as an emotional regulation strategy, with higher levels of depression, anxiety and stress and with lower subjective well-being. Externally oriented thinking is negatively related with cognitive reappraisal and with subjective well-being. In general, higher alexithymia scores are related with expression suppression. That confirms findings that alexithymia predicts poorer level of functioning in non-clinical samples as well (Ciarochi et al., 2008). The relationship between alexithymia and emotional regulation is explained by the deficit in cognitive modulation of emotions, which is a characteristic of alexithymia. Although schizophrenic patients have reduced expression of their emotional experiences and difficulties in understanding other people's emotions, they do not experience fewer emotions compared to other people. Flat affect could be linked with the strategy "expression suppression" not with lack of emotions. Their difficulties are probably related to their ability to understand and regulate their emotions. That highlights the importance of developing therapeutic interventions that focus on awareness of one's own emotions in general and learning more effective strategies for emotional regulation. Low percentages of working with a psychologist amongst patients could be linked with lack of understanding of the importance of psychological interventions. The results could be used for planning psychological interventions and setting therapeutic goals towards improving emotional regulation strategies. Levels of alexithymia could be a risk factor for patients and could predict their performance on the capacity for regulating negative and positive emotions. The main limitation of the study is that we used a scale that is not validated for Bulgaria – the ERQ scale. Also, the sample size is too small. Future research must include more participants and the ERQ scale must be validated. For the patients was difficult to use the computer for

answering the study and the researcher had to read the questions, which could have influenced their responses.

Authors' note

Declaration: The data was collected as a part of my PhD thesis. They are presented as a poster in EABCT 2023 conference "CBT in a Changing World: Migration and Cultural Diversity". I am the only author.

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Conflict of interest: None.

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PERSONALITY TRAITS, PREOPERATIONAL THINKING, AND MENTAL HEALTH

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Abstract

It has been suggested by various cognitive behaviour theorists that the perceptual and cognitive characteristics of the preoperational cognitive stage, defined by Piaget as the second stage of cognitive development, manifest themselves in chronic depression and various personality disorders. Although individuals have a formal level of functioning in their work life, they may experience regression to the preoperational domain due to an event in the interpersonal domain. In this study, the relationships between preoperational thinking and psychiatric symptoms (depression and anxiety) and personality traits were analysed. The sample consisted of 61 patients and 102 healthy individuals (104 women, 55 men). Sociodemographic form, Personality Belief Questionnaire-Short Form (PBQ-SF), The Luebeck Preoperational Thinking Recording Scale (LQPT) and Patient Health Questionnaire -9 (PHQ-9) were applied to the participants.

The study results revealed a diverse predictive role of LQPT scores across different personality traits. LQPT is highly predictive for traits like Histrionic and Dependent, moderately predictive for Borderline, Obsessive-Compulsive, and Antisocial, less predictive for Paranoid, Passive-Aggressive, and Narcissistic, and not predictive for schizoid personality traits. The results of this study also showed a significant relationship between an increase in general psychiatric symptoms (depression and anxiety) and an increase in preoperational thinking levels. It was also found that preoperational thinking was significantly higher in patients with psychiatric disorders (GAD, OCD, depression, panic disorder). These findings support the results of previous research that provide a new interpretation of Piaget's work on the preoperational stage in the context of personality and psychiatric symptoms in adults.

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Individuals with personality disorders hold negative schemas - beliefs about themselves, other people, and the world - strongly. These beliefs may affect the person's thoughts, feelings, and behaviors (Albein-Urios et al., 2019; Otani et al., 2018; Sargin et al.,). It has been suggested that individuals with personality disorders' thinking styles and beliefs show the characteristics of the preoperational stage of cognitive development (Leahy, 1995). It is stated that early negative personal schemas are formed at the preoperational level and are, therefore, determined by the rigid structure of preoperational thinking (Leahy, 1995; Sperry & Sperry, 2016).

Piaget, one of the leading figures in the field of cognitive development, states that the best way to understand the nature of the adult mind is to examine the development of an individual's mental activity from birth and observe the changes that the individual undergoes in the process of adapting to the environment (Piaget, 1950). The preoperational stage, the second of the developmental stages in the cognitive development theory developed by Piaget, covers the stage between the ages of 2 and 6-7 (Wadsworth, 2015). Children exhibit a deficit in abstract reasoning and perceive situations limited to their perspectives at this developmental stage. Key characteristics of this stage include a lack of reasoning, reliance on intuition, a tendency to focus on one aspect of an event, and an underdeveloped perception of multifaceted concepts such as cause and effect. In addition, children may show impulsive actions, a monotonous way of speaking, and a pronounced egocentrism, indicating a poor understanding of others' points of view (Piaget & Inhelder, 2013; Wood et al., 2001).

The first theory to draw scientific attention to the relationship between preoperational thinking style and psychopathology is the Cognitive Behavioral Analysis System of Psychotherapy (CBASP) developed by McCullough (2003). CBASP, explicitly developed for the treatment of chronic depression, suggests that individuals with chronic depression have a thought structure fixed in Piaget's preoperational stages of cognitive development (McCullough, 2003). Biological, cultural, and personal experiences have an impact on cognitive development. Some individuals may show early-stage characteristics in the social cognitive domain as a result of the interaction of environmental stimuli (e.g., living environment, traumatic situations) and individual characteristics (e.g., intelligence level, emotional characteristics) (McCullough, 2003). CBASP suggests that challenging environmental conditions experienced during early development disrupt or delay normal emotional-cognitive development in individuals. This is based on the similarities between the thought structures of chronically depressed individuals and preoperational children (McCullough, 2003).

In the formation of personality disorders, schemas from the preoperational stage persist into adulthood with avoidance and compensation (Leahy, 1995).

Individuals with personality disorders are characterized by deficiencies in some or many skills learned during development and a thinking pattern resembling the early developmental stage (Sperry & Sperry, 2016).

Researchers have suggested that characteristics typically associated with the preoperational cognitive stage are frequently observed in individuals diagnosed with personality disorders (Leahy, 1995; Driscoll et al., 2004). For example, these individuals think concretely in the interpersonal domain and struggle to understand abstract concepts. They cannot understand the perspectives of others from their point of view (Gan et al., 2020; Sargin et al., 2017); they have difficulty in expressing or managing their emotions correctly; they may have irrational or irrational thoughts; they have the binary (i.e., all or nothing) thinking style of preoperational thinking (Driscoll et al., 2004; Fonagy & Bateman, 2016) . They emphasize outcomes rather than intentions. Like the egocentrism of the preoperational stage, they tend to personalize adverse events perceive, and interpret events through themselves. They have difficulties in interpersonal relationships and social areas. They have intense cognitive distortions. They focus on only one side of events, as in cognitive distortions such as generalization, mind reading, labeling, and all-or-nothing thinking. They have the universal thinking of the preoperational stages, such as the repetition of negative experiences in the past or that they will have a similar future (Driscoll et al., 2004).

The relationship between preoperational thinking and personality disorder is not fully understood. However, some experts believe that the two conditions may have common origins. For example, parents of people with personality disorders may have difficulty forming healthy relationships with their children. This can affect their emotional development and lead to the development of preoperational thinking. Some experts believe that individuals may revert to preoperational thinking because the preoperational structure of the schema acts as a structural fixation, and they have difficulty understanding and coping with the world around them (Leahy, 1995; Mccullough, 2003). These individuals may continue their lives generally until they experience a regression to the preoperational stage in their adult lives (Leahy, 1995). While they may have a formal level of functioning in their occupational life, they may experience a regression to the preoperational domain due to an event in the interpersonal domain (Mccullough, 2003). For example, a person with a personality disorder may have a traumatic experience. This experience may cause the person to perceive the world as unsafe and unpredictable. This may cause the person to focus on concrete thinking and their point of view.

More research is needed into the relationship between preoperational thinking and personality disorders. This study aims to investigate the relationship between preoperational period and personality traits and psychiatric symptoms. It is thought that this research may help us to understand better why these two conditions are related and how they can be used to treat personality disorders.

Method

Participants

The patients who participated in the study consisted of individuals with diagnoses such as depression, obsessive-compulsive disorder (OCD), generalized anxiety disorder (GAD), panic disorder, etc. who applied to an private outpatient center for psychotherapy which is second author is director, while the healthy participants consisted of adults living in Ankara and who did not receive any diagnosis according to DSM-5. This study involved a comparative analysis between patients (*n*=61) and healthy groups (*n*=102). The patient group comprised 61 individuals with a mean age of 34.18 years (*SD* = 11.56). The mean educational background of the group was 15.07 years (*SD* = 2.39). Regarding sex distribution, 37 participants were female (60.66%) and 24 were male (39.34%). The healthy group comprised 102 individuals with a mean age of 35.84 years (*SD* = 9.46) and a mean education of 14.71 years (*SD* = 2.71). The sex distribution was 71 females (69.61%) and 31 males (30.39%). Independent sample t-test was used to compare age, total years of education, and income; the Pearson Chi-Square test was used to analyze gender and marital status differences between groups. No significant difference was found between the groups except for marital status (p = .033). The study was conducted by the ethical standards of the responsible committee and the Declaration of Helsinki. All participants gave informed consent before inclusion in the study. The detailed sociodemographic characteristics of the patients and the healthy groups are presented in Table 1.

Table 1. Sociodemographic characteristics of the patients and the healthy group

Variable	Group		*p*
	Patients (*n*=61)	Healthy group (*n* =102)	
	M (SD)	*M (SD)*	
Age	34.18 (11.56)	35.84 (9.46)	.346[b]
Total years of education	15.07 (2.39)	14.71 (2.71)	.393[b]
Income[a]	30.2K (8.7K)	30.7K (20.1K)	.837[b]
	n (%)	n (%)	
Sex			.242[c]
Female	37 (60.66%)	71 (69.61%)	
Male	24 (39.34%)	31 (30.39%)	
Marital Status			.033[c]
Single	30 (49.18%)	33 (32.35%)	
Married	31 (50.82%)	69 (67.65%)	

Variable	Group		*p*
	Patients (*n*=61)	Healthy group (*n* =102)	
Diagnosis			-
Depression	16 (26.2)	-	
OCD	10 (16.4)	-	
GAD	6 (9.8)	-	
Panic Disorder	5 (8.2)	-	
Other	24 (39.4)	-	

a: Turkish lira; b: independent samples *t*-test; c: Pearson Chi-Square

Instruments

Personality Belief Questionnaire-Short Form (PBQ-SF). The PBQ-SF developed by (Butler et al., 2007), derived from the long-form PBQ, assesses key personality pathologies across nine dimensions. It features seven items per dimension, rated on a 0-4 scale. The overall Cronbach's Alpha for the PBQ-SF has been reported as .97, with dimension coefficients ranging from .81 to .92, and test-retest reliability between .57 and .82. The Turkish adaptation by Taymur et al. (2011) consists of 65 items, has shown an overall internal consistency of .92.

The Luebeck Preoperational Thinking Recording Scale (LQPT). LQPT, developed by Kühnen et al. (2011) to assess preoperational thinking in chronically depressed individuals, consists of 22 items with binary choices. Lower scores on a 0-22 range indicate higher levels of preoperational thinking. The original scale showed a Cronbach's alpha of α=0.90 and a split-half reliability of 0.89. Its Turkish version, adapted by Uca (2016), maintains high reliability with a Cronbach's alpha of 0.89 and a split-half reliability of 0.90, confirming its suitability for research use in the Turkish context. In this study, Cronbach's alpha was found to be .89.

Patient Health Questionnaire -9 (PHQ-9). PHQ-9 was developed by Kurt Kroenke et al. (2001) using DSM-4 diagnostic criteria, which assesses depression with these diagnostic criteria. Sari et al. (2016) conducted the Turkish validity and reliability study, and Cronbach's alpha coefficient was reported as 0.84 (79). The scale consists of 9 questions scored between 0 (never) and 3 (almost every day). In the present study, internal consistency was calculated as .86.

Procedure

Statistical analysis

The IBM SPSS (v27) was used for data analysis. Data entries were checked before proceeding to the primary analyses, and missing data were analyzed. After

the missing data analysis, analyses were performed on the data of 163 participants. Skewness and kurtosis values, histograms, and expected probability graphs were examined for the sample to explore the normal distribution of the dataset. Skewness and kurtosis values in the data sets in the range of +1.5 -1.5 are generally acceptable values for normal distribution (Tabachnick & Fidell, 2013). In our study, since these values were between -1.23-1.26 and the histogram and expected probability graphs were close to normal distribution, it was accepted that the dataset showed normal distribution. A Kolmogorov-Smirnov test was performed for LQPT distribution in terms of groups (patients and healthy participants). In addition, homoscedasticity and multicollinearity assumptions were tested and before conducting the multiple linear regression analysis to test predicting variables of personality traits. The subscales of BPQ, which show a risk of multicollinearity and had a low correlation with the dependent variable, were not added to the analysis (Karagöz, 2017). This analysis was carried out with the data of 111 participants who completed all the scales used in the study and was found to be sufficient $N \geq 50+8m$ (Green, 1991). No outliers were observed. Welch's t-test, which has higher statistical power than Student's t-test, was used to compare LQPT scores of patients and healthy participants because of unequal variances and sample sizes (Delacre et al., 2017).

Results

Research findings are presented in this study were given in three stages. Firstly, the difference in preoperational thinking levels between the patient and healthy control group was assessed and then the relationships between preoperational thinking, depression, anxiety and personality traits were evaluated. Finally, it was examined whether the preoperational thinking level predicted personality traits by controlling the group, depression and anxiety levels of the participants.

The Difference between preoperational thinkinking Levels between Healthy and Patient Groups

A two-tailed independent sample t-test was compared to compare LQPT scores between patients and healthy group. Analysis results were significant $t(60.95) = -7.07$, $p < .001$, d =1.35). According to these findings, the LQPT mean scores of the patient group were significantly higher than the mean scores of the healthy control group. The results are presented in Table 2.

Table 2. Comparing LQPT scores between patients and healthy group

	Patients			Healthy group					
Variable	*M*	*SD*	*n*	*M*	*SD*	*n*	*t*	*p*	*d*
LQPT	14.90	4.50	48	19.80	2.49	102	-8.59	< .001	1.35

Note. $N = 150$. df = 148. d represents Cohen's d. LQPT: Luebeck Questionnaire for Recording Preoperational Thinking.

Relationships Between Scores Preoperational Thinking, Depression, Anxiety, and Personality Traits

As presented in Table 3, LQPT scores showed significant negative correlations with psychiatric symptoms (depression and GAD) and all personality traits except for narcissistic and schizoid. Specifically, LQPT scores were negatively correlated with PHQ (r = -.39, p < .01) and GAD (r = -.36, p < .01) scores. Additionally, LQPT scores showed a strong correlation with various personality traits. From the highest to the weakest level of correlation, LQPT scores were negatively correlated with dependent (r = -.66, p < .01), borderline (r = -.65, p < .01), Histrionic (r = -.58, p < .01), paranoid (r = -.44, p < .01), obsessive-compulsive (r = -.44, p < .01), avoidant (r = -.41, p < .01), passive-aggressive (r = -.30, p < .05) and antisocial (r = -.23, p < .05) traits. However, LQPT was not found to be significantly correlated with narcissistic and schizoid traits (p > 0.05).

Table 3. Pearson correlation matrix of primary variables in the study

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. LQPT	-												
2. PHQ	-.39**	-											
3. GAD	-.36**	.76**	-										
4. Avoidant	-.41**	.37**	.39**	-									
5. Dependent	-.66**	.44**	.42**	.50**	-								
6. OC	-.44**	.26**	.34**	.72**	.45**	-							
7. Antisocial	-.23*	.24*	.27**	.59**	.38**	.49**	-						
8. Narcissistic	-.13	.05	.14*	.48**	.35**	.48**	.50**	-					
9. Histrionic	-.58**	.21*	.22**	.52**	.68**	.56**	.54**	.46**	-				
10. Schizoid	.02	.15	.24*	.49**	.02	.37**	.41**	.45**	0.12	-			
11. Paranoid	-.44**	.46**	.42**	.66**	.54**	.60**	.68**	.41**	.58**	.52**	-		
12. Borderline	-.65**	.56**	.51**	.63**	.84**	.55**	.50**	.29**	.62**	0.17	.75**	-	
13. PA	-.30**	.34**	.37**	.63**	.43**	.49**	.64**	.57**	.59**	.57**	.70**	.45**	-

Note. *p < 0.05; *p < 0.01; LQPT: Pre-operational thinking; PHQ: Patient Health Questionnaire-9; GAD: General Anxiety Disorder 7

Preoperational Thinking as a Predictor of Personality Traits

In a series of two-stage hierarchical regression analyses of variables predicting personality traits assessed using the PBQ subscales, adding LQPT as a predictor resulted in different changes in explained variance. At step 1, PHQ, GAD, and group (being in the healthy group) were entered as predictor variables. LQPT scores were added as predictor variables into the models in Step 2. Each step in the hierarchical regression was compared to the previous step using *F*-tests.

For the histrionic personality trait, the inclusion of LQPT scores resulted in an additional 28% variance explanation (F (1, 107) = 46.64, $p < .001$, $\Delta R^2 = .28$), indicating a strong relationship between LQPT scores and this trait. None of the variables was found to be significant predictors in the first model; LQBT scores ($B = -1.01$, $t(107) = -6.83$, $p < .001$) were significant predictors of histrionic trait scores in the second model. Similarly, in the dependent personality trait, LQPT explained an additional 22% of the variance (F (1, 105) = 42.46, $p < .001$, $\Delta R^2 = .22$), suggesting a significant relationship. Although being in the healthy group significantly predicted dependent personality trait scores in the first model, except for LQPT scores ($B = -0.75$, $t(105) = -6.52$, $p < .001$), none of the other variables were found to be significant in the second model. Borderline was found to be the third of the personality traits best explained by the unique contribution of LQPT scores. The addition of LQPT to the model significantly improved the prediction of borderline personality trait scores (F (1, 104) = 25.56, $p < .001$, $\Delta R^2 = .12$). This model indicates that adding LQPT scores explained an additional 12% of the variation in borderline trait scores. Being in the healthy group and PHQ scores were found to be significant predictors in the first model, LQBT scores ($B = -0.64$, $t(104) = -5.06$, $p < .001$) along with PHQ scores ($B = 0.25$, $t(104) = 2.23$, $p = .028$) was significant predictors of borderline personality trait scores in the second model.

Additionally, for the paranoid trait, although there was a significant improvement, the variance explained by the LQPT was relatively modest at 6% (F (1, 104) = 8.68, $p = .004$, $\Delta R^2 = .06$). In the case of the narcissistic trait, LQPT scores explained a further 5% of the variance (F (1, 107) = 7.14, $p = .009$, $\Delta R^2 = .05$). Finally, for the passive-aggressive trait, the addition of LQPT scores led to a 7% increase in variance explained (F (1, 107) = 9.92, $p = .002$, $\Delta R^2 = .07$). However, for the schizoid personality trait, the addition of LQPT scores to the model did not significantly improve its predictive ability (F (1, 106) = 0.03, $p = .869$, $\Delta R^2 = .00$), suggesting a negligible contribution of the LQPT in explaining schizoid trait variances.

Table 4. Summary of Hierarchical Regression Analysis for Variables Predicting Avoidant, Dependent, Obsessive-Compulsive, Antisocial, and Schizoid Personality Traits

DV	Step	Variables	*B*	*SE*	95.00% CI	β	*t*	*p*	ΔR^2
Avoidant	Step 1	Group (HG)	-0.17	1.23	[-2.60, 2.27]	-0.01	-0.14	.892	.16
		PHQ	0.14	0.14	[-0.14, 0.42]	0.15	1.01	.314	
		GAD	0.28	0.15	[-0.02, 0.57]	0.27	1.87	.064	
	Step 2	Group (HG)	1.78	1.30	[-0.80, 4.36]	0.15	1.37	.175	.08
		PHQ	0.10	0.13	[-0.17, 0.37]	0.10	0.74	.461	
		GAD	0.23	0.14	[-0.05, 0.51]	0.23	1.66	.101	
		LQPT	-0.49	0.14	[-0.78, -0.21]	-0.36	-3.41	< .001	
Dependent	Step 1	Group (HG)	-2.66	1.10	[-4.84, -0.49]	-0.23	-2.43	.017	.25
		PHQ	0.21	0.13	[-0.04, 0.47]	0.23	1.68	.097	
		GAD	0.13	0.14	[-0.14, 0.40]	0.13	0.93	.354	
	Step 2	Group (HG)	0.20	1.03	[-1.84, 2.25]	0.02	0.20	.843	.22
		PHQ	0.13	0.11	[-0.09, 0.35]	0.14	1.20	.232	
		GAD	0.09	0.12	[-0.13, 0.32]	0.10	0.82	.414	
		LQPT	-0.75	0.11	[-0.98, -0.52]	-0.57	-6.52	< .001	
Obsessive-Compulsive	Step 1	Group (HG)	-1.69	1.29	[-4.25, 0.88]	-0.13	-1.30	.196	.13
		PHQ	-0.04	0.15	[-0.34, 0.25]	-0.04	-0.29	.770	
		GAD	0.33	0.16	[0.02, 0.64]	0.31	2.10	.038	
	Step 2	Group (HG)	0.53	1.36	[-2.17, 3.23]	0.04	0.39	.695	.10
		PHQ	-0.09	0.14	[-0.37, 0.19]	-0.09	-0.65	.517	
		GAD	0.28	0.15	[-0.02, 0.57]	0.26	1.86	.065	
		LQPT	-0.56	0.15	[-0.85, -0.26]	-0.39	-3.71	< .001	
Antisocial	Step 1	Group (HG)	2.14	1.23	[-0.29, 4.57]	0.18	1.75	.084	.10
		PHQ	0.07	0.14	[-0.21, 0.35]	0.08	0.50	.615	
		GAD	0.29	0.15	[-0.009, 0.58]	0.30	1.92	.057	
	Step 2	Group (HG)	3.61	1.32	[0.98, 6.23]	0.31	2.73	.008	.05
		PHQ	0.04	0.14	[-0.24, 0.31]	0.04	0.26	.793	
		GAD	0.26	0.15	[-0.03, 0.55]	0.27	1.77	.080	
		LQPT	-0.38	0.15	[-0.67, -0.09]	-0.28	-2.57	.011	
Schizoid	Step 1	Group (HG)	3.65	1.23	[1.22, 6.09]	0.31	2.97	.004	.13
		PHQ	-0.03	0.14	[-0.31, 0.25]	-0.03	-0.20	.839	
		GAD	0.40	0.15	[0.11, 0.69]	0.41	2.71	.008	
	Step 2	Group (HG)	3.75	1.36	[1.04, 6.45]	0.32	2.75	.007	
		PHQ	-0.03	0.14	[-0.32, 0.25]	-0.03	-0.22	.823	.00
		GAD	0.40	0.15	[0.11, 0.69]	0.41	2.69	.008	
		LQPT	-0.03	0.16	[-0.34, 0.29]	-0.02	-0.16	.869	

Note. B: Unstandized regression coefficients; *β*: Standardized regression coefficients

Table 5. Summary of Hierarchical Regression Analysis for Variables Predicting Paranoid, Narcissistic, Passive-Aggressive, Borderline, and Histrionic Personality Traits

DV	Step	Variables	*B*	*SE*	95.00% CI	β	*t*	*p*	ΔR^2
Paranoid	Step 1	Group (HG)	-0.11	1.38	[-2.63, 2.84]	-0.01	-0.08	.939	
		PHQ	0.39	0.16	[0.08, 0.71]	0.36	2.49	.014	.22
		GAD	0.15	0.16	[-0.17, 0.47]	0.14	0.95	.346	
	Step 2	Group (HG)	-1.85	1.46	[-1.04, 4.75]	-0.13	-1.27	.206	
		PHQ	0.34	0.15	[0.04, 0.65]	0.31	2.23	.028	.06
		GAD	0.09	0.16	[-0.22, 0.40]	0.08	0.57	.572	
		LQPT	-0.51	0.17	[-0.86, -0.17]	-0.31	-2.95	.004	
Narcissistic	Step 1	Group (HG)	3.82	1.07	[1.70, 5.94]	0.37	3.57	< .001	
		PHQ	-0.10	0.12	[-0.35, 0.14]	-0.12	-0.83	.408	.13
		GAD	0.35	0.13	[0.10, 0.61]	0.41	2.77	.007	
	Step 2	Group (HG)	5.16	1.16	[2.87, 7.46]	0.50	4.47	< .001	
		PHQ	-0.13	0.12	[-0.37, 0.11]	-0.16	-1.11	.271	.05
		GAD	0.33	0.13	[0.08, 0.58]	0.38	2.62	.010	
		LQPT	-0.34	0.13	[-0.60, -0.09]	-0.29	-2.67	.009	
Passive-Aggressive	Step 1	Group (HG)	2.24	1.04	[0.18, 4.30]	0.22	2.15	.034	
		PHQ	0.12	0.12	[-0.11, 0.36]	0.15	1.04	.299	.18
		GAD	0.31	0.12	[0.06, 0.56]	0.36	2.49	.014	
	Step 2	Group (HG)	3.76	1.11	[1.56, 5.95]	0.36	3.39	< .001	
		PHQ	0.09	0.12	[-0.14, 0.32]	0.11	0.78	.438	.07
		GAD	0.28	0.12	[0.04, 0.52]	0.33	2.33	.022	
		LQPT	-0.39	0.12	[-0.63, -0.14]	-0.33	-3.15	.002	
Borderline	Step 1	Group (HG)	-3.17	1.07	[-5.30, -1.05]	-0.26	-2.96	.004	
		PHQ	0.34	0.12	[0.10, 0.58]	0.35	2.77	.007	.38
		GAD	0.10	0.13	[-0.15, 0.35]	0.10	0.79	.433	
	Step 2	Group (HG)	-1.17	1.04	[-3.24, 0.89]	-0.10	-1.13	.263	
		PHQ	0.25	0.11	[0.03, 0.47]	0.26	2.23	.028	.12
		GAD	0.04	0.11	[-0.18, 0.27]	0.04	0.37	.709	
		LQPT	-0.64	0.13	[-0.88, -0.39]	-0.44	-5.06	< .001	
Histrionic	Step 1	Group (HG)	-1.79	1.44	[-4.63, 1.06]	-0.13	-1.24	.216	
		PHQ	0.10	0.16	[-0.23, 0.42]	0.09	0.58	.566	.07
		GAD	0.09	0.17	[-0.25, 0.43]	0.08	0.54	.588	
	Step 2	Group (HG)	2.19	1.34	[-0.46, 4.84]	0.16	1.64	.105	
		PHQ	0.00	0.14	[-0.27, 0.28]	0.00	0.03	.976	
		GAD	0.01	0.14	[-0.27, 0.30]	0.01	0.09	.925	.28
		LQPT	-1.01	0.15	[-1.31, -0.72]	-0.66	-6.83	< .001	

Note. B: Unstandized regression coefficients; *β*: Standardized regression coefficients

Table 6. Model comparisons for variables predicting personality traits

Dependent Variable	Model	R^2	df_{mod}	df_{res}	F	p	ΔR^2
Avoidant	Step 1	.16	3	107	6.99	< .001	.16
	Step 2	.25	1	106	11.64	< .001	.08
Dependent	Step 1	.25	3	106	11.80	< .001	.25
	Step 2	.47	1	105	42.46	< .001	.22
Obsessive-Compulsive	Step 1	.13	3	106	5.18	.002	.13
	Step 2	.23	1	105	13.74	< .001	.10
Antisocial	Step 1	.10	3	107	3.92	.011	.10
	Step 2	.15	1	106	6.63	.011	.05
Schizoid	Step 1	.13	3	107	5.38	.002	.13
	Step 2	.13	1	106	0.03	.869	.00
Paranoid	Step 1	.22	3	105	9.94	< .001	.22
	Step 2	.28	1	104	8.68	.004	.06
Narcissistic	Step 1	.13	3	108	5.59	.001	.13
	Step 2	.19	1	107	7.14	.009	.05
Passive-Aggressive	Step 1	.18	3	108	7.88	< .001	.18
	Step 2	.25	1	107	9.92	.002	.07
Borderline	Step 1	.38	3	105	21.06	< .001	.38
	Step 2	.50	1	104	25.56	< .001	.12
Histrionic	Step 1	.07	3	108	2.52	.061	.07
	Step 2	.35	1	107	46.64	< .001	.28

Note. Each Step was compared to the previous model in the hierarchical regression analysis.

Discussion

In this study, we examined the relationships between preoperational thinking, psychiatric symptoms (depression and GAD), and personality traits. We focused on depression, anxiety, and personality traits as predictors of preoperational thinking in a sample of individuals diagnosed with various psychiatric disorders and undiagnosed individuals. The study results revealed a diverse predictive role of LQPT scores across different personality traits. LQPT is highly predictive for traits like Histrionic and Dependent, moderately predictive for Borderline, Obsessive-Compulsive, and Antisocial, less predictive for Paranoid, Passive-Aggressive, and Narcissistic, and not predictive for schizoid personality traits.

The results of this study showed a significant relationship between an increase in general psychiatric symptoms (depression and anxiety) and an increase in preoperational thinking levels. It was also found that preoperational thinking was significantly higher in patients with psychiatric disorders (GAD, OCD, depression,

panic disorder). These findings support the results of previous research that provide a new interpretation of Piaget's work on the preoperational stage in the context of personality and psychiatric symptoms in adults. Inhelder & Piaget (1999) defined the preoperational stage as a period in which children's thought processes are not entirely logical, show egocentric tendencies, and cannot evaluate events from multiple perspectives. Limited perspectives and impulsive reactions in this stage characterize children's behavior. Therefore, the results of the present study have the potential to suggest that adults with psychiatric symptoms may experience similar cognitive limitations and provide essential clues about the cognitive aspects of disorders.

Kühnen et al. (2011) and Klein et al. (2018) reported that the severity of depression symptoms had a significant impact on the preoperational level and that LQPT scores differed significantly between patients with chronic depression and episodic depression. Similarly, Wilbertz (2010) reported a significant relationship between anxiety and preoperational thinking in chronically depressed patients. More specifically, they have found a negative association between clinician-rated egocentrism and anxiety. Moreover, Sondermann et al. (2020), reported a significant effect of preoperational thinking on the severity of depressive symptoms over the observation period was identified, suggesting that higher levels of preoperational thinking are associated with more severe depressive symptoms.These results can be interpreted as the higher the level of preoperational thinking, the higher the risk of depression and anxiety. Considering that preoperational thinking includes components such as snapshot perspective, prelogical thinking, and lack of perceived functionality, these findings also demonstrate the importance of understanding the cognitive behavioral theory's emphasis on the cognitive aspect of depression. Negative and unrealistic thought patterns about one's thoughts, world, and future are known to play a central role in the cognitive behavioral theory approach to depression and anxiety (Beck, 2002; Clark and Beck, 2010). CBT aims to recognize and replace these negative thought patterns with more realistic and positive ones. This process occurs when the therapist helps the individual to question their thoughts, feelings, and behaviors and to develop alternative interpretations. In this context, these findings provide evidence that therapies such as CBT used in the treatment of depression can help individuals recognize their limited and egocentric thought patterns and help them develop functional and more realistic cognition patterns.

CBASP, initially focusing on the link between preoperational thinking and psychopathology for treating chronic depression, proposes that such individuals often exhibit thought patterns described in Piaget's preoperational cognitive stages (McCullough, 2003). However, to the best of our knowledge, information in this field is limited to these studies. Therefore, considering that cognitive theory-based psychotherapies focused on preoperational thinking can produce effective results in working with psychiatric symptoms, it is thought that it would be essential to develop these therapy techniques and methods and to increase studies to examine their

effectiveness. In addition to cognitive interventions in the treatment of depression and anxiety, these findings suggest the importance of developing strategies to understand better and focus on the individual's cognitive processes. They may indicate that cognitive approaches to understanding and treating depression and anxiety should be further deepened.

This study also found significant relationships between preoperational thinking and personality traits and that preoperational thinking predict various personality traits. Similarly, Maheshwari & Chadha (2021) found correlations between personality traits and cognitive distortions, which may also be related to preoperational thinking. Although this aspect has not been well studied in the literature based on studies examined personality traits in understanding personality disorders (Berghuis et al., 2012; Deary et al., 1998; Warner et al., 2005), our results may be interpreted as being consistent with Leahy's (1995) and McCullough's (2003) perspectives on the potential relationship between preoperational thinking and personality disorders. The negative correlations between preoperational thinking and personality traits, such as histrionic, dependent, borderline personality traits, suggest that there may be a significant relationship between preoperational thinking and personality related psychiatric problems.

Moreover, it is essential in the context of Lane & Schwartz (1987) and Layden et al. (1993), which emphasized preoperational cognitive processes in personality disorders. In particular, the findings that preoperational thinking predicted histrionic, dependent and borderline traits may give clues to the relationship between personality beliefs and cognitive processing patterns. However, there is a very limited number of studies on this relationship and only studies on specific personality disorders. For example, histrionic personality belief is often characterized by a need for attention, superficial emotions, and dramatic or inappropriate behaviors to get attention (Bornstein, 1999; Pfohl, 1991). Such behaviors can often be associated with the satisfaction of immediate emotional needs consistent with preoperational thinking characterized by the difficulty in understanding intangible concepts and the inconsistency of perceptions with actual situations (Inhelder & Piaget, 1999).

Similarly, borderline personality disorder is associated with emotional instability, intense and volatile relationships, identity issues, and extreme detachment from reality, sometimes referred to as fragmentation (Leichsenring et al., 2011; Lieb et al., 2004). These traits may be compatible with a mindset that tends to see the world in black and white and has difficulty processing complex situations and understanding variances. Preoperational thinking refers to the self-centered and concrete ways of thinking in childhood. Borderline personality traits may reflect this thinking, as individuals often think and react according to their immediate emotional state. This can lead to impulsive and self-centered thinking processes inconsistent with real life.

Consequently, individuals' ways of perceiving and experiencing the world may affect personality traits by revealing preoperational cognitive processes.

Individuals with these personality traits may have more concrete and self-centered thought patterns that reflect their immediate emotional needs and escape from reality. These findings emphasize the importance of cognitive behavioral therapies in treating personality beliefs and suggest that these therapies would focus on developing individuals' cognitive processes to be more mature, aligned, and consistent with the real world. Therefore, the study findings support the theoretical perspectives presented in the literature (Leahy, 1995; McCullough, 2003; Lane & Schwartz, 1987; Layden et al., 1993) and suggest the importance of future studies on the complex relationship between personality traits, psychiatric symptoms, and preoperational thinking. As Farrell and Shaw (1994) emphasized, developing interventions that focus on the cognitive and emotional aspects of personality disorders, especially in therapeutic contexts, may increase the effectiveness of interventions developed for psychiatric disorders and the understanding of personality traits. More recently, Pakpahan and Saragih (2022) suggests that understanding and addressing the limitations of preoperational thinking in educational settings are crucial for fostering appropriate cognitive development and could influence personality development and the formation of schemas.

It should be noted that this study, which examined the relationships between preoperational thinking, personality traits, and psychiatric symptoms, has several limitations despite its strengths, such as the sample consisting of both diagnosed and healthy individuals and focusing on a unique and inadequately studied field. In particular, the limited number of diagnosed and healthy individuals in the sample limits the generalizability of the findings. Although there were no significant differences in sociodemographic characteristics such as age, education, income, gender, and marital status, the potential impact of these factors on cognitive and personality factors was not examined. Differences in gender and marital status distributions and income, especially in the healthy group, suggest that there may be potential underlying factors not accounted for in the statistical analysis. Furthermore, the cultural context of the study and the majority of the individuals included in the patient group being individuals with depression and obsessive-compulsive disorder limits the generalizability of the findings to other patient groups.

Authors' note

Declaration: The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the study and that the research has complied with APA ethical standards in the treatment of the participants. Portions of these findings were presented as a poster at the 2023 EABCT Congress Antalya Turkey.

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USABILITY OF AN ECOLOGICAL MOMENTARY ASSESSMENT APP FOR MOOD EVALUATION IN YOUNG ADULTS – THE MOODWHEEL APP

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Abstract

The purpose of this study was to investigate the usability of a momentary ecological assessment app 'MoodWheel' in the student population.

We explored MoodWheel's usability through standardized measures for assessing app usability. In this study, 505 students (Mage = 19.33, SD = SD =1.80, min. 18 and max.

34) were instructed to use the app daily for an entire month and then complete the System Usability Scale. We then computed the total score including usability, learnability factors.

Our results show a mean of 72.81, SD = 16.52 for the total score, indicating good usability of the MoodWheel app. The Learnability factor obtained a mean of 3.61, SD=.66 which is above average and the Usability factor obtained a mean of 2.91, SD =.66. The usability scale yielded above-average results.

Considering recommendations from literature, we can affirm that the MoodWheel app demonstrates strong usability as an Ecological Momentary Assessment (EMA) app for evaluating mood that has the ability to accurately assess students' levels of stress and overall mental health in the targeted population.

Keywords: Ecological Momentary Assessment; Emotions; Experience Sampling; Usability.

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Challenges related to mental health can affect individuals at any point in their lifetime, but university students of all ages are at particular risk for mental health associated issues due to a variety of novel factors such as moving away from home, financial restraints and social distress that might arise (Bantjes et al., 2023). In this vein, World Mental Health International College Student Initiative is the biggest international enterprise focused on students' mental health with the aim of investigating the fluctuations in mental health during university years and developing well-defined interventions to help them better manage the encountered difficulties (see Benjet et al., 2023; Tomoiaga & David, 2022). Nowadays, technology-based interventions are the most popular ones due to their accessibility and attractiveness and there are already studies testing and documenting their effectiveness (Tomoiaga & David, 2022; Ebert et al., 2019). Ecological Momentary Assessment (EMA) tools are amongst the newest and most accurate methods to monitor mental and emotional problems due to the experience sampling method used and the advantage of continuously assessing mental health parameters that can be used in defining patterns of emotional and/or mental health problems in order to personalize interventions to each student according to their needs (de Vries et al., 2021).

One such EMA instrument is MoodWheel (MW), created by David (David, 2013) and it is available on Google Play and the App store. The tool is based on the Circumplex Model of Emotions (Russell, 1980) and the Binary Model of distress (Ellis & Harper, 1975; Ellis, 1991) and is composed of four subscales: negative functional emotions, negative dysfunctional emotions, positive functional emotions and positive dysfunctional emotions. The app offers users the possibility to rate each emotion on the mood wheel and indicate their intensity, to measure their pulse using the camera from the mobile, to measure physical activity and to monitor social media use on their telephone. Moreover, the app can be personalized to include the ABC model of cognitive-behavioral therapy (Ellis, 1991) and psychological questionnaires. Furthermore, the Google Play version of the app can be connected to a wearable device (Polar Verity Sense) that can measure heart-rate variability. MoodWheel`s preliminary investigation was conducted by David in 2013 using a sample of 82 adults and the results showed adequate reliability and internal consistency. The MW app has two versions, one for adults and one for children and adolescents. Each of the two versions can accommodate appropriate psychological questionnaires while the children`s version has a prompt for each emotion, to help them better distinguish between them.

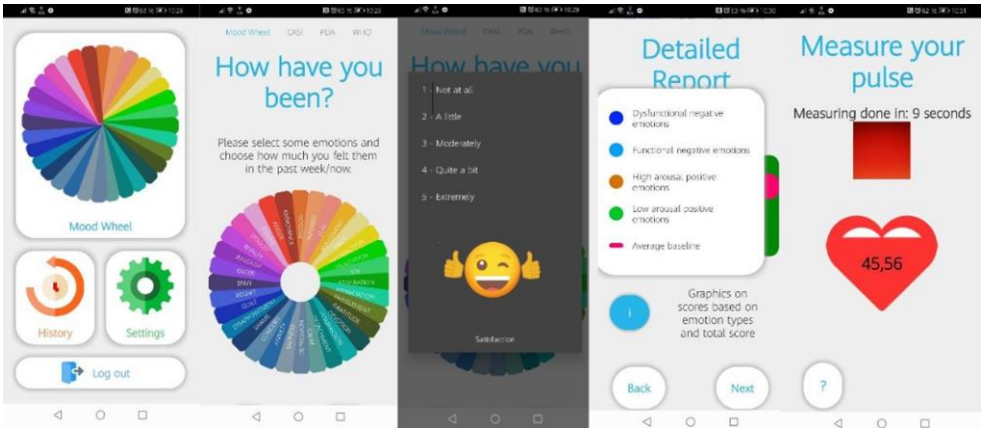

Figure1. The MoodWheel

The app was used in a study to monitor students' emotions and stress during their first year of college (David et al., in preparation). We investigated the app`s factorial structure and validity against standardized measures for children and adolescents (David, Tomoiaga & Fodor, in review) and for the student population (David, Tomoiaga & Fodor, in preparation). Apart from validity and factorial structure aspects, the acceptability of the app and intervention is a very important and heavily debated subject in literature regarding the use of mobile apps for mental health assessment and interventions (Berry et al., 2016).

The usability aspect is mostly studied employing the System Usability Scale (SUS; Brooke, 1986). O'Donnell and collaborators (2019) assessed usability of a mobile intervention for alcohol-harm minimization intervention using the SUS scale and their results showed that the app had good usability above the cutoff of 68. Newton and collaborators (2020) tested a CBT-based app for adolescents with anxiety and assessed its usability with the SUS scale. Their results showed above average scores for the total scores of SUS. Boemo and collab. (2022) also developed an EMA-based app to assess emotions and emotion regulation obtaining above average evaluations for usability.

The aim of the study was to assess the usability of the MoodWheel app in the student population. We collected usability data of the app on students who participated in another research project that used the MoodWheel app for mood assessment.

Method

Participants & Procedure

Participants were 505 students, mean age of 19.33 (*SD* =1.80, min 18 and max 34) that were enrolled in a study that involved using the MoodWheel app to monitor their mood. Out of our sample, 75% were females and 51% of them used the iOS operating system while 49% of them used an Android system.

Participants were instructed to use the MoodWheel app to monitor their mood daily for a month. Following that month, they were asked to complete the usability scale (SUS; Brooke, 1986). The MoodWheel app is an ecological momentary assessment instrument that is available on mobile on Google Play and the App Store. In order to gain access, participants have to create an account using a valid email address or by using Facebook or Gmail accounts. Then, they must agree to the terms and conditions. Furthermore, they are asked to evaluate how they are feeling now on the mood wheel (see *Figure.1*) and are invited to select each emotion and indicate its intensity on a scale from 1 to 5. After completing the evaluation, they receive a graph with their stress levels and are invited to record the rest of the parameters (e.g., heart-rate, physical activity, mobile activity such as call log, social media use and psychological questionnaires).

Measure

For assessing usability in students, we used the System Usability Scale (SUS; Brooke, 1986). SUS is a self-report scale containing 10 items, each of them describes a specific feature of the usability aspect such as frequency of use, complexity or learnability. The scale was widely used in studies for assessing usability (Kaya et al., 2019; O'Donnell et al., 2019) by computing a total score. The total scores ranged from 0 to 100 and studies suggest that a score above 68 (Brooke, 1986) represents good usability. All items are rated on a 5-point Likert scale from strongly disagree to strongly agree. Other studies using this scale compute other two factors such as learnability and usability, but there are concerns and debates regarding their factorial structure, so results should be interpreted with caution (Lewis, 2018). In this study we computed the total score and also the Usability and Learnability factors. Besides the scale, we also included three more items targeting perceived discomfort, perceived disturbance of intimacy and time taken to get through the app. All three items were negatively phrased (e.g., the app and the parameters assessed are making me uncomfortable) and were rated on a 5 point Likert scale from 1 - strongly disagree to 5 - strongly agree.

Results

Our results are based on a sample of 505 students with a mean age of 19.33. We computed the total score of SUS by scoring each item on the scale. The odd numbered items 'score is the item position minus 1, and for the remaining one's it is 5 minus the score position. The total score is calculated by multiplying the sum of the items by 2.5, thus resulting in a total score ranging from 0 to 100. Our result showed a mean of 72.81, *SD*= 16.52 for the total score, indicating good usability. For the Learnability factor we obtained a mean of 3.61, *SD*=.66 which is above average and for Usability factor we obtained a mean of 2.91, *SD* =.66. Both scores are above average, indicating good usability and learnability, but there are no guidelines on how to interpret them. The data pertaining to means and standard deviations is presented in *Table 1*.

Table 1. Means and standard deviation

	N	Minimum	Maximum	Mean	Standard Deviation
SUS Total	505	5	100	72.81	16.525
Usability	505	2	9	2.77	1.324
Learnability	505	8	32	23.34	3.509
Intimacy	505	1	5	1.88	1.123
Discomfort	505	1	5	1.84	1.080
Valid (listwise)	505				

In regard to the discomfort item, the mean score was 1.84, *SD*= 1.08 indicating that participants did not consider that the app made them feel discomfort. The mean for privacy was 1.88, *SD*=1.12, indicating that participants did not consider that the app invaded their privacy.

Discussion

The aim of the present study was to assess the usability of the MoodWheel app in a student sample. We assessed usability of the MoodWheel app on a sample consisting of 505 students who participated in a larger study and had to complete the MoodWheel app daily, completing the usability app a month later.

Results of the usability scale were above average and taking into account the recommendations (De Vries et al., 2021) from literature we can conclude that the MoodWheel has good usability as an EMA app that evaluates mood. The Learnability and Usability scores also represent above average evaluations, indicating the app's acceptable usability.

Our results regarding the privacy and discomfort add on to the acceptance of the App by the targeted users. Acceptance is an important aspect when considering apps used for mental health assessment and/or interventions and is widely discussed in literature (Berry et al., 2016).

Our results on the usability of our EMA app are similar to those reported in literature. Bailon & collab. (2019) evaluated the usability of their EMA app used for assessing affective states and their results on usability were a little lower compared to our results. This indicates that MoodWheel has the opportunity to be more feasible and accepted by the population as an evaluation instrument.

This study has important implications especially regarding practical aspects. Having an EMA tool that has high usability and acceptability to evaluate emotions in student populations is important and very useful due to the access to real time monitoring of emotions allowing for the possibility of developing personalized interventions. Also, MoodWheel represents an accessible and easy to use assessment method that can be further enriched to address all needed aspects and using EMA methodology which is in line with the latest recommendations for early detection of emotional problems.

Limitations

This study has the limitation of relying only on a self-report instrument and not including other types of qualitative assessment as well. However, focus groups were used as part of the refinement process.

Conclusion

In conclusion, in this study, we investigated the MoodWheel app, as a new measure developed in an ecological momentary assessment framework, that has the ability to accurately assess students' levels of stress and overall mental health. Results have shown that the app has good usability and acceptability in the targeted population and a promising ability to detect psychological distress.

Authors' note

Declaration: The first author was involved in collecting data and writing the paper and the second author was involved in writing the paper. The third author performed the conceptualization, supervision, acquiring the funding and revision of the manuscript.

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Ethical approval: All procedures performed in study involving human participants were in accordance with the ethical standards of the institutional research committee. The study was approved by the The Scientific Council of the Babeș-Bolyai University with the approval number 14.182/14.10.2022 and preregistered in Clinical Trials with no NCT06085872.

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study.

The datasets generated during and/or analysed during the current study are not publicly available but are available from the corresponding author on reasonable request.

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