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## **NALU. MINDFUL MOVEMENT: DEVELOPMENT AND VALIDATION OF A PSYCHOEDUCATIONAL PROGRAMME FOR THE PREVENTION OF ANOREXIA IN EDUCATIONAL SETTINGS**

**Nalu. Mindful Movement: Opracowanie i walidacja psychoedukacyjnego programu profilaktyki anoreksji – kontekst edukacyjny**

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### **Abstract**

The aim of this article was to present the development and empirical validation of the *Nalu. Mindful Movement* psychoeducational programme, designed to prevent anorexia among adolescents. This programme, intended for implementation in schools and care institutions, was developed in accordance with the PRECEDE-PROCEED model which provides a structured approach to identifying needs, planning interventions, and evaluating their effectiveness. It was specifically tailored for individuals at risk of developing anorexia, based on the scientific model of the Anorexia Readiness Syndrome (ARS). The programme incorporates the latest guidelines for health education and includes interventions targeting both subjective aspects (related to experiences and perceptions) and physiological factors. The programme was created based on a comprehensive review of contemporary methodologies in eating disorder prevention and health education programmes. The distinguishing feature of the programme is that it has been validated at both subjective and physiological levels.

An analysis of the programme's effectiveness revealed significant educational and psychosocial benefits. The programme was empirically validated both at the subjective (psychometric) and objective (physiological) levels. The evaluation involved 42 young women exhibiting symptoms of Anorexia Readiness Syndrome (ARS). Well-being was assessed using subjective measures (stress, anxiety, mood, and eating disorder symptoms) and objective physiological indicators (heart rate and heart rate variability – HRV). The participants demonstrated a marked improvement in their understanding of anorexia, its risk factors, and preventive strategies. The integration of bottom-up processes (enhanced sensitivity to bodily signals) and top-down processes (regulation of thoughts, emotions, and beliefs) was the key mechanism responsible for the programme's success. This approach resulted in improved emotional awareness and regulatory skills, as well as increased self-esteem, motivation, and a sense of agency.

among participants. The programme also fostered the development of critical thinking and reflection on cultural norms, enabling young people to make informed decisions about their health and well-being.

The findings highlight the programme's potential to holistically support the prevention of eating disorders, and the educational and emotional development of adolescents. The study also emphasises the need for further development of similar initiatives that integrate multidimensional approaches to health prevention.

**Keywords:** health pedagogy, health education, prevention, educational programme, eating disorders, anorexia.

## Streszczenie

Celem niniejszego artykułu jest przedstawienie opracowanego i empirycznie zweryfikowanego programu psychoedukacyjnego *Nalu. Mindful Movement*, zaprojektowanego w celu zapobiegania anoreksji wśród młodzieży. Program, przeznaczony do wdrażania w szkołach i placówkach opiekuńczych, został opracowany zgodnie z wytycznymi modelu PRECEDE-PROCEED, który zapewnia ustrukturyzowane podejście do identyfikacji potrzeb, planowania interwencji i oceny ich skuteczności. Program stworzono z myślą o osobach zagrożonych wystąpieniem anoreksji, opierając się na naukowym modelu Syndromu Gotowości Anorektycznej (ARS). Program uwzględnia najnowsze wytyczne dotyczące edukacji zdrowotnej, a jego interwencje obejmują zarówno aspekty subiektywne (związane z doświadczeniami i przeżyciami), jak i fizjologiczne. Powstał na bazie kompleksowego przeglądu współczesnych metodologii prewencji zaburzeń odżywiania oraz programów edukacji zdrowotnej. Jego wyróżnikiem jest walidacja zarówno na poziomie subiektywnym, jak i fizjologicznym.

Badania nad skutecznością programu wykazały istotne korzyści edukacyjne i psychospołeczne. Uczestnicy znacząco poprawili swoje zrozumienie anoreksji, jej czynników ryzyka oraz strategii zapobiegawczych. Kluczowym mechanizmem skuteczności programu było zintegrowanie procesów oddolnych (uwrażliwienie na sygnały cielesne) i odgórnych (regulacja myśli, emocji i przekonań). Rezultatem była poprawa świadomości emocjonalnej i umiejętności regulacyjnych, a także wzrost samooceny, motywacji oraz poczucia sprawczości uczestników. Program wspierał również rozwój krytycznego myślenia i refleksji nad normami kulturowymi, co umożliwiło młodym ludziom podejmowanie świadomych decyzji dotyczących zdrowia i dobrostanu.

Wyniki badań podkreślają potencjał programu w holistycznym zapobieganiu zaburzeniom odżywiania oraz rozwoju edukacyjnym i emocjonalnym młodzieży. Wskazano także na konieczność dalszego rozwijania podobnych inicjatyw, które integrują podejście wielowymiarowe w profilaktyce zdrowotnej.

**Słowa kluczowe:** pedagogika zdrowia, edukacja zdrowotna, profilaktyka, program edukacyjny, zaburzenia odżywiania, anoreksja.

## Introduction

The escalating health risks in the 21<sup>st</sup> century, exacerbated by the rising mortality associated with lifestyle diseases, necessitate the search for effective strategies to mitigate this surge of illness and to promote overall well-being. Eating disorders (ED), particularly anorexia nervosa (AN), which is characterised by impaired psychosocial functioning and may lead to the onset of other mental health disorders, are a prevalent issue in this context (Dakanalis, et al., 2019). The existing treatments for AN demonstrate inconsistent effectiveness, and the disorder frequently results in significant clinical and social repercussions due to its protracted nature and increased rates of chronicity, mortality, and relapse (Herpertz-Dahlmann et al., 2018).

These considerations underscore the urgent need to reflect on preventive intervention strategies. The development of comprehensive preventive strategies and the establishment of early intervention programs should be prioritised. Such initiatives have the potential to curtail the burden of AN by addressing the root causes of the disorder and mitigating its profound impact on individuals and society.

The advancements of restorative medicine, including new pharmaceuticals and sophisticated diagnostic and treatment technologies, are costly to implement, which renders them largely inaccessible to many individuals. In contrast, health education and prevention initiatives can be made available to virtually everyone. Due to their relatively modest costs, these initiatives can be regarded as investments that are likely to generate savings by reducing the expenses associated with treatment, care, and rehabilitation of individuals with health conditions.

In contemporary pedagogical literature, health pedagogy is considered a distinct subdiscipline in research areas focusing on the diagnosis of health needs, health interventions, and analysis and evaluation of health education processes designed to enhance physical, mental, and social health, as well as the life skills that promote a healthy lifestyle and improve the overall quality of life at all stages. This approach aims to inform compensatory pedagogical actions that benefit both the individual and the broader environment (Syrek, 2008; Woynarowska, 2023). Since health is an inherently interdisciplinary concept, health education interventions require collaboration among specialists from a myriad of fields, including medicine, psychology, pedagogy, sociology, and philosophy, in both conducting research and devising prevention programs informed by such research.

Health education should be regarded as a fundamental component of the treatment and prevention of ED, and the promotion of healthy eating habits. The rising incidence and high risk of life-threatening outcomes associated with these disorders across diverse age groups contribute to their global spread, posing not only a significant medical challenge but also a social and an economic burden. Educating individuals at risk of ED can foster a sense of co-responsibility for their treatment and well-being, thereby facilitating a partnership-oriented and a professional relationship among the participants in this process.

The purpose of this article is to present *Nalu. Mindful Movement*, an empirically validated psychoeducational programme for the prevention of anorexia, which can be utilised and implemented by teachers and educators in schools and other care settings. This prevention programme was developed between 2023 and 2024 in accordance with the guidelines of the PRECEDE-PROCEED model of health education programme planning (Green & Kreuter, 2005), which offers a structured approach and effectively addresses the complex determinants of anorectic eating disorders. This model provides a systematic approach to identifying needs, planning interventions, and evaluating the effectiveness of educational activities.

In the following sections, all eight phases of the PRECEDE-PROCEED model (Green & Kreuter, 2005) are presented, encompassing both the diagnostic (PRECEDE) and the implementation and evaluation (PROCEED) components. This comprehensive framework guided the conceptualisation, development, implementation, and assessment of the *Nalu. Mindful Movement* programme. Each phase demonstrates how theoretical foundations were translated into contextually appropriate and evidence-based strategies to address the increasing prevalence of anorexia nervosa (AN) among adolescents. The structure of the article reflects its primary objective: to provide a detailed account of a scientifically grounded, systematically planned, and practically applicable preventive intervention. The programme has the following characteristics: (1) it was designed specifically for individuals who have been diagnosed as being at risk of developing AN based on the scientific model of the Anorexia Readiness Syndrome (ARS) (Ziółkowska, 2001); (2) it was designed according to the latest health education guidelines to incorporate the population health model with interventions targeting both psychological and physiological issues (Borden & Cook-Cottone, 2020; Sala, et al., 2020; Syper, et al., 2023); (3) it was developed based on a comprehensive review of contemporary ED prevention methods (Korsak, 2022), as well as health education programmes (Korsak, 2023). A distinguishing feature of the programme is that it has been validated at both subjective and physiological levels (Korsak & Ratajczak, 2025).

### **Nalu. Mindful movement.**

#### **Phases of the precede-proceed model (Green & Kreuter, 2005)**

##### **Part One – PRECEDE**

###### *Phase 1: Social Assessment and Situational Analysis*

Health disorders encompassing both physical and mental ailments adversely impact cognitive processes, perception, emotions, behaviour, and social relationships, thereby constraining the educational and developmental opportunities available to individuals. This presents a significant challenge for teachers and educators who are tasked with creating environments that assist students in navigating their difficulties and realising their potential. Recent global events, including the COVID-19 pandemic, the climate crisis, and political instability, have exacerbated issues such as anxiety, depression, eating disorders, and suicide (Cianconi, et al., 2020; Devoe, et al., 2023; Persaud, et al., 2018; Torales, et al., 2020). These circumstances necessitate the implementation of appropriate pedagogical measures, including emotional education, prevention programmes, and the cultivation of mental resilience among youth.

In many countries, the prevailing health model is predicated upon the traditional medical framework that predominantly emphasises emergency care. This methodology

engenders a substantial imbalance between the demand for and the availability of services (Carbonell, et al., 2020). Therefore, concepts associated with a paradigm shift in healthcare are emerging. A population health approach has the potential to address the health needs of extensive demographic groups. This model examines the determinants of health, including lifestyle choices and various social factors, while focusing on disease prevention and the implementation of interventions aimed at averting health complications (Samet & Hussein, 2024). Health education that fosters community engagement is a critical component of this paradigm, creating a ripple effect whereby healthier behaviours are normalised and adopted at the societal level.

*Phase 2: Identification of Health Issues and Risk Factors within a Population through Traditional Epidemiological Indicators and Analyses of Genetic, Behavioural, and Environmental Determinants.*

It is estimated that eating disorders lead to the loss of over 3.3 million healthy life years globally each year. Unlike other mental health conditions, the years lived with disability (YLDs) linked to AN and bulimia nervosa continue to increase. Despite progress in treatment options, mortality rates for these disorders remain disturbingly high (van Hoeken & Hoek, 2020). The risk of suicide is eleven-fold higher in individuals with severe eating disorders than in their peers without symptoms of an eating disorder. Furthermore, this risk is twice higher in individuals presenting with sub-threshold symptoms (Lipson & Sonnevile, 2020). Eating disorders significantly decrease the quality of life, and annual healthcare expenses in this group are 48% higher compared to the general population (Van Hoeken & Hoek, 2020).

The health implications of mental disorders, as quantified by Disability-Adjusted Life Years (DALYs) – a metric that accounts for years of life lost due to premature death, as well as years of life lived with a disability, adjusted for the severity of that disability – are most pronounced in the 14 to 24 age group (Global Psychology Alliance, 2024). After the political transformations of 1989 in Central and Eastern Europe, AN and bulimia nervosa have emerged as the most prevalent mental disorders affecting female adolescents in Poland (Pilecki, et al., 2009). From a population health perspective, targeted investments in the quality of life of this age cohort would likely yield significant benefits.

*Phase 3: Educational and Environmental Assessment – Identification of Factors Influencing Health Behaviour*

The treatment of AN poses a significant challenge, particularly if an intervention is not initiated within the first three years following the onset of symptoms (Treasure & Russell, 2011). The effectiveness of the currently available treatment modalities is limited,

with only 30–40% of patients achieving remission (Stice, et al., 2021). Early identification of individuals at risk, combined with widespread implementation of effective prevention programmes, holds promise for halting the progression of the disorder and reducing the overall prevalence of ED.

The population-based approach to health underscores the critical importance of health education in preventing and significantly mitigating the development of AN, particularly among young females. To implement effective educational interventions, it is essential to identify the optimal moment at which the issue can be addressed educationally, before it progresses to a stage that requires clinical treatment. The associated disease risks and risk factors must also be identified. The ARS model developed by Ziółkowska is a noteworthy framework in this context. The model supports the identification of symptoms indicative of potential abnormalities in the fulfilment of nutritional needs and attitudes towards one's own body (Ziółkowska, 2001). The ARS also considers risk factors that may be utilised to develop educational interventions. An individual's susceptibility to eating disorders is assessed with the use of specific indicators relating to psychological (Psyche: Self-Esteem, Perfectionism and Perseverance, Attitude Towards Food, Sense of Self-Attractiveness, Emotions and Moods), physiological (Soma: Body Weight and Dimensions), and social (Polis: Relationships within the Family System, Susceptibility to the Influence of Advertising) dimensions. It has been posited that the ARS comprises a set of symptoms that are situated primarily within cognitive and behavioural domains and raise concerns regarding abnormal recognition of hunger and satiety, attitudes towards one's own body, and the internalisation of media messages regarding physical attractiveness (Ziółkowska & Ocalewski, 2021).

Although the ARS incorporates the term "anorexia," it is not equivalent to a clinical eating disorder such as AN. Rather, ARS refers to a constellation of cognitive, emotional, and behavioural predispositions that may increase the likelihood of developing AN. Consequently, it serves as a valuable reference for educational interventions because it identifies several key factors that contribute to the development of AN. These factors include the desire for peer acceptance, tension arising from the need for social comparison, drive for control, competitive behaviours, perfectionism, and conflicting pressures faced by young women.

*Phase 4* consists of two parts:

1. Intervention Planning – development of strategies and methodologies for implementing the programme based on a previous diagnosis.

Current psycho-pedagogical knowledge indicates that the provision of learning materials in a pre-packaged format does little to engage learners and fails to facilitate the assimilation of content (Marshall, 2014). Furthermore, research on the prevention of eating disorders suggests that didactic psychoeducational interventions are less effective

than interactive approaches (Shaw, Stice, & Becker, 2009). Therefore, solutions should be sought within the interpretivist-constructivist paradigm which posits that stimulating activity and fostering conditions conducive to independent work are the key prerequisites for a successful outcome.

Expanding on this, the theory of expansive learning underscores the significance of collaborative processes and the transformation of learning environments through active participation. Expansive learning is a process of creating new meanings through iterative cycles of questioning, reflection, and innovation. This framework is particularly relevant for addressing complex issues, such as the prevention of eating disorders, where interactive and experiential methods assist learners in exploring the underlying factors and developing sustainable strategies (Engeström & Sannino, 2013).

Moreover, the humanistic paradigm posits that education should take place in a multidimensional context. This approach differs from popular concepts in that it encompasses not only cognitive functions but also the physical body and emotional experiences. This perspective arises from a holistic conception of the human being, where different spheres of functioning are not separated, but form an integral whole (Hannaford, 1998).

Jack Mezirow's theory of transformative learning aligns with this perspective by underscoring critical reflection as a fundamental mechanism in adult education. Transformative learning takes place when individuals critically assess their beliefs, assumptions, and experiences, which leads to profound changes in their worldview. Within the framework of AN prevention programmes, this approach can empower learners to question societal norms and biases related to body image, thereby facilitating the development of healthier self-perceptions. The reflective aspect of transformative learning promotes a deeper engagement with content and encourages the synthesis of theoretical knowledge with personal experiences, which is essential for enduring behavioural change (Pleskot-Makulska, 2007).

David A. Kolb's model of experiential learning aligns seamlessly with the aforementioned concepts by positing that the learning process is cyclical and encompasses intellect, emotion, and practical action. This model comprises four stages: concrete experience, reflection on experience, formulation of abstract concepts, and active experimentation (Kolb & Kolb, 2017). This framework not only enables the participants to acquire theoretical knowledge but, more importantly, to assimilate it through practice and reflection, which is crucial in AN prevention programmes. Engaging students in body work activities, such as mindfulness practice, yoga, intuitive movement, exploration of emotions related to body image, and the development of interpersonal skills and interoceptive awareness, supports the cultivation of healthy habits and fosters a positive self-attitude. Kolb's method facilitates direct involvement in the learning process, which, according to research on the efficacy of interactive interventions in eating disorders, significantly enhances the effectiveness of preventive measures. Consequently,

this method addresses educational needs in a manner consistent with a holistic and humanistic approach.

The significance of reflective education in adult learning and methodologies that integrate individual experiences with broader social and cultural contexts should be underscored. Such approaches encourage learners to engage critically with the learned content and to co-construct knowledge through dialogue and collaboration (Perkowska-Klejman, 2013). The above approach aligns with the principles of expansive and transformative learning by fostering agency and adaptability in learners. Reflective education creates opportunities for meaningful and sustainable change by situating the learning process within the participants' personal experiences.

Body-oriented methods such as yoga, mindfulness, and dance and movement therapy are increasingly employed in the prevention and treatment of eating disorders (Borden & Cook-Cottone, 2020; Sala et al., 2020; Syper et al., 2023). These approaches aim to enhance protective factors by fostering a positive body experience and mitigating risk factors. A systematic review of body-oriented therapies in the prevention of eating disorders has demonstrated that programmes based on bodywork techniques are effective in reducing risk factors and promoting protective factors. Furthermore, these techniques can be incorporated into a fundamental therapeutic framework to significantly reduce the symptoms of eating disorders (Korsak, 2022).

2. Administrative and Political Assessment – identification of opportunities and resources pertinent to the implementation of the programme.

Research has demonstrated that a skilful combination of health education, promotion, and prevention activities can produce synergistic effects, thus enhancing the efficacy of these measures and contributing significantly to public health improvement (Woynarowska, 2023). The discussed strategies align with the contemporary empowerment model, which is a collaborative approach to health promotion that involves individuals and communities. This model is predicated on social policies that promote education and health. The empowerment of individuals and communities is the critical element of this model because it enables the participants to assume control over their health and life (Syrek, 2019). The empowerment model is consistent with the holistic approach in health pedagogy, which recognises the interdependencies between physical, mental, and social health. In this context, the promotion of shared responsibility is a key educational component that encourages individuals and communities to actively cultivate a health-promoting environment. Health education has two primary goals within this framework: to foster a supportive environment for the acquisition of knowledge about health, health resources, risks, and diseases, and to influence decision-makers who formulate social policy, determine the functioning of environments, and support individual and community health initiatives (Woynarowska, 2023).

## Part Two – PROCEED

### Phase 5: Implementation of the Programme Based on the Established Strategy and Using the Planned Methods

In view of the above, the *Nalu. Mindful Movement* programme is founded on five key educational principles:

*Learning is a continuous process embedded in experience.* Knowledge is consistently derived from experience and tested through experience. However, the source of learning is the reflective engagement with experience, rather than the experience itself. The educational process can be enriched by emphasising the learner's perspectives and articulated theories, scrutinizing and evaluating these theories, and integrating new and enhanced ideas into the existing belief system.

*Learning is a fundamental process of human adaptation.* Effective learning requires four essential skills: (1) the ability to grasp specific experiences, (2) the capacity to reflect on those experiences, (3) the aptitude for abstract conceptualisation, and (4) the ability to actively experiment with the acquired knowledge. Mindfulness practice seeks to transcend automatism and facilitate direct and unmediated experiences, which is critical to the learning process. When individuals engage attentively, they (1) examine a situation from multiple perspectives, (2) perceive the information presented within that context as novel, (3) remain cognisant of the context in which this information is perceived, and ultimately, (4) formulate new categories for processing that information.

*Learning is a holistic process of adapting to the world.* Experiential learning integrates all mental functions and responses: thinking, feeling, perceiving, and taking action. It is not confined to a specific domain of human activity, such as cognition or perception. An understanding of the mechanisms that underlie thought and emotion is not sufficient: one should also be able to distinguish between behaviours that are influenced by conscious thought and those that are driven by affective responses.

*Learning involves an interaction between the individual and the environment.* Knowledge is the product of the exchange between social and individual knowledge. The former is a compilation of human cultural experiences, while the latter reflects an individual's subjective experiences. Knowledge is generated through the interplay of objective and subjective experiences in a process referred to as learning. As learners, we do not merely respond to a predetermined environment; rather, we actively construct situations that align with our learning intentions.

*Learning is best understood as a process, rather than in terms of outcomes.* Learning encompasses successive stages of knowledge acquisition, but it does not end upon the attainment of knowledge, nor is it always evident through tangible experience. Instead, learning is an ongoing process characterised by continuous experience. Concepts and reflections are not static; they are formed and transformed through successive experiences.

*Nalu. Mindful Movement* is a proprietary programme for the prevention of eating disorders that focuses on the emerging risk factors of the ARS in three spheres: (1) psyche, (2) soma, and (3) polis. The programme relies on mindfulness-based bodywork and involves the most effective and scientifically proven bodywork techniques, as well as attention-based cognitive therapy and cognitive-behavioural methods.

The programme comprises four modules, and it lasts four weeks, with one session per week. Each module consists of two components: (1) a psychoeducational component that lasts 1 hour and 15 minutes and focuses on mental health promotion, understanding the unity of body and mind, effective emotional regulation, body image, mindfulness, social pressures, and cultural influences on beauty standards; and (2) a movement component that lasts 1 hour and involves a mindfulness-based approach to enhance interoceptive awareness.

The programme addresses three important domains of human functioning, but it serves educational rather than psychotherapeutic purposes. It does not aim to reorganise psychological structures or processes; instead, it provides knowledge, skills, and competencies that support self-regulatory processes. Through this approach, individuals at risk of developing a disorder can rely on their abilities to stay in good mental health.

The objective of the programme is to provide the participants with support in identifying and changing inappropriate beliefs and habits, and developing more effective and appropriate ways of dealing with difficult situations. The programme helps cultivate the skills needed to understand and correct faulty thinking, which contributes to a positive self-image and acceptance of one's own body. Furthermore, the programme aims to improve daily functioning and teach healthy strategies for coping with challenges, including improved body self-awareness.

Learning to consciously identify own thoughts, feelings, and behaviours is central to the programme. This is achieved by, among other things, paying attention to bodily responses and their relevance in daily life. By acquiring and developing these skills, the participants become empowered to take control of their lives (Wojnarowska-Soldan 2017). The programme can also help individuals reduce undesirable behaviours, improve their living conditions, and optimise their overall health (Sokołowska 2007). The programme can be implemented in both individual and group settings.

The programme addresses the risk factors of ARS, encompasses three spheres of human functioning, and is based on psychoeducation that targets individual, social, and body-oriented resources. The educational principles underpinning each module are discussed below.

### **Module 1: Strengthening Self-Esteem**

Educational Objectives: (1) to develop self-awareness and self-acceptance, (2) to establish a healthy self-esteem that is grounded in internal resources, and (3) to comprehend cultural pressures related to appearance.

Description: The module aims to enhance the participants' self-awareness by encouraging reflection on individual values, inner resources, and experiences. The participants reflect on how their traits, talents, and relationships influence their identity. The exercises in this module have been designed to facilitate the discovery and reinforcement of self-esteem, and to foster a healthy relationship with one's own body based on internal resources, rather than external judgments or standards.

### **Module 2: Positive Body Image**

Educational Objectives: (1) to critically analyse social norms of beauty and the influence of media, (2) to promote a healthy relationship with the body by understanding its functionality, and (3) to foster body acceptance irrespective of external standards.

Description: The module centres on assisting participants in cultivating a healthy attitude towards their bodies by fostering an awareness of their functional value. The participants reflect on the impact of social and media role models on their perceptions of appearance and learn to critically evaluate unrealistic beauty standards. Through discussions as well as group and individual exercises, the participants develop skills to identify destructive messages and appreciate the body for its capabilities, such as movement, health, and emotional expression. The module reinforces the acceptance of diversity in appearance and cultivates positive self-attitudes, thereby contributing to the prevention of eating disorders.

### **Module 3: Regulation of Emotions and Relationship with the Body**

Educational Objectives: (1) to develop the ability to recognise and express emotions, (2) to establish a healthy relationship with the body as an integral component of personality, and (3) to enhance awareness of the body and its needs.

Description: In this module, the participants learn to recognise and accept their emotions as a natural aspect of everyday experiences. Workshops and exercises will focus on the practical dimensions of developing emotion regulation skills, including relaxation techniques, breath work, and exercises designed to establish healthy boundaries within relationships. The participants are encouraged to explore the interplay between their emotions and bodily needs, thus fostering a positive relationship with their bodies. Furthermore, the module aims to cultivate empathy towards oneself and others, while promoting authenticity in interpersonal relationships.

### **Module 4: Mindfulness and Future Planning**

Educational Objectives: (1) to develop mindfulness and emotion regulation in daily life, (2) to strengthen self-acceptance and self-compassion, and (3) to consolidate the acquired knowledge and build long-term resilience to pressure.

Description: The concluding module centres on integrating the acquired knowledge and tools into participants' daily functioning. The participants are encouraged to develop mindfulness by practicing techniques, such as observing thoughts, regulating automatic emotional reactions, and expressing gratitude. They formulate plans to implement positive changes in their lives, which enhances their commitment to maintaining a healthy relationship with their bodies and emotions. Reflecting on progress, discussing challenges, and reinforcing self-acceptance are the pivotal components of the final module which enable the participants to further cultivate and solidify healthier patterns of thought and behaviour.

#### *Phase 6: Process Evaluation*

The programme was implemented by the EMPATIA Academic Psychological Assistance and Therapy Centre (AOPPiT EMPATIA) of the University of Warmia and Mazury in Olsztyn, and its effectiveness at both subjective and psychophysiological levels has been empirically validated (Korsak & Ratajczak, 2025). The programme relies on AidMed, an advanced biofeedback device that enables real-time monitoring of bodily responses by measuring physiological parameters, such as the respiration rate and heart rate variability (HRV).

The program has been evaluated based on several key aspects, including the participants' feelings and physiological indicators, to enable further improvement and development of its components.

The programme's effectiveness was validated between March and December 2023. The implementation comprised two phases: (1) a control phase and (2) an experimental phase. Each phase lasted four weeks. The objective of the control phase was to register the initial parameters which were then used as the baseline for the experimental phase. The aim of the experimental phase was to monitor changes in the levels of subjective and psychophysiological variables in women at risk of anorectic eating disorders who had participated in educational classes based on the *Nalu. Mindful Movement* programme. During the experimental phase, the sessions were held once a week. Three components of the programme were experimentally verified: (1) the Dance and Movement Therapy component; (2) the Yoga component, and (3) the Mindfulness component, across three experimental groups: (1) the *Nalu. Mindful Movement* Dance and Movement Therapy group; (2) the *Nalu. Mindful Movement* Yoga group, and (3) the *Nalu. Mindful Movement* Mindfulness group. In each group, subjective assessments of psychological well-being and physiological parameters were conducted three times as part of: (1) a pre-test of the control phase, (2) a post-test of the control phase that also constituted the pre-test of the experimental phase, and (3) a post-test of the experimental phase. In addition, at the beginning and end of each session during the experimental

phase, stress levels and mood were assessed using the thermometer method. The research project was approved by the Research Ethics Committee of the University of Warmia and Mazury in Olsztyn (Decision No. 17/2021).

Due to the lack of established norms for the Anorexia Readiness Syndrome Inventory (SGA-12), a pre-anorexic state is diagnosed when the ARS score is more than one standard deviation above the mean (Ziółkowska & Ocalewski, 2021). A total of 98 participants aged 18–25 who self-reported concerns related to eating disorder-like habits and beliefs volunteered for the study. Their eligibility was evaluated in two stages. First, the participants completed the SGA-12 questionnaire to confirm the presence of pre-anorexic symptoms. This was followed by a structured clinical interview to exclude individuals with existing mental disorders or somatic illnesses. Due to diagnoses of eating disorders and various organisational factors, 49 participants withdrew from the study. The remaining subjects were randomly assigned to experimental groups. Ultimately, 42 individuals aged 19–25 ( $M = 22.10$ ,  $SD = 1.69$ ) completed the training: NaluDMT = 10, NaluYoga = 17, NaluMindfulness = 15. Participation in the study was voluntary, and all participants gave their written informed consent before being enrolled in the study.

#### *Phase 7: Impact Evaluation*

The results of programme validation with a detailed analysis are presented in a separate article (Korsak & Ratajczak, 2025). The main conclusions of the validation process are briefly outlined in the following section.

All interventions led to improvements in the participants' subjective measures of well-being, including eating disorder symptoms and mood, relative to both baseline and pre-training measurements. Each intervention was analysed separately, and group comparisons were made at all time points to identify the optimal treatment for ARS.

All interventions resulted in significant or near-significant improvements in physiological measures of well-being, specifically the heart rate (HR) and most HRV parameters. Each intervention was analysed separately, and the groups were compared at all time points to identify the most effective approach to influencing the physiology of ARS. The outcomes were consistent with the nature of each intervention. The Dance Movement Therapy (DMT) did not significantly affect any HRV parameters, and the lack of physiological improvement after DMT suggests that therapeutic movement without thought control may be insufficient to impact ARS physiology. However, the obtained result could also be attributed to smaller sample size compared to other groups. Yoga practice proved to be most effective in stimulating the parasympathetic autonomic nervous system (ANS), as indicated by a decrease in HR and an increase in vagally-mediated HRV indices (RMSSD and HF power). The measures influenced by both branches of the ANS were also improved, including SDNN and total power, although

LF and the LF/HF ratio remained unchanged. Mindfulness meditation appeared to enhance parasympathetic signalling to the heart, although not as effectively as yoga.

Post-intervention energetic arousal was higher after movement-related training (DMT and yoga) than after mindfulness meditation. The observed differences in effects were consistent with the nature of each intervention. The DMT emphasises movement, and it positively influenced mood and body-related experiences. Yoga improves body control, attention, and breathing, and it was the most versatile and effective component of the programme that impacted mood, bodily perceptions, stress, anxiety, and self-related thoughts. Mindfulness meditation focuses on body signals and thought control, and it was effective in altering self-related beliefs and reducing stress and anxiety, but less effective in improving mood and energising the body.

Body movement and bodily self-awareness enhance perception and influence the mind in a bottom-up manner, while thought control exerts a top-down effect on beliefs and emotions.

#### *Phase 8: Evaluation of Outcomes*

The *Nalu. Mindful Movement* programme integrates body movement with mindful attention to bodily sensations, and it had a significant impact on the participants' educational outcomes. The evaluation of outcomes focuses on two primary mechanisms of influence: bottom-up processes derived from enhanced perception and integration of bodily signals, and top-down processes involving thought control and the regulation of beliefs and emotions.

The programme's effectiveness was evaluated based on its impact on educational indicators. The participants' understanding of AN, including the risk factors and preventive strategies, improved markedly, and the acquired knowledge was reinforced through experiential learning activities that integrated movement and mindfulness practices. The programme also fostered substantial improvements in emotional awareness and regulation skills. It enhanced sensitivity to bodily and emotional signals, thus helping the participants to better understand and manage their emotional states – abilities that are vital for effective learning and coping with academic demands. By merging bottom-up approaches, such as sensitivity to bodily signals, with top-down strategies, such as cognitive and emotional control, the programme increased the participants' engagement, motivation, and self-esteem, thus fostering a sense of control over their bodies and minds and contributing to improved academic performance. Moreover, by reshaping beliefs about health and the body, the programme encouraged critical thinking and reflective skills, thus enabling the participants to critically analyse and challenge detrimental cultural norms and make informed decisions regarding their physical and mental well-being.

However, the significance of methodological rigor and interpretive caution should be acknowledged when evaluating the programme (Mertens, 2024). The results of this study offer promising insights into the efficacy of integrated body movement and mindfulness practices to address psychoeducational challenges, particularly in relation to AN risk factors. Nevertheless, due to the methodological limitations of the evaluation, a nuanced discussion is needed to ensure the validity and applicability of the findings.

The *Nalu. Mindful Movement* programme led to measurable improvements in the participants' emotional regulation, self-esteem, and understanding of AN, but small sample size (N = 42) and single-site implementation could undermine the generalizability of the results. In addition, the sustainability of the observed changes could not be monitored due to the lack of follow-up assessments. Research in educational and psychological interventions frequently highlights the risk of temporal decay in intervention effects. Without longitudinal data, it remains unclear whether the programme's benefits persist over time or are merely short-term outcomes of a structured intervention. The decision to evaluate individual programme components (Dance and Movement Therapy, Yoga, and Mindfulness) separately, rather than as an integrated whole, hinders a comprehensive understanding of potential synergistic effects. Holistic interventions should be evaluated for the presence of interactions between their elements. For example, the interplay between movement-based and mindfulness-based components could potentially amplify the resulting benefits through complementary mechanisms – enhanced interoceptive awareness could be accompanied by improvements in emotional regulation.

The present findings are consistent with the foundational principles of the programme and emphasise the importance of experiential and reflective learning. The observed improvements in the participants' emotional regulation, self-esteem, and body image can be attributed to the programme's focus on experiential learning cycles, which actively engaged the participants in reflective observation, conceptualization, and experimentation. These outcomes align with Kolb's experiential learning theory which underpins the programme's design and advocates for the integration of cognitive, emotional, and physical domains in education.

Several recommendations can be made for future research to address the limitations of the study and enhance the evidence base. Firstly, the generalizability of the findings could be improved and potential biases could be reduced by increasing sample size and diversity, and recruiting participants from multiple sites. Secondly, longitudinal assessments with follow-up evaluations at six months, one year, and beyond could be incorporated into the study design to determine the long-term sustainability of the programme's effects. In addition, the programme should be evaluated using a more holistic approach to assess its integrated impact rather than the impact of individual components. Such an approach could provide deeper insights into the potentially synergistic effects of the programme's components, and it would enable the researchers to optimize the

design of the intervention. A mixed-method approach combining quantitative and qualitative techniques could shed new light on the participants' experiences and the nuanced mechanisms driving change.

### Conclusion

The educational program based on mindfulness, bodywork, and analysis of personal beliefs proved to be highly effective in addressing the key educational indicators. The integration of bottom-up and top-down approaches was crucial for the program's multidimensional impact and its ability to promote knowledge acquisition, as well as the development of psychosocial skills. These findings underscore the need for further initiatives that holistically support the prevention of eating disorders and the overall educational and emotional development of young people.

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