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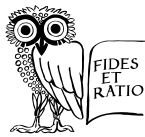


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# The role of neurosonography in the prenatal diagnosis of fetal central nervous system anomalies: A narrative review<sup>1</sup>

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**Abstract:** *Introduction:* Fetal neurosonography is an advanced ultrasound technique for prenatal assessment of the central nervous system (CNS), enabling detailed analysis of brain anatomy and detection of both subtle developmental disturbances and complex congenital malformations. With technological progress and standardization of examination techniques, it has evolved from a method used mainly to detect structural defects into a tool for assessing fetal brain maturation and development, becoming the primary imaging method for the CNS in prenatal diagnostics. *Aim:* This paper presents the contemporary role of neurosonography in the prenatal diagnosis of the fetal central nervous system, with particular emphasis on its clinical applications, diagnostic capabilities, limitations, and prospects for further development. *Method:* It is an analysis of current literature on fetal neurosonography and a narrative review, including the guidelines of the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) and publications concerning examination technique, clinical indications, applications of neurosonography, and new directions in its development. *Results:* Contemporary prenatal CNS diagnostics is based on a two-tier model comprising screening examination and detailed neurosonography performed in cases of suspected abnormalities or the presence of risk factors. Neurosonography is used for the diagnosis of brain developmental malformations, the assessment of cortical maturation, the evaluation of neuronal migration disorders, and the detection of changes associated with intrauterine growth restriction, congenital heart defects, intrauterine infections, and genetic diseases. The method enables detection of subtle neurodevelopmental disturbances even before unequivocal morphological changes appear. Its effectiveness, however, depends on gestational age, imaging quality, and the examiner's experience. In selected cases, diagnostics are supplemented by fetal magnetic resonance imaging. Artificial intelligence, radiomics, and quantitative neurosonography are also gaining increasing importance, as they may enhance the precision and objectivity of prenatal assessment. *Conclusions:* Neurosonography constitutes the primary method for the prenatal assessment of the central nervous system. Its role systematically extends beyond the diagnosis of structural defects, encompassing assessment of brain maturation, qualification for genetic diagnostics, and support in evaluating neurological prognosis. The integration of modern imaging techniques with artificial intelligence tools and molecular diagnostics creates prospects for earlier detection of neurodevelopmental disorders and further development of personalized prenatal diagnostics. **Keywords:** prenatal diagnosis; neurosonography; fetal central nervous system; neurodevelopment; fetal magnetic resonance imaging (MRI).

## Introduction

Fetal neurosonography is a specialized ultrasound method for evaluating the central nervous system (CNS), enabling detailed analysis of brain anatomy and detection of both subtle developmental deviations and complex congenital anomalies. Although it originated from routine ultrasonographic assessment

of fetal anatomy, technological advances have made it a distinct field of prenatal diagnosis. The first reports of transvaginal imaging of the fetal CNS were published in the early 1990s (Monteagudo et al., 1991). Major advances followed improvements in ultrasound systems and transducers and the

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Pawl.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Pawl.pdf)

development of digital image-processing methods, which enabled increasingly high-quality, detailed imaging. At the same time, standardization of examination techniques consolidated neurosonography as the principal method of prenatal CNS assessment and the first-line modality for diagnosing many CNS abnormalities. In selected cases, ultrasound assessment is complemented by magnetic resonance imaging (MRI) (Paladini et al., 2021). Evaluation of the fetal brain remains one of the greatest challenges in prenatal diagnosis because of the dynamic development and structural complexity of the CNS during fetal life. Some abnormalities become apparent only later in pregnancy or after birth. Accurate interpretation therefore requires high-quality equipment, appropriate examination techniques, and substantial examiner expertise (Eixarch et al., 2023; Paladini et al., 2021). In recent years, neurosonography has evolved from a method focused primarily on detecting structural CNS anomalies into an advanced tool for assessing fetal brain development and maturation. Increasing imaging resolution and improved knowledge of normal prenatal development now permit identification of subtle disturbances in brain architecture and markers of atypical neurodevelopment before unequivocal morphologic changes appear.

Contemporary applications of neurosonography therefore extend beyond diagnosing congenital anomalies.

The method is increasingly used to assess cortical maturation, diagnose acquired CNS injury, and identify fetuses at increased risk of neurodevelopmental impairment, including those affected by fetal growth restriction (FGR), congenital heart disease, and intrauterine infection. This broader scope makes neurosonography not only a diagnostic tool but also a source of information on prenatal brain development and the potential neurologic prognosis of the fetus and child (Eixarch et al., 2023; Maligner et al., 2020).

These findings have important clinical implications: they allow clinicians to individualize diagnostic and therapeutic management and coordinate multidisciplinary prenatal and postnatal care, while providing parents with reliable information about

prognosis, the child's possible developmental course, and available treatment and support. Care for a fetus with disease, particularly CNS abnormalities, requires a multidisciplinary team that may include maternal-fetal medicine specialists, neonatologists, pediatric neurologists and neurosurgeons, clinical geneticists, infectious disease specialists, and, in many cases, palliative care specialists.

This narrative review presents the contemporary role of neurosonography in prenatal diagnosis of the fetal central nervous system, with particular emphasis on current indications, diagnostic capabilities, limitations, and future directions. The authors also emphasize the complexity of this field and the need to individualize management in each case.

## **1. Neurosonography in contemporary prenatal diagnosis**

Assessment of the fetal CNS is an integral component of ultrasonography at every stage of pregnancy. As fetal development progresses, CNS anatomy becomes increasingly differentiated, and successive structures and morphologic features emerge that cannot be evaluated earlier in gestation. Consequently, the information obtained during ultrasonography changes with gestational age and CNS maturity. Contemporary prenatal CNS diagnosis therefore follows a two-tier approach, progressing from screening assessment of fetal anatomy during routine ultrasonography to detailed neurosonography when an abnormality is detected, or risk factors are present (Eixarch et al., 2023; Maligner et al., 2020).

It identifies abnormalities that require further evaluation, while targeted neurosonography provides detailed characterization. This two-tier approach preserves screening effectiveness while ensuring comprehensive evaluation of brain structures in fetuses at increased risk of disease (Eixarch et al., 2023; Maligner et al., 2020).

This model is founded on screening examinations performed in accordance with current recommendations, the findings of which determine whether detailed neurosonography is required (Paladini et al., 2021).

### **1.1. Screening examinations**

Screening examinations, routinely performed in pregnant populations, constitute the first stage of prenatal assessment of the fetal CNS. Their purpose is to confirm normal development of cerebral structures or identify abnormalities that require specialist evaluation. The scope of CNS assessment changes with gestational age, reflecting dynamic brain development and the sequential appearance of anatomic structures (Malingier et al., 2020).

Current recommendations recommend performing the first CNS ultrasound between 11 and 14 weeks of gestation to allow an initial assessment of the developing nervous system. Although many cerebral structures have not yet reached maturity, the most severe developmental anomalies, including anencephaly, holoprosencephaly, encephalocele, and major spinal dysraphism, can be detected (Karim et al., 2024; Minister Zdrowia, 2025).

First-trimester CNS assessment includes evaluation of the calvarium, cerebral falx, cerebral hemispheres, and lateral ventricles containing the choroid plexuses, which form the characteristic 'butterfly' appearance confirming normal division of the forebrain into two symmetric hemispheres. More posteriorly, the thalamus and posterior fossa structures are visualized, including the brainstem (BS), the fourth ventricle represented by the intracranial translucency (IT), and the cisterna magna. The examination should be completed by assessing the shape and continuity of the spine (Borowski, et al. 2020).

Assessment of the hindbrain in the sagittal plane is particularly important. Measuring the brainstem (BS) and the distance between the brainstem and occipital bone (brainstem-to-occipital bone, BSOB), then evaluating their ratio, may increase early detection or suspicion of open spina bifida and selected posterior fossa anomalies. The normal BS/BSOB ratio is  $<1$ . An increased ratio results from displacement of posterior fossa structures and is among the earliest sonographic markers of open spina bifida (Lachmann et al., 2011; Volpe et al., 2016). Despite the increasing diagnostic value of first-trimester ultrasonography, assessment of posterior fossa structures and the BS and BSOB parameters is still not routinely performed at all centers, potentially limiting early diagnosis of selected CNS anomalies.

The scope of first-trimester assessment nevertheless remains limited because many cerebral structures have not yet reached a sufficiently advanced stage of development. Consequently, a normal examination does not exclude abnormalities that become apparent later in pregnancy (Karim et al., 2024).

Second-trimester ultrasonography plays a key role in the prenatal diagnosis of CNS anomalies. Most developmental brain abnormalities are detected during this examination, and their identification indicates the need for detailed neurosonography (Malingier et al., 2020). At this stage, current screening standards allow comprehensive evaluation of major intracranial structures, including the lateral ventricles, cavum septi pellucidi, thalami, cerebellum, cisterna magna, and spine (Borowski et al., 2020; Malingier et al., 2020). Detection or suspicion of an abnormality during screening warrants detailed neurosonography, which permits multiplanar evaluation of the brain and more precise characterization of the findings (Paladini et al., 2021).

The diagnostic capabilities of ultrasonography also change during the third trimester. Imaging conditions remain favorable early in the trimester; however, progressive calvarial mineralization gradually reduces ultrasound penetration and hampers detailed assessment of cerebral structures. Conversely, later examinations can detect abnormalities that emerge only near the end of the second trimester or during the third trimester, including disorders of cortical maturation and some acquired CNS injuries, and can monitor previously diagnosed abnormalities (Eixarch et al., 2023; Malingier et al., 2020).

### **1.2. Screening neurosonography and detailed neurosonography**

Contemporary prenatal CNS diagnosis is based on a two-tier ultrasound model comprising screening and detailed neurosonography. These examinations serve distinct but complementary functions and are integral components of the diagnostic process (Malingier et al., 2020).

Screening neurosonography is performed as part of routine ultrasonography in the first, second, and third trimesters (Minister Zdrowia,

2025). Its purpose is to confirm normal CNS development and identify findings suggestive of a developmental anomaly or brain injury. It includes assessment of the basic intracranial structures in accordance with current recommendations and serves as the principal means of identifying patients who require further diagnostic evaluation (Borowski et al., 2020).

Screening is performed with a transabdominal transducer in three standard axial planes: transventricular, transthalamic, and transcerebellar. These planes assess the shape and dimensions of the skull, lateral ventricles, choroid plexuses, interhemispheric fissure, cavum septi pellucidi, basal ganglia, cerebellum, and cisterna magna. The spine is also assessed in the axial, coronal, and sagittal planes (Malingier et al., 2020).

Detailed neurosonography is an advanced ultrasound examination performed when screening identifies an abnormality or when risk factors for CNS disease are present. Its purpose is to characterize detected findings precisely and evaluate brain structures that are not visible or are difficult to assess during screening. Unlike screening, detailed neurosonography includes additional coronal and sagittal planes, most commonly obtained through the fontanelles or cranial sutures, thereby enabling more detailed analysis of CNS anatomy (Malingier et al., 2020). Neurosonography experts most often perform detailed assessment with a transvaginal transducer, whose higher frequency provides substantially greater image resolution. Obtaining optimal imaging planes often requires gentle manipulation of the fetal head through the maternal abdomen (Eixarch et al., 2023).

Table 1. Principal indications for detailed neurosonography and examination objectives

| Indication                                                        | Objective of detailed neurosonography                                                             | Clinical relevance                                                           |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Abnormality detected during screening                             | Confirm the diagnosis, determine the extent of the abnormality, and identify associated anomalies | Plan further prenatal evaluation and perinatal management                    |
| Ventriculomegaly                                                  | Assess brain anatomy and determine the cause of ventricular dilation                              | Establish prognosis and select further testing (MRI, genetic testing, TORCH) |
| Posterior fossa abnormalities                                     | Differentiate developmental anomalies and evaluate hindbrain structures in detail                 | Establish the diagnosis and prognosis                                        |
| Abnormal development of the corpus callosum or midline structures | Evaluation of associated anomalies and brain maturation                                           | Risk assessment of neurodevelopmental impairment                             |
| Abnormal head circumference (microcephaly or macrocephaly)        | Identify the cause of abnormal brain growth                                                       | Differentiate malformations, infections, and genetic disorders               |
| Suspected intrauterine infection                                  | Detect inflammatory markers and CNS damages                                                       | Assessment of brain injury and prognosis                                     |
| Fetal growth restriction (FGR)                                    | Assess brain maturation and look for changes associated with chronic hypoxia                      | Identify fetuses at risk of neurodevelopmental impairment                    |
| Twin pregnancies complicated by TTTS or sFGR                      | Detect CNS injury due to hemodynamic disturbances at an early stage                               | Monitor neurologic sequelae                                                  |
| Complex congenital heart disease                                  | Assess associated CNS abnormalities and brain maturation                                          | Improve counselling and the postnatal care plan.                             |
| Suspected genetic disorder or multiple-anomaly syndrome           | Identify characteristic CNS abnormalities                                                         | Guide genetic testing                                                        |
| Suspected hypoxia or CNS injury                                   | Assess acquired lesions and their evolution                                                       | Monitor disease progression and plan further management                      |
| Relevant obstetric or family history                              | Exclude recurrent CNS anomalies or detect early pathology                                         | Individualize prenatal surveillance                                          |

TTTS, twin-to-twin transfusion syndrome; sFGR, selective fetal growth restriction; MRI, magnetic resonance imaging; TORCH, acronym for a group of congenital infections (Toxoplasma gondii, Others [including syphilis, varicella-zoster virus, parvovirus B19, Zika virus, and HIV], Rubella virus, Cytomegalovirus, and Herpes simplex virus).

This approach maintains screening effectiveness while providing in-depth evaluation in pregnancies requiring specialist assessment of the fetal brain. In clinical practice, detailed neurosonography is now the standard for advanced ultrasonographic evaluation of the fetal central nervous system (Malingier et al., 2020).

Acquiring the appropriate imaging planes requires not only high-quality equipment but also examiner expertise. Therefore, detailed neurosonography should be performed at centers with appropriate technical resources and personnel experienced in prenatal CNS diagnosis (Malingier et al., 2020).

### **1.3. Indications for detailed neurosonography**

Detailed neurosonography is indicated when screening reveals a fetal CNS abnormality or when factors associated with an increased risk of CNS anomalies are present. Its purpose is not only to confirm the abnormality but also to characterize it precisely, assess associated anomalies, establish prognosis, and guide further diagnostic management (Malingier et al., 2020).

Table 1 presents principal indications for detailed neurosonography based on ISUOG recommendations (Eixarch et al., 2023; Malingier et al., 2020).

The indications for detailed neurosonography continue to expand. The examination is now used not only to diagnose structural anomalies but also to assess fetal brain maturation, monitor changes arising during fetal disease, and identify markers with potential prognostic relevance to subsequent neurologic development. The following sections discuss these contemporary applications.

## **2. Detailed neurosonography: examination technique**

Detailed neurosonography is an advanced ultrasound examination that permits multiplanar assessment of the fetal central nervous system. Unlike screening, it is not limited to basic cerebral structures but enables detailed analysis of brain anatomy, detection of subtle developmental abnormalities, and assessment of CNS

maturation. A central component is the acquisition of axial, coronal, and sagittal planes, which provide complementary information and enable comprehensive evaluation of intracranial structures (Malingier et al., 2020; Paladini et al., 2021).

Transvaginal ultrasonography is the preferred approach to detailed neurosonography. The fontanelles and cranial sutures serve as natural acoustic windows, providing higher-resolution images than the transabdominal approach. Image quality is comparable to that obtained during transfontanellar ultrasonography in neonates and permits detailed evaluation of fetal brain structures (Eixarch et al., 2023; Paladini et al., 2021). The transvaginal approach is preferred for fetuses in cephalic presentation; when it cannot be performed, such as in breech presentation, neurosonography may be conducted transabdominally (Paladini et al., 2021).

The examination begins with assessment of the brain in the standard axial planes used for screening. The evaluation is then extended to the coronal and sagittal planes, which are fundamental to detailed neurosonography. In clinical practice, obtaining images that allow optimal evaluation of individual anatomic structures and reliable characterization of abnormalities matters more than acquiring every recommended plane (Paladini et al., 2021).

Coronal planes primarily permit evaluation of midline structures and hemispheric symmetry. Standard assessment includes four planes: transfrontal, transcaudate, transthalamic, and transcerebellar. These demonstrate the frontal horns of the lateral ventricles, cavum septi pellucidi, corpus callosum, thalami, third ventricle, choroid plexuses, circle of Willis, and posterior fossa structures, including the cerebellar hemispheres and vermis. Multiplanar analysis increases diagnostic sensitivity for developmental anomalies that routine screening may miss (Paladini et al., 2021).

Sagittal assessment includes the midsagittal plane and two parasagittal planes. The midsagittal plane is particularly important because it simultaneously demonstrates the entire corpus callosum, cavum septi pellucidi, cavum Vergae, brainstem, fourth ventricle, cerebellar vermis, and cisterna magna. The parasagittal planes allow detailed assessment of lateral

ventricular morphology, the choroid plexuses, and cerebral parenchyma, complementing evaluation in the axial and coronal planes (Eixarch et al., 2023).

Detailed neurosonography also includes assessment of the spine and spinal cord in the sagittal, axial, and coronal planes, including continuity of the vertebral structures, the spinal canal, and the course of the spinal cord. Particular attention should be paid to the conus medullaris, whose position changes with gestational age. Also assess its morphology, as abnormalities may indicate neural tube defects or other developmental disorders of the fetal spinal cord (Eixarch et al., 2023; Paladini et al., 2021).

## **2.1. Assessment of fetal brain maturation**

One of the most important developments in contemporary prenatal neurosonography is the shift from assessing brain anatomy alone to evaluating development and maturation. Until recently, ultrasonography was used primarily to detect structural CNS anomalies. High-resolution imaging and a better understanding of normal prenatal development now allow assessment of cortical maturation and neuronal migration. In many cases, subtle disturbances in brain development can be identified before unequivocal morphologic or clinical changes appear (Eixarch et al., 2023; Pooh et al., 2019).

Cortical development is dynamic and closely related to gestational age. As pregnancy progresses, cerebral sulci and gyri appear sequentially; their presence, morphology, and degree of development reflect normal neuronal migration and organization. Assessment requires detailed knowledge of normal prenatal development according to gestational age. Cortical maturation analysis should be an integral part of every neurosonographic examination and should be performed in all appropriate imaging planes (Eixarch et al., 2023).

The Sylvian fissure is one of the best-characterized markers of brain maturation and becomes visible at approximately 18 weeks of gestation. Its shape and degree of opercularization change predictably over subsequent weeks; deviations from the expected appearance may indicate abnormal fetal cortical development. Assessment of the Sylvian fissure angle

has been shown to detect cortical developmental abnormalities before other sonographic findings appear. This parameter is therefore considered one of the most promising markers for prenatal assessment of brain maturation (Pooh et al., 2019).

Other cerebral sulci can be assessed later in pregnancy. The parieto-occipital sulcus is generally visible from approximately 19 weeks of gestation, whereas the cingulate sulcus becomes visible at approximately 24 weeks. The olfactory sulci cannot be assessed in the coronal plane until approximately 28 weeks. Analyzing the sequence in which individual sulci appear and their degree of development allows comparison of brain maturation with gestational age and complements conventional anatomic assessment (Eixarch et al., 2023).

The cat-ear lines (CEL) sign has also received increasing attention. Visible from approximately 19 weeks of gestation in anterior coronal planes, it consists of symmetric hyperechoic lines extending from the lateral ventricles toward the surface of the cerebral hemispheres. This finding can be evaluated only by ultrasonography and reflects normal neuronal migration. Delayed appearance or abnormal CEL morphology may be an early marker of neuronal migration disorders and malformations of cortical development, including lissencephaly, polymicrogyria, schizencephaly, and subependymal heterotopia (Matsuzawa et al., 2023). Importantly, the CEL sign has no equivalent on MRI, underscoring the unique role of neurosonography in assessing early cortical development.

Assessment of brain maturation does not replace conventional anatomic evaluation but substantially complements it. It may reveal developmental abnormalities when structural changes are still subtle or absent. This is one of the most rapidly evolving areas of prenatal neurosonography and is increasingly applied not only to developmental anomalies but also to fetuses at increased risk of neurodevelopmental impairment, including those with fetal growth restriction, congenital heart disease, or intrauterine infection. Neurosonography can thus identify both structural anomalies and fetuses at risk of neurodevelopmental impairment before fixed morphologic changes occur (Paladini et al., 2021).

## **2.2. Neurosonography in the diagnosis of ventriculomegaly**

Ventriculomegaly is among the most frequently diagnosed CNS abnormalities in prenatal practice and one of the most common indications for detailed neurosonography. Although diagnosis is based on a simple measurement of lateral ventricular width, subsequent evaluation requires comprehensive assessment of the entire brain because ventricular dilation is often secondary to other developmental anomalies or CNS damages (Alluhaybi et al., 2022; Eixarch et al., 2023).

Ventriculomegaly is defined as unilateral or bilateral dilation of the lateral ventricle up to 10 mm or greater. Measurement should be performed in the transventricular plane at the level of the parieto-occipital sulcus. In the normally developing fetal brain, lateral ventricular width remains relatively constant, generally measuring 6-8 mm throughout the second and third trimesters (Eixarch et al., 2023). Under current standards, assessing the lateral ventricles is an integral part of second-trimester screening. Most cases of ventriculomegaly are detected during this screening (Alluhaybi et al., 2022; Borowski et al., 2020). Ventriculomegaly detected at screening should always prompt detailed neurosonography. The purpose is not merely to confirm ventricular dilation but, more importantly, to determine its cause and identify associated brain abnormalities that may substantially alter prenatal and postnatal prognosis. Detailed assessment includes the corpus callosum, midline structures, posterior fossa, cerebral cortex, choroid plexuses, and cerebral white matter. Evaluation of cortical maturation and markers of neuronal migration disorders that may not be visible during routine screening is also important (Eixarch et al., 2023; Malinger et al., 2020).

Ventriculomegaly is a sonographic finding rather than a distinct disease entity. It may accompany CNS malformations, genetic disorders, intrauterine infections, intraventricular hemorrhage, brain tumors, neuronal migration disorders, and changes caused by fetal ischemia or hypoxia. In many cases, only comprehensive assessment of the entire brain can establish the underlying etiology and allow accurate prognostication (Pooh, 2021).

Further management depends on the severity of ventriculomegaly and the presence of associated anomalies. Ventriculomegaly is classified as mild (10-12 mm), moderate (13-15 mm), or severe (> 15 mm) (Pooh, 2021). Isolated mild ventriculomegaly is generally associated with a favorable prognosis, and lateral ventricular width normalizes on follow-up in some fetuses (Pisapia et al., 2017; Tank et al., 2022). Severe ventriculomegaly, by contrast, is associated with a high risk of coexisting CNS anomalies, chromosomal abnormalities, and neurodevelopmental impairment (Litwinska et al., 2019). Severe ventriculomegaly is not synonymous with hydrocephalus. Hydrocephalus is a distinct clinical entity resulting from impaired cerebrospinal fluid circulation and increased intracranial pressure, most commonly due to aqueductal stenosis (Pisapia et al., 2017; Pooh, 2021). Distinguishing these conditions is essential for subsequent diagnosis and treatment.

Comprehensive neurosonographic assessment guides selection for further evaluation, including genetic testing and magnetic resonance imaging, which may provide additional information about brain anatomy in selected cases. Neurosonography, genetic testing, and MRI are complementary methods in the differential diagnosis of ventriculomegaly. Nevertheless, detailed neurosonography remains the first-line examination for precise assessment of fetal brain anatomy, monitoring the evolution of findings, and establishing prenatal and postnatal prognosis (Alluhaybi et al., 2022; Pisapia et al., 2017).

## **2.3. Neurosonography in fetuses with fetal growth restriction (FGR)**

Fetal growth restriction (FGR) is among the most common complications of pregnancy and remains an important risk factor for neurodevelopmental impairment. Unlike fetuses with conventional CNS anomalies, most fetuses with FGR have no overt structural brain abnormalities. Growing evidence, however, indicates that chronic placental insufficiency and associated hypoxia produce subtle alterations in brain maturation and organization that can be detected prenatally (Eixarch et al., 2023).

Fetuses with FGR exhibit circulatory redistribution known as the brain-sparing effect. In response to chronic placental insufficiency and progressive hypoxia, adaptive mechanisms redistribute blood flow toward organs essential for survival, particularly the brain and heart. Consequently, cerebral perfusion increases at the expense of peripheral-organ perfusion. On Doppler examination, this redistribution is reflected by decreased vascular resistance in the middle cerebral artery (MCA), expressed as a reduced pulsatility index (PI), together with increased resistance in the umbilical artery (UA). Although brain sparing is initially compensatory and helps maintain oxygen delivery to the developing brain, its persistence indicates advanced adaptation to hypoxia and does not provide complete neuroprotection. Increased cerebral perfusion raises blood volume within the cerebral vasculature; concurrent disruption of flow autoregulation and increased blood-brain barrier permeability may promote fluid extravasation into neural tissue, edema, and microcirculatory dysfunction (Misan et al., 2022; Misan et al., 2023).

These processes alter cortical maturation, drive white matter remodelling, and disrupt the organisation of neuronal networks, which are considered major mechanisms underlying the increased risk of subsequent neurodevelopmental impairment among children affected by FGR (Husen et al., 2019; Sahebdel et al., 2025).

The long-term adverse effects of growth restriction on neurodevelopment are well documented (Shah et al., 2025; Sun et al., 2025). For many years, evaluation of fetuses with FGR was limited to monitoring biometric and Doppler parameters. Attention is now shifting toward CNS development

because neurodevelopmental impairment is among the most important long-term consequences of FGR. Contemporary neurosonography can identify subtle alterations in brain architecture that are not visible during routine ultrasonography (Mappa et al., 2024; Sun et al., 2025).

Assessment of cortical maturation is particularly important. Delayed cerebral sulcation, abnormal opercularization of the Sylvian fissure, and delayed maturation of other cortical sulci have been reported in fetuses with FGR and may indicate abnormal neuronal migration and organization (Eixarch et al., 2023; Pooh et al., 2019). These changes are often subtle and require detailed neurosonography performed by an experienced clinician.

Neurosonography also permits assessment of the volume and morphology of selected brain structures, including the corpus callosum, cerebellum, and white matter. An increasing number of studies indicate that severe FGR is associated with adaptive changes involving the developing brain that may correlate with later cognitive function and behavioral disorders. In this context, neurosonography is no longer used merely to exclude structural anomalies; it becomes a tool for assessing the quality of brain development (Mappa et al., 2024).

The relevance of neurosonography in FGR therefore extends beyond prenatal diagnosis. Findings may support neurologic prognostication, identify fetuses requiring particularly intensive surveillance, and guide neonatal and neurologic care after birth. Although most available neurodevelopmental markers remain investigational, their growing number suggests that assessing brain maturation may be-

Table 2. Neurosonographic markers in fetal growth restriction (FGR)

| Neurosonographic marker              | Change in FGR                     | Interpretation                       |
|--------------------------------------|-----------------------------------|--------------------------------------|
| Sylvian fissure                      | Shallow; delayed opercularization | Impaired cortical maturation         |
| Corpus callosum                      | Reduced length; thinning          | White matter remodeling              |
| Cingulate sulcus                     | Delayed maturation                | Delayed cortical development         |
| Parieto-occipital sulcus             | Delayed development               | Delayed cortical development         |
| Cerebellar vermis                    | Reduced dimensions                | Abnormal posterior fossa development |
| Fastigium-corporum callosum distance | Reduced                           | Potential marker of brain remodeling |

come an integral component of FGR evaluation (Eixarch et al., 2023). Table 2 presents a detailed list of neurosonographic markers in FGR.

In clinical practice, evaluation of a fetus with FGR should not be limited to excluding structural brain anomalies. Detailed neurosonography permits analysis of markers of brain maturation, including opercularization of the Sylvian fissure, development of other cortical sulci, corpus callosum morphology, white matter appearance, and development of posterior fossa structures. Growing evidence indicates that severe FGR is associated with delayed cortical sulcation and altered development of the corpus callosum and cerebellum, which may reflect impaired CNS maturation before permanent morphologic or clinical changes occur. Although most of these markers require further validation, their assessment may provide valuable prognostic information and complement conventional ultrasound and Doppler parameters (Eixarch et al., 2023; Pooh et al., 2019).

These pathophysiologic processes are reflected neurosonographically by delayed cortical maturation, abnormal sulcation, and altered morphology of midline and posterior fossa structures (Mappa et al., 2024).

### **3. Neurosonography in the diagnosis of intrauterine infections**

Intrauterine infections are among the most important acquired causes of fetal CNS injury. Neurotropic pathogens may disrupt neural cell proliferation, migration, and maturation, resulting in both complex developmental anomalies and injury to the developing brain. Neurosonographic findings depend on the pathogen, timing of infection, and severity of the lesions. Unlike most developmental anomalies, infection-related changes are dynamic and may emerge gradually; therefore, a single normal ultrasound examination does not exclude evolving CNS injury. Serial neurosonography therefore plays a key role in diagnosing and monitoring fetuses with suspected or confirmed intrauterine infection (Maligner et al., 2020).

#### **3.1. Cytomegalovirus (CMV)**

Congenital cytomegalovirus (CMV) infection is the most common prenatal viral infection and a leading cause of hearing loss and neurologic disability in children (Leruez-Ville et al., 2024). Neurosonography is the primary modality for CNS imaging in fetuses with suspected CMV infection.

The most frequently reported findings include mild or moderate ventriculomegaly, white matter hyperechogenicity, periventricular cysts, intracranial calcifications, choroid plexus abnormalities, and microcephaly. More advanced cases may demonstrate abnormal cortical development (delayed sulcation and abnormal opercularization of the Sylvian fissure), polymicrogyria, pachygyria, and cerebellar hypoplasia (Benoist et al., 2008; Leruez-Ville et al., 2024).

#### **3.2. Congenital Toxoplasmosis**

Congenital toxoplasmosis remains one of the most common parasitic causes of fetal brain injury. Neurosonography most frequently demonstrates ventriculomegaly or hydrocephalus, diffuse intracranial calcifications, particularly in the basal ganglia and cerebral cortex, and cerebral parenchymal atrophy. Severe cases may include microcephaly and abnormal cortical development. Compared with CMV infection, calcifications are generally more diffuse and are more often located outside the periventricular region (Robert-Gangneux & Dardé, 2012).

#### **3.3. Congenital Rubella Syndrome**

CNS abnormalities associated with congenital rubella occur much less frequently than those associated with CMV infection or toxoplasmosis. The most common findings are microcephaly, delayed brain maturation, and nonspecific abnormalities of cortical development. In clinical practice, diagnosis relies primarily on the coexistence of CNS and cardiac abnormalities, cataracts, and serologic findings, while neurosonography plays a complementary role (Patel, 2021).

Table 3. Characteristic neurosonographic features of the most common intrauterine infections

| Pathogen          | Most common neurosonographic findings                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| CMV               | Ventriculomegaly, hyperechoic white matter, periventricular cysts, calcifications, abnormal cortical maturation, polymicrogyria, cerebellar hypoplasia |
| Toxoplasma gondii | Hydrocephalus, diffuse intracranial calcifications, cerebral atrophy, microcephaly                                                                     |
| Zika virus        | Severe microcephaly, calvarial collapse, pachygyria/lissencephaly, cortical-subcortical calcifications, cerebellar hypoplasia                          |
| HSV               | Cerebral necrosis, ventriculomegaly, calcifications                                                                                                    |
| VZV               | Microcephaly, cerebral atrophy, nonspecific CNS injury                                                                                                 |

### 3.4. Zika Virus Infection

Zika virus infection produces one of the most characteristic neurosonographic patterns among prenatal infections. The typical finding is severe microcephaly with partial collapse of the calvarium. Additional findings include ventriculomegaly, cortical-subcortical calcifications, severe neuronal migration abnormalities, pachygyria, lissencephaly, cerebellar hypoplasia, and cerebral parenchymal atrophy (Brasil et al., 2016; Moore et al., 2017).

### 3.5. Other Neurotropic Infections

Herpes simplex virus (HSV), varicella-zoster virus (VZV), and other less common pathogens may also injure the developing fetal brain, although these infections are considerably less frequent. Neurosonographic findings are less specific and may include ventriculomegaly, areas of necrosis, calcifications, microcephaly, and secondary cerebral atrophy (Khalil et al., 2016).

Regardless of etiology, neurosonography remains the principal modality for prenatal CNS assessment. It enables detection of structural abnormalities, evaluation of cortical maturation, and monitoring of lesion progression on follow-up. When intrauterine infection is suspected, perform serial examinations because some lesions develop gradually and may not be present at the initial ultrasound assessment (Leruez-Ville et al., 2024; Malinger et al., 2020).

Table 3 presents the principal neurosonographic features of individual intrauterine infections.

## 4. Neurosonography in fetuses with congenital heart disease

Congenital heart defects (CHD) are among the most common congenital anomalies and occur in approximately 1% of live-born infants.

Growing evidence indicates that abnormal brain development in fetuses with congenital heart disease can be detected prenatally by neurosonography. A systematic review published in 2025 found that fetuses with severe heart defects most commonly demonstrate delayed cortical maturation, manifested by abnormal development of the Sylvian fissure and delayed appearance and maturation of other cortical sulci. Some studies also reported smaller dimensions of the corpus callosum, cerebellar vermis, and other midline structures, suggesting a global delay in brain maturation. The authors emphasized that neurosonography may identify these changes before they are visible with other imaging modalities, making it a promising tool for assessing prenatal neurodevelopment in fetuses with CHD. They also highlighted the need to standardize examination techniques and conduct further prospective studies to determine the prognostic value of individual neurosonographic markers (Monteiro et al., 2025), as well as to evaluate brain maturation and identify subtle changes that may affect subsequent neurologic development (Donofrio et al., 2014; Eixarch et al., 2023).

The pathophysiologic basis of these changes is chronic hemodynamic disturbance that reduces oxygen and nutrient delivery to the developing brain. Depending on the type of cardiac defect, blood entering the cerebral circulation may be inadequately

Table 4. Neurosonographic markers of impaired brain maturation in fetuses with congenital heart disease

| Marker                               | Change observed in CHD   | Interpretation                     |
|--------------------------------------|--------------------------|------------------------------------|
| Sylvian fissure                      | Delayed opercularization | Delayed cortical maturation        |
| Other cortical sulci                 | Delayed sulcation        | Abnormal neurodevelopment          |
| Corpus callosum                      | Reduced length           | Delayed white matter development   |
| Cerebellar vermis                    | Reduced dimensions       | Delayed posterior fossa maturation |
| Fastigium-corporis callosum distance | Abnormal values          | Marker of global brain maturation  |

CHD, congenital heart disease.

oxygenated or cerebral blood flow may be reduced, resulting in chronic hypoxia and delayed fetal CNS maturation. Magnetic resonance imaging (MRI) studies have shown that the brains of fetuses with severe cardiac defects develop more slowly than those of healthy fetuses and often correspond in maturity to brains that are 2-4 weeks younger (Clouchoux et al., 2013; Limperopoulos et al., 2010).

Detailed neurosonography can detect many of these changes prenatally. Assessment of cortical maturation, particularly the degree of Sylvian fissure opercularization and the development of other cortical sulci, is especially important. Fetuses with severe heart defects have demonstrated abnormal sulcation and delayed cortical maturation compared with healthy fetuses. Reduced dimensions of the corpus callosum, cerebellar vermis, and other midline structures have also been observed and may indicate globally delayed brain development (Monteiro et al., 2025; Pooh et al., 2019).

Quantitative assessment of neurosonographic markers is also receiving increasing attention. Analysis of corpus callosum length, the fastigium-corporis callosum distance, degree of Sylvian fissure opercularization, and development of other cortical sulci may identify impaired brain maturation before abnormalities become apparent during routine ultrasonography. Although most of these parameters remain investigational, available findings suggest that they may be valuable prognostic markers (Eixarch et al., 2023).

The significance of neurosonography in fetuses with CHD extends beyond prenatal diagnosis. Detecting impaired brain maturation may affect counselling by offering additional evaluation, including fetal MRI, choice of delivery in a tertiary center, or organization of postnatal neurologic care.

Contemporary neurosonography is therefore becoming an important component of comprehensive evaluation in fetuses with severe heart defects, providing information not only about anatomy but also about functional maturation of the developing brain (Monteiro et al., 2025).

The most frequently reported neurosonographic markers in fetuses with congenital heart disease are presented in Table 4.

## 5. Neurosonography and genetic diagnosis

Advances in genetic testing, particularly the increasing availability of modern molecular diagnostic techniques, have substantially changed the management of fetal CNS abnormalities. The introduction of chromosomal microarray analysis (CMA; SNP-CGH) and next-generation sequencing (NGS), including whole-exome sequencing (WES), into clinical practice has significantly increased detection of genetic causes of developmental brain anomalies. However, the diagnostic yield of these methods depends largely on accurate prenatal phenotype characterisation. Detailed neurosonography therefore plays a key role in selecting patients for further genetic testing and interpreting the results (Lord et al., 2019; Petrovski et al., 2019).

Anatomic abnormalities of the fetal CNS are associated with an increased risk of genetic disorders. In these cases, consider invasive testing with an appropriately selected genetic assay. DNA is most commonly isolated from amniotic fluid obtained by amniocentesis and subsequently evaluated for

Table 5. Indications for genetic testing based on fetal neurosonographic findings

| Neurosonographic finding                                  | Most common genetic etiology                                                                                                                         | Recommended testing             |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Agenesis/dysgenesis of the corpus callosum                | Chromosomal abnormalities, copy number variants (CNVs), and monogenic disorders (including Smith-Lemli-Opitz, Aicardi, and Mowat-Wilson syndromes)   | CMA → WES                       |
| Holoprosencephaly                                         | Chromosomal abnormalities (approximately 60% of cases), variants in SHH, ZIC2, SIX3, PTCH1, FGFR1, and CDON, and Smith-Lemli-Opitz syndrome          | CMA + WES                       |
| Posterior fossa malformations                             | Chromosomal abnormalities (approximately 16% in Dandy-Walker malformation), CNVs, ciliopathies, and monogenic disorders (including Joubert syndrome) | CMA +/- WES                     |
| Lissencephaly/pachygyria/polymicrogyria                   | Neuronal migration disorders associated with variants in PAFAH1B1 (LIS1), DCX, TUBA1A, CHD7, PAX8, and other genes                                   | WES                             |
| Gray matter heterotopia                                   | Sequence variants in FLNA, ARFGEF2, and other neuronal migration genes, and FMRI repeat expansion                                                    | WES, MS-MLPA/PCR                |
| Severe or complex ventriculomegaly                        | Chromosomal abnormalities, CNVs, and monogenic disorders (after exclusion of intrauterine infection)                                                 | CMA → WES                       |
| Multiple CNS anomalies or CNS plus extracranial anomalies | Genetic syndromes of diverse etiology (chromosomal abnormalities, CNVs, and monogenic disorders)                                                     | CMA + WES (preferably trio-WES) |

CMA, chromosomal microarray analysis; WES, whole-exome sequencing; trio-WES, whole-exome sequencing of the fetus/child and parents; MS-MLPA, methylation-specific multiplex ligation-dependent probe amplification; PCR, polymerase chain reaction.

chromosomal abnormalities and submicroscopic imbalances, including by CMA. Depending on the source, copy number variants (CNVs) are identified in approximately 8-11% of isolated fetal CNS anomalies. If CMA of the extracted DNA yields a normal result, NGS for monogenic disorders may be considered. The scope of NGS depends on the methods available at the diagnostic center. It may include a gene panel, WES, or trio-WES, in which the fetal and parental exomes are sequenced concurrently. This approach permits more accurate interpretation and classification of detected variants with respect to pathogenicity and clinical significance.

Many abnormalities detected by neurosonography are associated with an increased risk of chromosomal abnormalities or monogenic disorders. These include agenesis or dysgenesis of the corpus callosum, posterior fossa malformations, holoprosencephaly, neuronal migration disorders, malformations of cortical development, severe ventriculomegaly, and coexisting developmental anomalies. In these cases, a normal karyotype does not exclude a genetic etiology; therefore, additional CMA or WES is increasingly recommended, particularly when neurosonographic findings suggest a specific disease phenotype (International Society of Ultrasound in Obstetrics and

Gynecology et al., 2023; Monaghan et al., 2020). The role of neurosonography extends beyond detecting the anomaly itself. Detailed analysis of brain morphology permits precise phenotyping, which is fundamental to selecting an appropriate molecular diagnostic strategy. Evaluating the location and nature of cortical developmental abnormalities, the degree of Sylvian fissure opercularization, the presence of heterotopia, corpus callosum abnormalities, and posterior fossa anomalies may direct testing toward specific gene groups involved in neuronal migration disorders. Examples include periventricular and subcortical heterotopia occurring in genetic conditions such as ciliopathies, tubulinopathies, inborn errors of metabolism, other monogenic disorders, and chromosomal microaberrations such as 5p or 1p36 deletions (Śmigiel & Szczałuba, 2021). Precise prenatal phenotyping has been shown to increase the diagnostic yield of WES and facilitate clinical interpretation of detected genetic variants (Lord et al., 2019; Petrovski et al., 2019).

Attention is also increasing for cases without classic structural anomalies in which neurosonography reveals subtle abnormalities of brain maturation, such as delayed sulcation, abnormal opercularization of the Sylvian fissure, or abnormal development of

midline structures. Although the diagnostic value of these markers remains under investigation, their presence may warrant extended genetic testing, particularly when other developmental abnormalities or a positive family history coexist (Eixarch et al., 2023; Monteiro et al., 2025).

Contemporary neurosonography is therefore not only a method of CNS imaging but also a tool for precisely defining the prenatal phenotype. Information obtained during the examination directly influences selection of appropriate genetic tests, interpretation of their results, and prenatal counselling.

Close collaboration among fetal medicine specialists, clinical geneticists, pediatricians, pediatric neurologists, radiologists, neonatologists, and perinatal hospice professionals is becoming the foundation of modern prenatal diagnosis of CNS anomalies. At many tertiary centers, multidisciplinary teams and case conferences provide comprehensive evaluation and reliable information for parents regarding fetal and childhood prognosis, further medical management, treatment options, rehabilitation, and postnatal care (Van den Veyver, 2019). Table 5 presents the genetic tests offered according to the identified phenotypic abnormalities.

## **6. Limitations of neurosonography**

Despite rapid advances in ultrasound technology, neurosonography, like every imaging modality, has inherent limitations. Recognizing these limitations is essential for appropriate interpretation and decisions about further prenatal evaluation. Contemporary neurosonography remains the first-line method for assessing the fetal CNS, but findings should always be interpreted in the context of gestational age, image quality, and the clinical setting (Malingier et al., 2020; Paladini et al., 2021).

One of the principal limitations is the dynamic development of the fetal brain. Numerous CNS structures emerge gradually as pregnancy progresses; consequently, some abnormalities cannot be visualized at earlier developmental stages. This particularly applies to neuronal migration disorders, malformations of cortical development, and certain acquired

injuries that may become apparent only in the third trimester or even after birth. A normal result on a single neurosonographic examination therefore does not completely exclude disease that develops later in fetal life (Eixarch et al., 2023; Pooh et al., 2019).

Technical factors also substantially influence examination quality, particularly the quality and resolution of the ultrasound equipment. Examinations performed on systems with limited imaging capabilities carry a high risk of diagnostic error. Detailed brain assessment may also be hindered by an unfavorable fetal head position, advanced gestational age and progressive calvarial mineralization, oligohydramnios, maternal obesity, abdominal surgical scars, or multiple gestation. In these circumstances, it may be impossible to obtain all standard neurosonographic planes, reducing examination sensitivity. In selected cases, image quality may be improved by using the transvaginal approach or repeating the examination after fetal position changes (Paladini et al., 2021).

Another limitation is that neurosonography primarily evaluates the morphology of the developing brain. Despite increasing capabilities for analyzing cortical maturation, many neurodevelopmental disorders are functional or molecular and do not produce detectable prenatal anatomic changes. These include some autism spectrum disorders, intellectual disabilities, and genetic diseases such as inborn errors of metabolism and adrenoleukodystrophies, in which prenatal ultrasonography may appear normal despite subsequent clinical manifestations (Eixarch et al., 2023).

Examiner experience is an important determinant of diagnostic value. Detailed neurosonography is among the most demanding ultrasound examinations in obstetrics and requires not only technical proficiency but also extensive knowledge of embryology and normal fetal brain maturation. Detection of subtle abnormalities improves with examiner experience and adherence to standardized protocols developed by international scientific societies (Malingier et al., 2020; Paladini et al., 2021).

When ultrasound findings remain equivocal, or a disorder that cannot be visualized neurosonographically is suspected, fetal MRI is indicated. The two modalities are complementary rather than competing.

Neurosonography remains the principal diagnostic and longitudinal monitoring tool, whereas MRI provides additional information about structures that are difficult to evaluate sonographically and about selected disorders of brain development (Malingier et al., 2020; Paladini et al., 2021).

## 7. Neurosonography and fetal magnetic resonance imaging

Rapid advances in prenatal imaging have established fetal magnetic resonance imaging (MRI) as an important complement in diagnosing CNS anomalies. This has not altered the role of neurosonography as the primary modality for fetal brain imaging. Under current International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) recommendations, detailed neurosonography remains the first-line examination for prenatal CNS diagnosis, whereas MRI should be performed only for specific indications as a complementary examination (Malingier et al., 2020; Paladini et al., 2021). It's important to note that both neurosonography and MRI are safe for the pregnant woman and fetus, and do not expose them to the ionizing radiation used in other imaging methods, such as computed tomography.

The primary advantage of neurosonography is the ability to obtain images in real time and to repeat the examination multiple times without exposing the pregnant woman and fetus to a lengthy examination in a noisy environment and without the possibility of movement. It is widely available, relatively brief, and permits simultaneous evaluation of fetal anatomy and vascular flow by Doppler, as well as longitudinal monitoring of abnormalities. With transvaginal and multiplanar imaging, image quality is now comparable to MRI for assessment of many midline and posterior fossa structures (Eixarch et al., 2023; Paladini et al., 2021).

MRI provides superior evaluation of structures that are difficult to assess sonographically, particularly in late pregnancy, when mineralization of the calvarium limits ultrasound penetration. It permits more precise assessment of white matter, the cerebral cortex, posterior fossa, and ischemic or hemorrhagic

Table 6. Most common indications for fetal MRI

| Most common indications for fetal MRI                                                                                |
|----------------------------------------------------------------------------------------------------------------------|
| Severe or progressive ventriculomegaly                                                                               |
| Suspected malformation of cortical development (including lissencephaly, polymicrogyria, or gray matter heterotopia) |
| Microcephaly or macrocephaly                                                                                         |
| Intracranial hemorrhage or suspected hypoxic-ischemic brain injury                                                   |
| Posterior fossa abnormalities                                                                                        |
| Suspected or confirmed intrauterine infection (particularly CMV or Zika virus infection)                             |
| Suspected CNS vascular malformation                                                                                  |
| Suspected intracranial tumor                                                                                         |
| Suspected genetic syndrome associated with CNS abnormalities (e.g., tuberous sclerosis)                              |
| Equivocal detailed neurosonography or inadequate ultrasound image quality                                            |

(Eixarch et al., 2023; Malingier et al., 2020; Paladini et al., 2021).

Table 7. Comparison of neurosonography and fetal magnetic resonance imaging in prenatal CNS diagnosis

| Feature                           | Neurosonography                 | MRI                                                                                      |
|-----------------------------------|---------------------------------|------------------------------------------------------------------------------------------|
| First-line examination            | Yes                             | No                                                                                       |
| Dynamic assessment                | Yes                             | No                                                                                       |
| Assessment of vascular flow       | Noninvasive Doppler examination | Possible with gadolinium-based contrast; gadolinium is not recommended for fetal imaging |
| Assessment of cortical maturation | Yes                             | Yes                                                                                      |
| White matter assessment           | Good                            | Very good                                                                                |
| Neuronal migration disorders      | Good                            | Very good                                                                                |
| Serial examinations               | Feasible                        | Limited                                                                                  |
| Availability                      | High                            | Limited                                                                                  |
| Cost                              | Low                             | High                                                                                     |
| Examination time                  | Short                           | Longer                                                                                   |

lesions. MRI is particularly useful for diagnosing neuronal migration disorders, selected malformations of cortical development, intracranial tumors, and brain damage related to intrauterine infection or hypoxia (Griffiths et al., 2017; Malingier et al., 2020).

MRI should not, however, replace properly performed neurosonography. In most cases, it is a second-line examination performed after detailed ultrasound assessment. Findings from the MERID-IAN study demonstrated that MRI may provide additional diagnostic information in some fetuses with suspected CNS anomalies, but its greatest value is achieved when it follows high-quality neurosonography (Griffiths et al., 2017). The most common indications for fetal CNS MRI are presented in Table 6.

The complementary nature of these modalities is increasingly emphasized. Neurosonography is the best tool for evaluating dynamic processes during brain development, monitoring changes over time, and analyzing vascular flow. MRI provides additional information about brain microstructure and lesions not visible sonographically. Combining the modalities improves prenatal diagnostic accuracy and permits more precise neurologic prognostication (Griffiths et al., 2017; Paladini et al., 2021).

Technological advances are gradually narrowing the differences between neurosonography and MRI. High-resolution ultrasonography, three-dimensional imaging, and new quantitative methods for assessing brain maturation now allow neurosonography to evaluate many structures that were accessible only by MRI a decade or two ago. Contemporary prenatal diagnosis therefore does not depend on choosing one modality over the other, but on their informed and complementary use according to the clinical findings and gestational age. Table 7 compares the two modalities.

## **8. Future directions in neurosonography: artificial intelligence, radiomics, and quantitative neurosonography**

Fetal neurosonography is among the most rapidly developing fields of prenatal diagnosis. Technological advances over recent decades have enabled a transition from basic assessment of CNS anatomy to detailed analysis of its development and maturation. The next stage in this evolution involves artificial intelligence (AI), radiomics, and quantitative ultrasound image analysis. These technologies are intended to increase diagnostic accuracy, improve reproducibility, and identify subtle changes that remain invisible during conventional visual assessment (Ramirez Zegarra & Ghi, 2023).

The most rapidly developing area is the application of AI and deep-learning algorithms to ultrasound image analysis. Current systems can automatically recognize standard imaging planes, identify fetal brain structures, and perform basic biometric measurements. Experimental studies have demonstrated high accuracy of AI algorithms in identifying appropriate ultrasound planes and supporting detection of selected CNS anomalies. In the future, these solutions may shorten examination time, reduce interobserver variability, and expand access to highly specialized prenatal diagnosis, particularly at centers with less experience (Ramirez Zegarra & Ghi, 2023).

Quantitative neurosonography is developing in parallel and seeks to assess fetal brain development objectively using measurable parameters. Increasing attention is directed toward the degree of Sylvian fissure opercularization, development of other cortical sulci, corpus callosum length, cerebellar vermis dimensions, and other midline structures. Unlike conventional qualitative assessment, quantitative parameters enable longitudinal monitoring of brain maturation and comparison with gestational age-specific reference values. Studies involving fetuses with growth restriction, congenital heart disease, and intrauterine infection suggest that quantitative assessment may detect neurodevelopmental abnormalities before unequivocal morphologic changes emerge (Mappa et al., 2024; Monteiro et al., 2025; Pooh et al., 2019).

Radiomics, which uses advanced computational image analysis, is another promising field. It extracts numerous features describing tissue texture, echogenicity, and spatial organization that are imperceptible during routine ultrasound assessment. Artificial intelligence algorithms can then analyze these data to identify patterns characteristic of specific disorders. Although radiomics in prenatal neurosonography remains investigational, it may facilitate early detection of changes associated with chronic hypoxia, neuronal migration disorders, intrauterine infection, and genetic disease (Gillies et al., 2016; Lambin et al., 2017).

The future of neurosonography also involves integrating data from multiple sources. Models that combine ultrasound imaging, Doppler indices, genetic test results, and clinical data are receiving increasing attention. AI analysis of such complex data sets may ultimately permit more precise prediction of neurodevelopmental impairment and individualization of prenatal care (Ramirez Zegarra & Ghi, 2023).

Despite the considerable potential of emerging technologies, their role is to support rather than replace the examining clinician. Final interpretation of ultrasound images requires consideration of the clinical context, gestational age, and examiner expertise. The future of neurosonography will likely be based on synergy among high-quality ultrasound imaging, quantitative assessment of brain development, molecular diagnostics, and artificial intelligence. Such an integrated approach may enable earlier diagnosis of neurodevelopmental disorders, more accurate counselling, and more personalized maternal and fetal care.

## **Conclusion**

Over recent decades, fetal neurosonography has evolved rapidly from an examination focused primarily on detecting structural CNS anomalies into an advanced tool for comprehensive assessment of fetal brain anatomy, maturation, and development. Technological advances, standardization of examination techniques, and improved understanding of normal prenatal neurodevelopment now permit detection of subtle disturbances in brain architecture that until recently were beyond the capabilities of ultrasonography.

Contemporary neurosonography plays a key role not only in diagnosing developmental CNS anomalies but also in evaluating fetuses at increased risk of neurodevelopmental impairment, including those affected by fetal growth restriction, congenital heart disease, and intrauterine infection. Its role in selecting patients for genetic testing and planning further prenatal and perinatal management is also increasingly important. When additional evaluation is required, neurosonography remains the first-line modality, whereas MRI is a valuable complement that provides additional information in selected clinical situations.

Despite its high diagnostic value, neurosonography remains dependent on operator expertise, image quality, and gestational age. Not all neurodevelopmental disorders manifest as morphologic changes detectable prenatally; interpretation should therefore always integrate the clinical findings and results of other imaging and genetic studies.

Neurosonography provides clinically important information that allows clinicians to individualize diagnostic and therapeutic management and organize multidisciplinary prenatal and postnatal care. It also provides parents with reliable information about prognosis, the child's possible developmental course, and available treatment and support. This information forms the basis of specialist counselling and supports parents in making informed decisions concerning future reproductive plans.

The future of neurosonography lies in further development of quantitative methods for assessing brain maturation, the use of artificial intelligence, and integration of ultrasound data with molecular diagnostics and advanced image-analysis techniques. These innovations may permit even earlier detection of neurodevelopmental disorders, more precise prognostication, and individualized prenatal care. Neurosonography remains the principal tool for prenatal CNS diagnosis. Its role continues to expand beyond anatomic assessment to encompass analysis of brain development and maturation, support for genetic diagnosis, and prognostication. In the coming years, integration with modern imaging technologies and artificial intelligence may establish neurosonography as a cornerstone of precision, personalized prenatal medicine.

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# Menstrual cycles in adolescent girls<sup>1</sup>

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**Abstract:** *Background:* The menstrual cycle is a key indicator of a woman's reproductive health. Its regularity, length, and the characteristics of individual phases reflect the maturation of the reproductive system and the maintenance of hormonal balance. Adolescence is a particularly dynamic period, during which menstrual cycles often show considerable variability in length, irregularity, and ovulatory patterns. Despite its clinical significance, few studies have analysed the menstrual cycle in adolescents based on self-recorded cycle observation charts. The aim of this study was to characterize selected menstrual cycle parameters in girls aged 12–19 years and to compare these parameters according to the participants' gynaecological age. *Method:* The study included 103 girls aged 12–19 who completed menstrual cycle observation charts. They recorded parameters such as cycle length, duration of bleeding, presence of cervical mucus, basal body temperature changes, and additional symptoms such as dysmenorrhea or intermenstrual spotting. Statistical analysis of the empirical data was conducted, taking into account the participants' biological and gynaecological age. *Results:* The average cycle length among girls who had been menstruating for ≤3 years was approximately 28.7 days, while in those menstruating for >3 years, it was approximately 30.8 days. The shortest recorded cycle lasted 18 days, and the longest 54 days. A 6-day bleeding duration was reported by 31.1% of participants, making it the most frequently observed length. The most frequently observed luteal phase length was 13 days. Fertile-type cervical mucus was typically observed around day 16 of the cycle, with peak mucus secretion occurring on days 19–20. Menstrual pain was recorded in 17.5% of all charts; however, information on the presence or absence of menstrual pain was missing in 46.6% of charts. Cycles without features suggestive of ovulation were more frequently observed among girls in the early years following menarche. *Conclusions:* Menstrual cycles in adolescent girls show considerable variation in length and associated symptoms, consistent with literature describing the immaturity of the hypothalamic–pituitary–ovarian (HPO) axis during this stage of life. Following prior training, most participants were able to record selected menstrual cycle parameters in accordance with the adopted self-observation protocol. However, interpretation of these findings should take into account that the study focused on the recording of cycle parameters and did not include independent validation of the accuracy of self-observation.

**Keywords:** adolescence, menstrual cycle, reproductive health, sexual maturation

## 1. Introduction

The ecological approach to fertility, also referred to as the ecology of procreation or the ecology of the womb, is a lifestyle and model of healthcare based on the full acceptance, observation and protection of the natural human fertility biosystem without pharmacological or mechanical intervention (Fi-jalkowski, 2011).

Accordingly, elements relating to menstrual-cycle observation may constitute a valuable educational tool, supporting an understanding of the physiology of one's own body and the development of responsible health-related attitudes among adolescent girls (Bhoda et al., 2024; Jones & Baldwin, 2025). To date, relatively few scientific studies have

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Pytk.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Pytk.pdf)

examined menstrual-cycle observation in adolescent populations, which provides grounds for undertaking the present study.

Younger members of Generation Z have grown up in an era of widespread internet access and rapid digital development. Being raised in such an environment has shaped their ways of functioning and learning, their perception of reality, and the expectations they formulate towards life and public institutions, including the healthcare system. This generation is characterised by high information needs and a desire for rapid and convenient access to reliable data, particularly in the field of health (Freund, 2024; Nowicka, 2020). Despite their considerable digital competence, young women in this generation may experience difficulties with conventional self-observation of the menstrual cycle, which involves using a printed chart and manually recording observed fertility signs. Although new electronic devices for measuring body temperature and cervical mucus, as well as hormonal analysers, are available on the market, they are not yet widely used among young girls. Examples include electronic ovulation thermometers (Microlife MT 16C2 and MT 1662), an automatic ovulation thermometer (ATOs J5M, CITIZEN T915), electronic fertility monitors (BIOSELF, Microlife MT 16C2 and MT 1662), devices supporting cervical-mucus interpretation (OVACUE Fertility Monitor), and hormonal analysers (Persona, CLEARBLUE). Cycle observation can also be learnt through websites ([www.psnnp.com](http://www.psnnp.com), [www.iner.pl](http://www.iner.pl)), after which fertility signs may be recorded using established smartphone applications. These include Ctlife, developed by the Polskie Stowarzyszenie Nauczycieli Naturalnego Planowania Rodziny (PSNNPR) [Polish Association of Natural Family Planning Teachers], which teaches the double-check symptom–thermal method (the so-called English method) developed by Dr Ann Flynn and Professor John Kelly of Queen Elizabeth Birmingham Maternity Hospital, and INERCYCLE, developed by the Institute of Natural Family Planning (INER), which promotes the method of Professor Josef Rötzer. Both methods require prior instruction by a trained instructor. Other applications supporting interpretation of the menstrual cycle are not always

tested by their developers, which may reduce their effectiveness. The strong interest of Generation Z in ecology, health and information technologies creates favourable conditions for promoting digital tools for cycle self-observation. Consequently, instructors or teachers of fertility-awareness methods should make use, during instruction, of reliable electronic tools available via the internet and smartphones.

The need to obtain information independently and the growing interest in procreative health (Piasecka et al., 2024) encourage critical analysis of available contraceptive methods, including reflection on the adverse effects associated with hormonal agents. This is attributable both to greater health awareness and to the desire for greater control over one's own body (Cetera et al., 2025).

In describing the menstrual cycle in women, particular attention is paid to its length and to whether the cycle is ovulatory or anovulatory. The latter characteristic is especially important for women planning to have children, as the cyclical changes occurring in the female body constitute an important indicator of procreative health. Certain deviations from the physiological course of the cycle may, however, indicate disorders or disease (Piasecka et al., 2023; Stępkowska & Przygodzka, 2020; Ślizień-Kuczapska et al., 2020).

Observing one's own menstrual cycle by recording symptoms and sensations regarded as the principal fertility signs enables women to participate actively in monitoring their procreative health and may also provide a basis for seeking medical assistance at an early stage.

The menstrual cycle results from complex, regular cyclical changes involving both the ovaries and the uterine mucosa. These processes give rise to monthly menstrual bleeding through the interaction of hormones and the reciprocal hormonal relationships between the hypothalamus, pituitary gland and ovaries (Pawelczyk & Banaszewska, 2021; Hoffmann & Strauss, 2021). The cycle is defined as the period from the first day of menstrual bleeding to the day preceding the onset of the subsequent bleeding. In the Polish population, menstrual-cycle length most commonly centres around 28 days, with possible deviations of several days. Among young women,

however, variations ranging from 21 to 36 days may also be considered physiologically normal. Thus, if a woman has short cycles (from 21 days), medium-length cycles ( $28 \pm 3$  days), or long cycles (up to 36 days), and each of 11 cycles can be assigned to one of these three groups, the cycles may be regarded as normal and regular. Once a year, a cycle may be markedly different in length owing, for example, to severe stress, exhaustion, dietary changes, travel and climatic change, illness, medication, or alcohol consumption. In healthy women over 21 years of age, menstruation should already be regular. Menstrual-cycle length is an individual characteristic dependent on genetic and hormonal factors as well as lifestyle (Pogodina et al., 2022).

In Europe, the physiological age range for the onset of puberty in girls is generally considered to be 8–13 years (Zachurzk, 2017). Deviations from the physiological timing of pubertal onset may take the form of precocious or delayed puberty (Troszyński, 2009).

The onset of the first menstruation represents an appropriate point at which girls may begin observing their menstrual cycle. Education is best initiated under the supervision of a mother familiar with a fertility-awareness method or a certified method instructor. During the first two or three years following menarche, cycles may vary considerably in length, ranging from 21 to 45 days, and are often anovulatory, while menstrual bleeding may also vary in abundance (Itriyeva, 2022). The first menstrual cycles during puberty are generally irregular, and luteal insufficiency may be physiological during this period. Maturation of the hypothalamic–pituitary–ovarian axis progresses gradually during the years following menarche (Troszyński, 2009). Studies indicate that as many as 85% of cycles may be anovulatory during the first year after menarche, with this proportion falling to approximately 59% after three years (Ślizień-Kuczapska et al., 2020). Gynaecological age makes it possible to compare girls who have already begun menstruating. There is, however, no current tool for assessing development before menarche based on the degree of maturation of secondary sexual characteristics. The standard has therefore become gynaecological age, determined

by the occurrence of menarche. Subsequent years are classified as positive values (+1, +2, +3, etc.) (Błogowska & Rzepka-Górska, 2004).

Observing the cycle from the time of the first menstruation enables girls to gain a better understanding of the physiological processes associated with maturation, supports acceptance of these changes, and promotes awareness of their own procreative health. The gradual introduction of successive fertility biomarkers, beginning with basal body temperature and followed by observation of cervical mucus, may prove useful in monitoring the course of the cycle and identifying changes that may require medical consultation (Najmabadi et al., 2021; Ślizień-Kuczapska et al., 2020). This knowledge is important not only for the young woman but also for the qualified physician, who should be able to identify possible abnormalities requiring preventive measures or treatment on the basis of menstrual-cycle observation charts.

## **2. Own research**

### **2.1. Aim**

The aim of the study was to characterise selected menstrual-cycle parameters in girls aged 12–19 years on the basis of self-observation charts and to compare these parameters according to the participants' gynaecological age.

### **2.2. Specific aims**

What differences in menstrual-cycle length exist between girls during the first three years following menarche and girls with a gynaecological age of more than three years?

What is the frequency of cycles without features suggestive of ovulation among girls during the first three years following menarche compared with their peers with a longer gynaecological age?

Combining the literature review with the authors' own research made it possible to address the subject comprehensively, from objective physiological processes to the subjective experiences of young women associated with the menstrual cycle.

The specific objectives included characterising selected menstrual-cycle parameters and fertility biomarkers: comparing biological age, calculated from birth, with gynaecological age, defined as the time elapsed since menarche; determining the number of days of menstruation; establishing the minimum and maximum cycle lengths and luteal-phase length; recording the day of first observation of cervical mucus and fertile-type mucus; observing the rise in basal body temperature (BBT); and recording menstrual pain and intermenstrual spotting.

### **2.3. Research hypotheses**

- H1. Menstrual-cycle length will differ between girls within the first three years following menarche and girls with a gynaecological age of more than three years.
- H2. Cycles without features suggestive of ovulation will be observed more frequently among girls within the first three years following menarche than among girls with a longer gynaecological age.

## **3. Method**

The study included 103 girls aged 12–19 years. The participants had previously been trained to conduct menstrual-cycle self-observation in accordance with the principles of the double-check symptom–thermal method. Instruction took place in the home and was provided by the girls' mothers or other close persons who were attending a course leading to certification as a Natural Family Planning (NFP) teacher in this method. Those providing instruction were required to demonstrate appropriate substantive and methodological preparation, and the teaching process took place under the supervision of instructors authorised to train NFP teachers. Owing to the retrospective nature of the study and the scope of the available documentation, it was not possible to establish reliably what proportion of participants had been taught directly by their mothers or other close persons and what proportion had been taught by NFP teachers. Cycle-observation

charts and survey questionnaires were obtained from the Polish Association of Natural Family Planning Teachers (PSNNPR).

The study employed diagnostic and descriptive research procedures aimed at characterising selected features of menstrual cycles in adolescent girls on the basis of data derived from their cycle-observation charts. The analysis focused on cycle length, the occurrence of features suggestive of ovulation, and other physiological parameters relevant to the assessment of procreative health.

The principal research technique was document analysis, consisting of a detailed assessment of the menstrual-cycle observation charts completed by the participants. The self-observation charts included menstrual bleeding, including intermenstrual spotting, the occurrence and characteristics of cervical mucus, BBT, and menstrual-cycle length. On the basis of the accepted rules for interpreting menstrual cycles according to the double-check symptom–thermal method, the analysis considered such cycle features as a rise in BBT, the presence of fertile- or infertile-type cervical mucus, identification of the mucus peak, and the co-occurrence of changes in mucus and temperature.

In the present study, the research method was document analysis. The material analysed comprised observations of adolescents' menstrual cycles. The self-observation charts contained parameters including menstrual bleeding (including intermenstrual spotting), the occurrence and characteristics of cervical mucus, basal body-temperature values, and menstrual-cycle length. According to the accepted rules for interpreting menstrual cycles under the multi-indicator method, the analysis considered features such as the temperature rise, the occurrence of fertile- and infertile-type mucus, the mucus peak, and the correlation between mucus and temperature. All participants measured their basal body temperature (BBT). Twelve-year-old girls experienced difficulties in measuring BBT, mainly owing to the lack of a regular routine, sleep patterns and technical errors. BBT measurements in adolescents, used for observing fertility indicators, were taken orally. An absence of explicit information concerning menstrual pain was treated as missing data rather than as evidence that

symptoms were absent. Because the documentation was analysed retrospectively, the reason for missing entries could not be established with certainty.

Document analysis was conducted on two levels: internally, focusing on the content of the documents, their interpretation and explanation; and externally, assessing the time and circumstances in which they were produced and establishing their reliability.

The document-analysis method used in the present study was supplemented by an interview conducted with a questionnaire obtained from the PSNNPR Training Committee. The questionnaire included questions concerning, among other things, age at menarche, the respondent's biological and gynaecological age at the time of observation, the occurrence of menstrual pain, and medication use during the observation period. The project did not require review by a bioethics committee because of its retrospective and non-invasive nature. The analysis was limited to anonymised observation charts collected in previous years. No additional diagnostic or therapeutic procedures were performed. For underage participants, consent was obtained from their parents or legal guardians and from the participants themselves.

The collected data provided the basis for statistical analyses and assessment of the research hypotheses. Analyses were performed using IBM SPSS Statistics, version 28.0.1.1. Categorical variables were presented as frequencies (n) and percentages (%), while selected quantitative variables were described using means and standard deviations. Relationships between categorical variables were assessed using Pearson's  $\chi^2$  test after checking expected cell counts in contingency tables. Where cell counts were small, appropriate exact tests were used or, where substantively justified, categories were combined. The frequency of cycles without features suggestive of ovulation was compared between the two gynaecological-age groups using Fisher's exact test. Mean menstrual-cycle length was compared between the two gynaecological-age groups using an independent-samples Student's t-test. Statistical significance was set at  $\alpha = 0.05$ .

## 4. Results

### 4.1. Characteristics of the study group

The study included 103 adolescents aged 12–19 years who had already experienced menarche. Menstrual-cycle analysis was based on data from observation charts and included both qualitative and quantitative information, allowing the analysed cycle parameters to be characterised and the study groups to be compared.

The participants came from different regions of Poland. The purposively selected adolescents were menstruating and wished to observe their cycles. They learnt to do so under the supervision of teachers from the Polish Association of Natural Family Planning Teachers. The girls had previously been introduced to the principles of fertility-awareness observation using the double-check symptom–thermal method. NFP teachers were responsible for interpreting the data recorded by the participants on the charts. Analysis of the documentation showed that, following standardised instruction by a method teacher, most participants were able to record selected cycle parameters. NFP teachers reviewed the observation charts and added their own comments. During meetings with the girls, they were asked to complete missing entries if they could remember them, and errors appearing in the cycle charts were explained. One, the most completely completed, menstrual-cycle observation chart was selected for analysis. The first two were excluded because of numerous omissions associated with the participants' stage of learning. The study was anonymous, and the analysis concerned data from one complete menstrual cycle recorded on an observation chart. In the case of underage girls, consent was obtained from their parents or legal guardians and from the participants themselves.

The results were divided into two groups according to the participants' gynaecological age. The first group comprised girls who had been menstruating for no more than three years, while the second comprised girls whose menstrual experience exceeded three years. This division was introduced because the menstrual cycle may become more stable approximately three years after menarche.

Table 1. Descriptive statistics of the biological and gynaecological age of the girls studied (N = 103)

| Variable           | M     | SD   | Mdn | Min | Max |
|--------------------|-------|------|-----|-----|-----|
| Biological age     | 16,36 | 1,74 | 16  | 12  | 19  |
| Gynaecological age | 3,62  | 1,52 | 4   | 1   | 6   |

M = mean; SD = standard deviation; Mdn = median; Min = minimum value; Max = maximum value.

The study group comprised girls with a biological age of 12–19 years. The largest proportions of participants were aged 16 (28.2%) and 17 (23.3%). Notably, three of the twelve-year-old participants reported having menstruated for more than three years, which may indicate that menarche occurred before the age of nine. The overwhelming majority of girls with longer menstrual experience (more than three years) were aged 16–19 years.

The biological and gynaecological ages of the participants varied within the study group, as shown by the descriptive statistics in Table 1.

The data presented in Table 1 show that the mean biological age of the participants was approximately 16 years and four months. The youngest participants were 12 years old and the oldest 19. The mean gynaecological age in the study group was approximately three years and seven months. The participants included both girls who had been menstruating for approximately one year and girls whose menstrual

experience already amounted to six years. The findings indicate considerable variation within the study group, reflected in the standard-deviation values.

The results indicate substantial diversity in both biological and gynaecological age among the school-age girls included in the study. Precocious menarche (before the age of nine) may significantly influence the subsequent course of menstrual cycles. The occurrence of such irregularities may be associated with immaturity of the hormonal axis or with occult pathological processes.

#### 4.2. General characteristics of the menstrual cycle in adolescent girls

As part of the study, participants answered questions enabling assessment of the course of their menstrual cycles. One of the parameters analysed was the duration of menstruation, the distribution of which is presented in Table 2.

The young women recorded the duration of menstrual bleeding on their observation charts. Analysis showed that the largest proportion of respondents (31.1%) reported six-day menstruation. This result was more common among girls who had been menstruating for more than three years (32.7%) than among those with up to three years of menstrual experience (29.2%).

A small proportion of participants reported shorter bleeding lasting three or four days. Five-day menstruation was reported by 20.4% of participants, while the longest, nine-day bleeding, was observed in 6.8%.

Table 2. Duration of menstrual bleeding according to gynaecological age

| Bleeding duration | Up to 3 years, N | %     | More than 3 years, N | %     | Total, N | %     |
|-------------------|------------------|-------|----------------------|-------|----------|-------|
| 3 days            | 1                | 2.1   | 0                    | 0.0   | 1        | 1.0   |
| 4 days            | 6                | 12.5  | 3                    | 5.5   | 9        | 8.7   |
| 5 days            | 8                | 16.7  | 13                   | 23.6  | 21       | 20.4  |
| 6 days            | 14               | 29.2  | 18                   | 32.7  | 32       | 31.1  |
| 7 days            | 10               | 20.8  | 10                   | 18.2  | 20       | 19.4  |
| 8 days            | 7                | 14.6  | 6                    | 10.9  | 13       | 12.6  |
| 9 days            | 2                | 4.2   | 5                    | 9.1   | 7        | 6.8   |
| Total             | 48               | 100.0 | 55                   | 100.0 | 103      | 100.0 |

The Fisher–Freeman–Halton exact test was used to compare the distribution of bleeding duration between the groups,  $p = .634$ .

It should be emphasised that the duration of menstrual bleeding did not differ significantly between the gynaecological-age groups ( $p = .634$ ).

Analysis of the data shows that menstrual bleeding among the adolescents studied lasted between three and nine days, with a mean duration of approximately six days. The results were clearly dispersed, as reflected in the standard deviation of 1.38.

The mean menstrual-cycle length among adolescents who had been menstruating for a relatively short period (up to three years) was approximately 28–29 days ( $M_1 = 28.73$ ). Among girls with longer menstrual experience, the mean was slightly higher, at approximately 30–31 days ( $M_2 = 30.8$ ). Variation in cycle length was observed in both groups, as indicated by the standard deviations ( $SD_1 = 6.92$ ;  $SD_2 = 5.09$ ). Despite the apparent difference between the group means, this difference was not statistically significant ( $p = .084$ ). Descriptive statistics are presented in Table 3.

The shortest menstrual cycle recorded among the adolescents was 18 days, while the longest was 54 days. Cycle length varied considerably, as indicated by the relatively high standard deviation ( $SD = 6.07$ ). The mean cycle length among the adolescents was close to 30 days ( $M = 29.84$ ).

Luteal-phase length is presented in Table 4. The analysis shows that the largest group of girls (17.5%) had a luteal phase lasting 13 days. The shortest recorded luteal phase lasted six days (1.9% of participants), while the longest lasted 21 days (1%). Statistically significant differences were observed between the groups ( $\chi^2(3, N = 100) = 18.49, p < .001$ ) (Table 4).

Table 3. Descriptive statistics of menstrual-cycle length of the girls studied ( $N=103$ )

| Variable           | M     | SD   | Min | Max |
|--------------------|-------|------|-----|-----|
| Cycle length, days | 29.84 | 6.07 | 18  | 54  |

M = mean; SD = standard deviation; Min = minimum value; Max = maximum value.

In the study group, absence of features suggestive of ovulation was recorded more frequently among girls who had been menstruating for a relatively short period (up to three years). In this group, no features suggestive of ovulation were recorded in 29.2% of participants, compared with 14.5% in the group who had been menstruating for longer. These findings indicate that the absence of features suggestive of ovulation was observed more frequently among adolescents whose menarche had occurred relatively recently.

#### 4.3. Observation of cervical mucus, the rise in basal body temperature and features suggestive of ovulation

An important element of menstrual-cycle self-observation in adolescents is monitoring the so-called principal fertility indicators, including daily measurement of basal body temperature and observation of the occurrence and changing characteristics of cervical mucus. Other symptoms that may accompany the peri-ovulatory period, such as ovulatory pain or breast enlargement and tenderness, may also play

Table 4. Categories of luteal-phase length according to gynaecological age

| Luteal-phase category               | Up to 3 years, N | %     | More than 3 years, N | %     | Total, N | %     |
|-------------------------------------|------------------|-------|----------------------|-------|----------|-------|
| Missing data                        | 1                | 2.1   | 2                    | 3.6   | 3        | 2.9   |
| No features suggestive of ovulation | 14               | 29.2  | 8                    | 14.5  | 22       | 21.4  |
| 6–10 days                           | 18               | 37.5  | 7                    | 12.7  | 25       | 24.3  |
| 11–14 days                          | 10               | 20.8  | 33                   | 60.0  | 43       | 41.7  |
| ≥15 days                            | 5                | 10.4  | 5                    | 9.1   | 10       | 9.7   |
| Total                               | 48               | 100.0 | 55                   | 100.0 | 103      | 100.0 |

Due to the small numbers in the original luteal-phase categories, these were combined into the intervals 6–10 days, 11–14 days and ≥ 15 days. Three cases with missing data were excluded from the inferential analysis.  $\chi^2(3, N = 100) = 18.49, p < .001$ .

a role. Particular importance is attached to recognising the characteristics of mucus occurring during the cycle. Data concerning the mucus observed by the participants are presented in Table 5.

Approximately 10% of respondents did not record the occurrence of cervical mucus on their observation charts. The empirical data showed that 60.2% of the adolescents first observed mucus between days 11 and 20 of the cycle. In 26.2% of participants, mucus appeared earlier, between days 5 and 10. Only three participants observed their first mucus between days 21 and 30. No statistically significant differences were found between the gynaecological-age groups in the day of first observation of cervical mucus ( $p = .282$ ).

Among the adolescents studied, the first appearance of mucus occurred between days 5 and 28 of the cycle, with the mean falling around days 11–12 ( $M = 11.84$ ). The results nevertheless showed substantial variation ( $SD = 3.53$ ). Particular importance was attached to identifying fertile-type mucus. The relevant data are presented in Table 6.

The results show that a greater proportion of adolescents who had been menstruating for less than three years had no record of fertile-type mucus than girls whose gynaecological age exceeded three years. The corresponding proportions were 29.2% in the shorter-duration group and 12.7% in the longer-duration group. Most respondents, both among girls menstruating for up to three years (58.3%) and those menstruating for longer (65.5%), observed fertile-type mucus between days 11 and 20 of the cycle. The differences between the groups were not statistically significant ( $p = .110$ ).

The self-observations were also analysed in an attempt to determine the so-called mucus peak day, defined as the last day on which fertile-type mucus occurred. Participants located this point at different stages, between days 12 and 38 of the cycle, with the largest number of observations falling on days 19–20 ( $M = 19.68$ ), indicating considerable variation ( $SD = 4.70$ ).

Table 5. Day of first observation of cervical mucus according to gynaecological age

| First observation of cervical mucus | Up to 3 years, N | %     | More than 3 years, N | %     | Total, N | %     |
|-------------------------------------|------------------|-------|----------------------|-------|----------|-------|
| No record                           | 5                | 10.4  | 6                    | 10.9  | 11       | 10.7  |
| Days 5–10 of cycle                  | 14               | 29.2  | 13                   | 23.6  | 27       | 26.2  |
| Days 11–20 of cycle                 | 26               | 54.2  | 36                   | 65.5  | 62       | 60.2  |
| Days 21–30 of cycle                 | 3                | 6.3   | 0                    | 0.0   | 3        | 2.9   |
| Total                               | 48               | 100.0 | 55                   | 100.0 | 103      | 100.0 |

The Fisher–Freeman–Halton exact test was used to compare the distribution of the first observation of cervical mucus between the groups,  $p = .282$ .

Table 6. Observation of fertile-type mucus according to gynaecological age

| Observation of fertile-type mucus | Up to 3 years, N | %     | More than 3 years, N | %     | Total, N | %     |
|-----------------------------------|------------------|-------|----------------------|-------|----------|-------|
| No record                         | 14               | 29.2  | 7                    | 12.7  | 21       | 20.4  |
| Days 5–10 of cycle                | 5                | 10.4  | 5                    | 9.1   | 10       | 9.7   |
| Days 11–20 of cycle               | 28               | 58.3  | 36                   | 65.5  | 64       | 62.1  |
| Days 21–30 of cycle               | 1                | 2.1   | 5                    | 9.1   | 6        | 5.8   |
| After day 30 of cycle             | 0                | 0.0   | 2                    | 3.6   | 2        | 1.9   |
| Total                             | 48               | 100.0 | 55                   | 100.0 | 103      | 100.0 |

The Fisher–Freeman–Halton exact test was used to compare the distribution of observations of fertile-type mucus between the groups,  $p = .110$ .

So-called disturbances in the observation of mucus secretion were relatively uncommon. Most girls—83.3% of those menstruating for up to three years and 80% of those menstruating for longer—reported no problems in this respect. A small proportion reported uncertainty associated with the use of sanitary pads (3.9%) or medication that could affect mucus characteristics (4.9%).

Another important indicator regarded as suggestive of ovulation is a rise in basal body temperature (Table 7).

The data in Table 7 indicate that a characteristic rise in BBT, regarded under the adopted criteria as a feature suggestive of ovulation, was observed in 70.8% of girls menstruating for less than three years and 81.8% of girls with longer menstrual experience. No such rise was recorded in 19.4% of participants. There were no statistically significant differences between the gynaecological-age groups in the observation of a BBT rise ( $p = .389$ ).

Respondents were also asked about difficulties associated with observing a biphasic BBT pattern. Some form of disturbance was reported by 34% of participants, whereas 61.2% reported no such problems.

A relationship between the occurrence of fertile-type mucus and a rise in basal body temperature was observed in 54% of all girls studied. In the younger gynaecological-age group, the two features co-occurred in 48% of participants, compared with 60% in the older group. The difference was not statistically significant ( $p = .219$ ).

Participants also reported additional indicators accompanying ovulation, such as ovulatory pain and breast changes. Only 8.7% of adolescents recorded such symptoms on their observation charts, whereas 91.3% did not record them. Gynaecological age did not significantly differentiate these results.

According to the adopted self-observation criteria, no features suggestive of ovulation were recorded in 22 of the 103 charts analysed (21.4%). This applied to 14 of 48 charts (29.2%) in the group menstruating for up to three years and 8 of 55 charts (14.5%)

Table 7. Observation of the rise in basal body temperature according to gynaecological age

| Rise in BBT                         | Up to 3 years,<br>N | %     | More than 3<br>years, N | %     | Total, N | %     |
|-------------------------------------|---------------------|-------|-------------------------|-------|----------|-------|
| No record or observation            | 1                   | 2.1   | 0                       | 0.0   | 1        | 1.0   |
| Rise in BBT observed                | 34                  | 70.8  | 45                      | 81.8  | 79       | 76.7  |
| No rise in BBT observed             | 12                  | 25.0  | 8                       | 14.5  | 20       | 19.4  |
| Rise in BBT could not be determined | 1                   | 2.1   | 2                       | 3.6   | 3        | 2.9   |
| Total                               | 48                  | 100.0 | 55                      | 100.0 | 103      | 100.0 |

BBT = basal body temperature. The Fisher–Freeman–Halton exact test was used to compare the distribution of observed BBT rises between the groups,  $p = .389$ .

Table 8. Occurrence of menstrual pain according to gynaecological age

| Menstrual pain | Up to 3 years,<br>N | %     | More than 3<br>years, N | %     | Total, N | %     |
|----------------|---------------------|-------|-------------------------|-------|----------|-------|
| Pain present   | 3                   | 6.3   | 15                      | 27.3  | 18       | 17.5  |
| No pain        | 20                  | 41.7  | 17                      | 30.9  | 37       | 35.9  |
| Missing data   | 25                  | 52.1  | 23                      | 41.8  | 48       | 46.6  |
| Total          | 48                  | 100.0 | 55                      | 100.0 | 103      | 100.0 |

When all three categories were analysed,  $\chi^2(2, N = 103) = 7.89$ ,  $p = .019$ . For the complete observations ( $n = 55$ ), Fisher's exact test was used,  $p = .010$ .

in the group menstruating for longer. This finding concerns features recorded on the observation charts and does not constitute clinical confirmation of an absence of ovulation.

#### **4.4. Menstrual pain and intermenstrual spotting in the observations of the adolescents studied**

Experiencing menstrual pain is an important health problem among adolescents. Data concerning this phenomenon, obtained from the cycle-observation charts completed by the girls, are presented in Table 8.

Intermenstrual spotting was recorded in 3.9% of the adolescents studied. No cases of spotting were recorded in the group of girls who had been menstruating for more than three years. The difference between the groups was statistically significant ( $p = .044$ ). It may therefore be concluded that intermenstrual spotting was recorded more frequently among girls who had begun menstruating relatively recently. The phenomenon was absent in 96.1% of the adolescents studied.

The results suggest that maintaining menstrual-cycle observation charts may have educational value and may encourage greater attention to changes occurring during the cycle. Following prior training, most of the girls studied were able to record selected cycle parameters in accordance with the adopted self-observation protocol. However, the study did not include independent validation of the accuracy of these observations.

## **5. Discussion**

From both clinical and educational perspectives, learning to observe the menstrual cycle may increase awareness of changes that could require medical consultation and may foster a sense of responsibility for one's own health (Duane et al., 2022).

The aim of the study was to characterise menstrual cycles in adolescent girls on the basis of data obtained from their observation charts. The findings are broadly consistent with the literature, although differences can also be identified in certain respects

and merit detailed analysis. Variation in menstrual cycles during adolescence has likewise been highlighted by Ślizień-Kuczapska et al. (2020).

Despite their relatively limited experience of observation, most girls were able to document cycle symptoms systematically. The possibility of systematically monitoring menstrual parameters in young adolescents has also been demonstrated in a prospective study using a mobile application (Bala et al., 2024). The present findings indicate considerable variation in adolescent menstrual cycles, both in length and in the characteristics of fertility biomarkers. Following menarche, menstrual cycles in most adolescent girls gradually stabilise over approximately 3–5 years, in association with maturation of the hypothalamic–pituitary–ovarian axis (Troszyński, 2009; Harley et al., 2024; Sun et al., 2019). Contemporary data confirm that gynaecological age is important in characterising the menstrual cycle. Harley et al. (2024), analysing 38,916 cycles in 6,486 adolescents, found that the frequency of highly variable, short and long cycles decreased as time since menarche increased. Similarly, Naveed and Whooten (2024) report that cycle regularity increases with time since menarche.

The mean age of the participants was approximately 16 years and four months, corresponding to late puberty. At this stage, most girls would be expected to have menstrual cycles that are already more stable in terms of length and regularity (Anthon et al., 2024). In interpreting adolescent cycles, however, not only chronological age but also gynaecological age—the time elapsed since menarche—should be taken into account (De Sanctis et al., 2019; Harley et al., 2024).

In the present study, the most frequently reported duration of menstrual bleeding was six days (31.1%), while more than 20% of girls experienced five-day bleeding. Only 6.8% reported bleeding lasting nine days. These figures correspond to data reported by Piasecka, according to which mean menstrual duration in a population of women was slightly more than five days (Piasecka et al., 2022). Current data indicate that menstrual bleeding in adolescents most commonly lasts 3–7 days, whereas longer bleeding may require further clinical assessment, particularly when it is heavy or impairs functioning (Ittreyeva, 2022).

The shortest duration of menstrual bleeding in the study group was three days and the longest was nine days. The analyses established a minimum menstrual-cycle length of 18 days and a maximum of 54 days. The mean cycle length in girls menstruating for a shorter period (up to three years) was approximately 28–29 days ( $M_1 = 28.73$ ), whereas among adolescents whose time since menarche was longer it was approximately 30–31 days ( $M_2 = 30.8$ ). These findings are similar to Deluga's observation of a mean menstrual-cycle length of 28.6 days in adult women (Deluga, 2000). Piasecka et al. likewise found an average menstrual cycle of approximately 28 days. However, in that study it had not previously been established whether the younger group consisted only of women with medium-length cycles (26–30 days), or whether the older group consisted only of women with longer cycles (above 31 days) (Piasecka et al., 2022). According to Itriyeva (2022), most adolescent cycles fall within the range of 21–45 days. The extreme values observed in the present study, 18 and 54 days, therefore fall outside the typical range.

With regard to luteal-phase length, the most frequently observed duration among the adolescents studied was 13 days, consistent with the findings of Piasecka et al. concerning adult women (Piasecka et al., 2022). According to the current position of the American Society for Reproductive Medicine, a typical luteal phase lasts approximately 12–14 days and may range from 11 to 17 days, whereas a luteal phase lasting  $\leq 10$  days may indicate a shortened luteal phase (Practice Committee of the American Society for Reproductive Medicine & Practice Committee of the Society for Reproductive Endocrinology and Infertility, 2026). When interpreting the findings in adolescents, however, the gradual maturation of ovulatory function must be considered. Sun et al. (2019) demonstrated that healthy girls after menarche may experience anovulatory cycles, ovulatory cycles with a short luteal phase, and ovulatory cycles with a normal luteal phase, indicating gradual maturation of the reproductive axis. This process is also the subject of the three-year longitudinal A Girl's First Period Study, which aims to characterise hormonal changes from the period following menarche to the development of mature ovulatory cycles (Lucien et al., 2022).

One of the key elements of self-observation within fertility-awareness methods is monitoring cervical mucus, basal body temperature and other indicators that permit assessment of changes associated with the peri-ovulatory period. Individual methods of ovulation monitoring differ, however, in the information they provide and, in their ability, to confirm that ovulation has occurred (Wegrzynowicz et al., 2024). The present findings indicate that 60.2% of the adolescent respondents observed the first appearance of mucus between days 11 and 20 of the cycle, whereas in 26.2% it appeared earlier, between days 5 and 10. By comparison, women in the study by Piasecka et al. (2022) recorded the first occurrence of mucus around day 9 of the cycle, which is consistent with the observations of the 26.2% of adolescents in the present study.

Fertile-type mucus was recorded by respondents between days 7 and 35 of the cycle, with the mean day of occurrence being approximately day 16 ( $M = 15.93$ ). Similar findings were obtained by Piasecka et al., in whose study mucus displaying high-fertility characteristics was also observed on average on day 16. In addition, participants in the present study most frequently recorded the so-called mucus peak between days 19 and 20 ( $M = 19.68$ ), consistent with the results reported by Piasecka et al. (2022).

The potential for error in assessing fertile-type mucus must nevertheless be taken into account, owing to the participants' early stage of learning cycle observation. Moreover, when only a single cycle is examined, distinguishing the appearance and sensation of mucus may be difficult. In women, the most commonly observed pattern is the 'dry' model: after menstruation, there is an absence of secretion in the vulval area, followed by the appearance of less-fertile mucus, then highly fertile mucus, followed by a return to less-fertile mucus and finally its complete disappearance. In the 'wet' model, constant, unchanging secretion is present after menstruation and produces a sensation of moisture. The first day on which this secretion changes marks the beginning of the fertile period, which ends when the constant, unchanging secretion returns, according to the double-check symptom–thermal method (PSNNPR) (Troszyński, 2009).

No record of fertile-type mucus was found for 29% of girls in the younger gynaecological-age group and 13% in the older group. Most commonly (58% in the younger group and 65.5% in the older group), the sign occurred between days 11 and 20 of the cycle. Most women experienced no difficulty in observing fertile-type mucus.

Additional symptoms that may accompany the peri-ovulatory period, such as ovulatory pain and breast changes, were recorded by 8.7% of respondents. Menstrual pain was recorded in 17.5% of the charts, although 46.6% contained no unambiguous information. Among girls for whom data were available, pain occurred in 13.0% of those within three years of menarche and in 46.9% of those menstruating for longer. These figures are lower than those reported by Białka et al. (2018), who indicate that dysmenorrhoea occurs in 30–70% of adolescents and young women, with symptoms located mainly in the lower abdomen.

A similar phenomenon was described in a 2014 study of pupils from six secondary schools in Turkey, in which as many as 92% of girls reported dysmenorrhoea (Esen et al., 2016). More recent international studies likewise indicate a high prevalence of dysmenorrhoea among adolescents. Nakamura et al. (2025) reported it in 74.9% of participants. Panova et al. (2026), meanwhile, emphasise that cases of dysmenorrhoea unresponsive to initial treatment require reassessment for potential secondary causes, including endometriosis. Comparison of the prevalence of menstrual complaints across studies is further complicated by differences in the measurement instruments used and their validation in adolescent populations (Dixon et al., 2024; Özcan et al., 2024).

It should be noted that, despite the growing number of studies concerning menstruation in adolescents, relatively few have assessed detailed self-observation of fertility biomarkers in groups with characteristics comparable to those of the present participants. For this reason, an attempt was made to compare the present findings with selected studies available in the literature.

In summary, the study indicates considerable variation in the length and characteristics of the observed cycles among the girls studied. Because only

one cycle per participant was analysed, however, individual cycle variability over time cannot be assessed on this basis. The findings are therefore consistent with literature indicating gradual maturation of reproductive function after menarche (Harley et al., 2024; Lucien et al., 2022; Sun et al., 2019). At the same time, the results highlight the importance of educating young women in menstrual-cycle self-observation and interpretation of fertility signs, both to increase awareness of their own procreative health and to identify changes requiring medical consultation. It should be emphasised that fertility-awareness methods, whose effectiveness depends on the method used and the correctness of its application, and which are non-invasive, constitute a valuable, accessible and low-cost means of supporting family planning and monitoring procreative health (Duane et al., 2022; Troszyński, 2009). Wider promotion of cycle self-observation may increase awareness of procreative health. The importance of such observation is supported by contemporary evidence identifying menstrual-cycle characteristics as an important health indicator (Rosen Vollmar et al., 2025).

## 6. Conclusions

1. The study group included girls whose gynaecological age ranged from one to six years. Among girls who had been menstruating for a shorter period, up to three years after menarche, mean cycle length was approximately 28–29 days, whereas among adolescents with longer menstrual experience, exceeding three years, cycles averaged 30–31 days. This difference was not statistically significant.
2. Most girls experienced no difficulty in observing the rise in BBT. Following prior training, most participants were able to record selected cycle parameters in accordance with the adopted self-observation protocol. The study did not, however, include independent validation of the accuracy of these observations.
3. Menstrual pain was recorded in 17.5% of all charts; however, because 46.6% of observations contained no unambiguous information con-

cerning pain, this finding requires cautious interpretation. Among participants with complete data, pain was recorded more frequently in the group of girls who had been menstruating for more than three years. Intermenstrual spotting was uncommon.

4. The findings indicate that the menstrual cycles observed in adolescent girls varied considerably, both in length and in the occurrence of individual cycle symptoms.
5. Hypothesis H1 was not confirmed because the difference in mean menstrual-cycle length between the groups was not statistically significant ( $p = .084$ ). Hypothesis H2 was not statistically confirmed; although the proportion of cycles without features suggestive of ovulation was higher in the group within three years of menarche, the difference was not statistically significant ( $p = .093$ ).
6. The findings indicate a need for wider implementation of educational programmes teaching young girls practical skills in observing and interpreting menstrual cycles. Menstrual-cycle observation may support greater awareness of biological processes occurring in the body.
7. Mobile applications for cycle tracking and conception planning are playing an increasingly important role, providing educational functions and supporting the monitoring of cycles and fertility (Lyzwinski et al., 2024).
8. The present study addresses a topic that is rarely examined in Poland, highlighting its originality and indicating the need for further research in this area.

## Limitations of the study

The researchers nevertheless point to an important limitation arising from the fact that the analysed material comprised only a single, third observed cycle for each adolescent. This may have substantially affected the objective assessment of the girls' ability to recognise cervical-mucus characteristics. The methodology used to obtain the research material constitutes a significant limitation of the pro-

ject. This stems from the small number of certified instructors of the method, which directly resulted in a limited number of observation charts being collected and restricted the sample size. The characteristics of the adolescent age group were associated with difficulties in systematically recording fertility indicators. Consequently, only one, the most complete, chart from the three observations conducted by each participant was included in the final analysis. The research material was collected between 2016 and 2021, which involved a considerable workload and long-term commitment. This may explain why comparable studies are relatively uncommon in the literature. Owing to the specific sampling procedure, the group analysed was non-representative; the final sample comprised 103 cycle-observation charts. A further methodological limitation was the use of purposive and voluntary sampling. This recruitment strategy increases the risk of selection bias and limits the generalisability of the findings to the adolescent population as a whole. The sample consisted exclusively of girls who were personally motivated to learn menstrual-cycle observation, and therefore did not reflect the attitudes of their wider peer group. Another methodological weakness was the inclusion of a broad age range (12–19 years). Combining, within a single analysis, charts from adolescents in early puberty with data from girls with a more mature hormonal profile may distort patterns characteristic of particular developmental stages. The group varied considerably not only in the maturity of the hypothalamic–pituitary–ovarian axis but also in its ability to maintain detailed observation charts. An important limitation is the absence of comparison between self-observation findings and clinical reference standards. Because the study was limited to analysis of existing documentation, validation of the accuracy of fertility-marker recognition could not be performed. The findings should therefore be interpreted cautiously, since information concerning participants' health status (chronic diseases, endocrine and nutritional disorders) and lifestyle (stress, diet, BMI) was not available, preventing complete elimination of potential confounding factors. The available documentation also contained no information on

whether participants continued self-observation after completing the project or on their subjective assessment of its usefulness.

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# Knowledge, attitudes, and self-reported health behaviors related to reproductive health among university students in Poland: A cross-sectional study<sup>1</sup>

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**Abstract:** *Introduction:* Reproductive health is a significant area of public health, and the level of knowledge and health behaviors in young adults may be important for their future health and reproductive decisions. The level of health education in students may influence informed decision making regarding health and reproductive plans. *Aim of the study:* The study aimed to assess the knowledge, opinions, and declared health behaviors of university students in Poland regarding reproductive health. *Material and methods:* A cross-sectional online survey (CAWI) was conducted in a group of 182 students from Polish universities. Non-random convenience sampling was used. Two standardized tools developed by Juczyński were utilized – the List of Health Criteria (LHC) and the Health Behavior Inventory (HBI) – along with an original, 26-item knowledge test on reproductive health. The analysis included descriptive statistics, a rank analysis of responses in the LHC and HBI, and the evaluation of the percentage of correct answers in the original knowledge test in relation to current medical guidelines. *Results:* In the LHC, the highest-rated criteria referred to subjective well-being and somatic fitness, including “feeling well” and “having all body parts functioning properly.” In the HBI, selected preventive behaviors were declared relatively more frequently, while behaviors related to rest, limiting work overload, and coping with tension and stress were reported less often. 48.9% of the respondents declared that they rarely or almost never avoided work overload. A significant proportion of the respondents rarely declared taking actions aimed at reducing intense stress and tension. A high percentage of incorrect answers was recorded in the section of the test concerning nutrition during pregnancy. *Conclusions:* The surveyed students’ knowledge regarding reproductive health was diverse and showed significant gaps in certain areas, particularly regarding selected physiological issues and nutrition during pregnancy. At the group level, a discrepancy was observed between high awareness of selected risk factors and less frequent reports of certain behaviors related to rest and stress reduction. The results indicate the validity of developing health education programs for students, covering both the knowledge of reproductive health and issues related to sleep, regeneration, and stress management.

**Keywords:** attitudes, students, knowledge, health behaviors, reproductive health

## 1. Introduction

The World Health Organization (WHO) defines reproductive health as the state of physical, mental and social well-being with respect to the reproductive system, its functions and processes, and not merely the absence of disease or disorder (WHO, n.d.). This term

also encompasses the ability to make informed and autonomous decisions regarding reproductive matters. Reproductive health includes sexual health, fertility and issues related to motherhood and reproductive care (Walentynowicz-Moryl and Mianowska, 2020).

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Wysz.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Wysz.pdf)

The importance of promoting reproductive health also increases in the light of the demographic changes we are observing. The reproductive health of parents largely affects the health of their children, as well as the health of subsequent generations (Ministerstwo Zdrowia, 2024).

Adverse demographic changes are observed not only in Poland, but also in many European countries. They have social, economic and health consequences (Kochańczyk, 2020). In this context, health education focused not only on the transfer of knowledge, but also on supporting behaviors conducive to reproductive health is of particular importance. The scope of professional competences of midwives includes educational and health-related activities concerning family planning, maternity and paternity protection, preparation for parenthood and counseling in the field of hygiene and nutrition (Act of 15 July 2011 on the Professions of Nurse and Midwife).

Students are at a stage of their life when health behaviors are shaped and decisions that will affect their future reproductive health may be made. Designing educational interventions should be preceded by an assessment of the needs and existing knowledge deficits in the target group. Therefore, a study was conducted to assess the knowledge, attitudes and self-reported health behaviors of students regarding reproductive health. Basic knowledge about sexuality, fertility and reproductive health is a crucial element of the health competences of young adults. Due to their professional competence, midwives may be an important source of expert information in this area (Uzar, 2019). Providing reproductive health education belongs to the statutory professional competences of midwives. The competences also include the preparation and provision of educational activities addressed to various target groups. The activities may help prevent reproductive health problems and increase health competences of the target groups. Moreover, education should cover topics such as family planning methods, prevention of sexually transmitted infections and the influence of reproductive health on the overall quality of life (Witkowska-Wirstlein, 2018). The lack or an insufficient scope of health education in this area may lead to risky behaviors

in young people. Learning the basics of fertility physiology constitutes an important part of sex education regardless of the general attitude towards sex education (Bączek et al., 2020). Young adults should have access to reliable information on factors affecting fertility, with age being a significant one. Reliable knowledge may support informed decisions about future family planning (Lucas et al., 2015).

So far, Polish research on the knowledge of pupils and students about fertility has primarily focused on three areas. They mainly include the knowledge of fertility physiology and menstrual cycle, methods of fertility recognition and contraception (Walentynowicz-Moryl and Mianowska, 2020). Knowledge of family planning methods should be available, reliable and well documented by scientific research. The level of this knowledge among medical students who may participate in education and health counseling in the future is of particular importance. Individual methods of contraception differ in their mechanism of action, effectiveness, contraindications and possible impact on health and daily functioning (Musik, 2024). Every person has the right to comprehensive education that contributes to a deeper understanding of moral, cultural and social values. It also helps in recognizing and understanding emerging problems (Bączek et al., 2020). Reproductive health education should also include adults, as information needs change with each stage of life. So far, the literature has primarily focused on the sex education of children and adolescents, while adult education has received relatively less attention. The authors of some research indicated that despite the declared interest in the subject of reproductive health, the level of the knowledge of students remained insufficient in selected areas. Knowledge deficits were also observed in medical students, despite the fact that the professional preparation of this group included issues related to human health (Turner et al., 2014). The growing number of online sources of information about sexuality and reproductive health may make it even more difficult to identify reliable and evidence-based material. These days, young people cite the mass media as the main source of knowledge in the field of sexual health. Although they allow

easy, fast and often free access to information, it is necessary to focus on verifying information on reproductive health (Jabłońska et al., 2018).

An additional argument in favor of the need to educate adults and promote pro-health and pro-parenting attitudes is the ongoing process of social changes related to sexuality that influence the transformation of concepts such as gender and the modification of medical and social norms. Current changes, as well as easy access to a variety of opinions on the Internet, require adults to provide support in terms of understanding the rational assessment of new reality. Reliable education in the field of reproductive health can support young adults in making informed decisions regarding health and reproductive plans (Walendzik-Ostrowska and Dec-Pietrowska, 2023).

Students' knowledge of selected aspects of reproductive health has been the subject of previous domestic and foreign research. So far, the analyses have focused largely on an isolated assessment of students' purely factual knowledge – most often concerning contraception methods, prevention of sexually transmitted infections or the physiology of fertilization. An important research gap is clearly visible in the literature concerning the subject. The level of knowledge, the way of evaluating health and self-declared health behaviors were analyzed much less frequently. This study attempts to partially fill this gap through an integrated analysis of three areas: knowledge about reproductive health, subjective evaluation of health criteria and reported health behaviors. Instead of being limited to a simple description of statements, the project integrated a proprietary clinical knowledge test based on the guidelines issued by the WHO (n.d.) and Polskie Towarzystwo Ginekologów i Położników [Polish Society of Gynecologists and Obstetricians] (PTGiP, n.d.) – with two recognized, standardized psychometric tools authored by Juczyński (2001): Lista Kryteriów Zdrowia (LKZ) [the List of Health Criteria] and Inwentarz Zachowań Zdrowotnych (IZZ) [Health Behavior Inventory]. Such an approach allows for the parallel characterization of knowledge, health criteria and reported health behaviors in the same group of respondents. Furthermore, unlike many previous

papers which are uniform in nature, this project makes it possible to characterize the co-occurrence of these phenomena in the context of the specificity of the demographic crisis and contemporary nutritional myths, which may add practical value to the obtained results in terms of the design of academic public health curricula.

To date, the results of research on students' knowledge about reproductive health have not been fully consistent. Researchers such as Walentynowicz-Moryl and Mianowska (2020) and Bączek et al. (2020) suggested that the young Polish generation was characterized by a relatively satisfactory general health awareness, stimulated by mass prevention campaigns. Conversely, other authors indicated significant shortcomings in the field of detailed biological knowledge and difficulties in assessing the reliability of information obtained from the Internet (Turner et al., 2014, Jabłońska et al., 2018). The ambiguity of the results so far justifies further analysis of both the level of knowledge and its relationship with the reported health behaviors. The field of nutrition during the preconception period and pregnancy is a source of additional controversy in the literature on this subject. Classic studies (e.g., Uzar, 2019) focused on the problem of malnutrition or extreme nutritional knowledge deficiencies in young women. As regards nutrition during pregnancy, the problem of misconceptions that lead to excessive restriction of certain food groups is also of particular importance (Lucas et al., 2015). However, the sources of erroneous nutritional beliefs and their potential relationship with decisions made by young adults remain insufficiently understood. An important cognitive gap is clearly visible in the current research approach. Most authors (e.g., Musik, 2024) treat the level of students' factual knowledge in an isolated way – as a simple sum of correct answers to questions about contraception or physiology. There is a lack of holistic, complementary studies that would link this purely cognitive component with the deeper psychological and axiological structures of young adults: with their subjective evaluation of health criteria and realistically implemented habits and lifestyle hygiene.

## **2. Own research**

### **2.1. Aim of the study and research questions**

The study was conducted to assess the knowledge, attitudes and self-reported health behaviors of students regarding reproductive health. The study was cross-sectional and exploratory. In connection with the goal, the following research questions were formulated:

- What level of knowledge about reproductive health do the surveyed students present and in which areas do the greatest knowledge deficits occur?
- What health criteria are the highest and lowest rated by the surveyed students in the LHC?
- Which health behaviors are reported by the surveyed students the most and the least frequently?

### **2.2. Research hypotheses**

In relation to the research questions, the following working hypotheses were formulated:

- The surveyed students will obtain a higher percentage of correct answers concerning general lifestyle and hygiene than in the area of detailed reproductive physiology and selected recommendations regarding nutrition during pregnancy.
- Within the LHC framework, the criteria related to subjective well-being and physical and functional capacity will be given the highest weight.
- A higher level of knowledge about the impact of stress, sleep and lifestyle on reproductive health will only be weakly correlated with the frequency of reported health-promoting behaviors in the corresponding areas of the HBI.

### **2.3. Material and methods**

The adopted research model is based on the analysis of three complementary areas of the functioning of young adults: the cognitive component (represented by the level of factual knowledge), the axiological component (subjective evaluation of health criteria – LHC) and the behavioral component, understood

as the self-reported frequency of health behaviors measured using the HBI. The analyses concerned the distributions of the studied variables in the analyzed sample of students.

The analysis of the empirical material ( $n = 182$ ) is based on methods of descriptive statistics and structural and rank analysis. In addition, we carried out the analysis of responses at the level of individual LHC and HBI items. For individual items, the average response values were calculated. Subsequently, they were organized from the highest to the lowest value, creating a ranking of items. The scoring weight was assigned to individual response categories on the Likert scale (from 1 to 5 points), which made it possible to rank health criteria and the frequency with which individual behaviors were reported.

The study was conducted with a diagnostic survey using the CAWI (Computer-Assisted Web Interview) technique. The authors of the study provided a link to the questionnaire on online forums, social networks and discussion groups associating students of various universities. The inclusion criterion for the study was the student status in any program at a Polish university. Midwifery students were excluded from the study due to the specific scope of education directly related to the studied issue, as this could lead to systematically higher knowledge test results.

The proprietary knowledge test on reproductive health used in the project consisted of 26 single-choice closed questions. This tool was a factual questionnaire used to assess factual knowledge concerning reproductive health. Due to the heterogeneous content range of the test, the Cronbach's alpha coefficient was not adopted as the basic indicator of its reliability. The questions were designed based on current clinical standards and guidelines of the WHO (n.d.) and PTGiP (n.d.). In order to assess the relevance of the content, the set of questions was assessed by two independent experts in the field of obstetrics and public health. Before starting the actual research process, a pilot study was conducted in a group of 15 students, which made it possible to verify the comprehensibility of the wording, eliminate structural errors and optimize the time needed to complete the questionnaire (the results of the pilot study were not included in the final analysis).

### 3. Results

A total of 182 respondents participated in the study with women constituting 80.8% of the sample. The age of the participants ranged from 18 to 48 years; 94.5% of the respondents were aged 18–25. Most of the respondents were unmarried (95.1%), 4.4% were married, and 0.5% were divorced. The largest group of the respondents came from a city with over 500,000 residents (43.4%). The second largest group included rural residents (20.9%), and the smallest group of individuals reported living in cities with between 150,000 and 500,000 residents (8.8%).

The respondents included students of first-cycle studies, second-cycle studies, as well as single-cycle master's programs. Over half of them (57.7%) were first-cycle students. First-year students made up the largest percentage (36.3%), followed by second-year (26.9%), third-year (20.3%) and fifth-year students (12.6%). Fourth-year students were the smallest group (3.9%). The study was addressed to both medical and non-medical students. The number of respondents studying medical faculties (53.8%) slightly exceeded the number of non-medical students. The group of respondents studying medical faculties included students of medicine, nursing, dietetics, speech and language therapy, pharmacy, dental medicine, and emergency medicine. The group of respondents studying non-medical fields included students majoring in education, psychology, cognitive science, management, law, philosophy, criminology, administration, English philology, journalism, military history, national security, and production engineering.

As regards the topics covered in the knowledge test, several categories can be identified: male and female reproductive health, fertility, pregnancy, contraception, as well as the organization of reproductive health care.

The percentage of correct answers varied across different areas of knowledge. In the area of intimate hygiene, the respondents demonstrated a high level of competence (78% of correct answers). A similar trend was observed in the assessment of factors influencing the regularity of the menstrual cycle (Table 1), where nearly the entire population (97.8%) correctly identified stress as a key determinant, and

high percentages of responses were also recorded for illness (96.2%) and sleep (90.1%). A lower percentage of correct answers was noted in questions regarding specific physiological parameters. This is evidenced by the fact that only 47.3% of the respondents knew the actual survival time of the ovum after ovulation, and nearly half (48.9%) could not indicate the correct length of the menstrual cycle.

As regards the structure of attitudes to the conditions of fertility (Table 2), a very high and consistent level of agreement was observed with regard to classic risk factors. The influence of stimulants, alcohol, stress, and healthy nutrition was confirmed by over 97% of the respondents. In the case of shift work, the responses were more diverse: 19.8% of the respondents indicated the answer "No opinion", and 14.2% disagreed with its impact on fertility.

Another set of questions concerned pregnancy and childbirth. In response to the question about the normal duration of pregnancy, the vast majority of the respondents (77.5%) correctly indicated that pregnancy lasted from 38 to 42 weeks. At the same time, over one-fifth of the respondents (21.4%) incorrectly believed that the normal duration of pregnancy was 32–36 weeks. The study participants demonstrated the highest level of knowledge regarding the function of the umbilical cord, with the percentage of correct answers reaching as high as 98.9%. The most difficult question, however, was one regarding the proper course of action after waters break. Correct answers were provided by 72.5% of the respondents, while 27.5% chose the wrong answer or admitted they did not know.

Significant variability in responses was also observed for questions concerning nutrition during pregnancy (Table 3). The highest percentage of responses consistent with recommendations was recorded for red wine (98.9% identified it as a prohibited product) and raw meat (71.4% identified it as a prohibited product, 27.5% as not recommended – which together amounted to 98.9% correct exclusion from the diet due to the risk of toxoplasmosis and listeriosis). Conversely, we found a high percentage of responses inconsistent with the adopted recommendations for selected products, e.g., red meat was classified as a non-recommended or prohibited

Table 1. Factors affecting the regularity of the menstrual cycle according to the respondents (N = 182)

| Factor                     | Stress      | Shift work  | Illness     | Travel      | Sleep       |
|----------------------------|-------------|-------------|-------------|-------------|-------------|
| Number of the respondents: | 178 (97.8%) | 112 (61.5%) | 175 (96.2%) | 128 (70.3%) | 164 (90.1%) |

Table 2. Respondents' attitudes to the impact of selected factors on fertility (N = 182)

| Factor / Number of respondents | Strongly agree | Agree      | No opinion | Disagree   | Strongly disagree |
|--------------------------------|----------------|------------|------------|------------|-------------------|
| Healthy nutrition              | 153 (84.1%)    | 25 (13.7%) | 1 (0.5%)   | 3 (1.6%)   | 0                 |
| Practicing sports              | 116 (63.7%)    | 52 (28.6%) | 7 (3.8%)   | 7 (3.8%)   | 0                 |
| Alcohol                        | 156 (85.7%)    | 21 (11.5%) | 1 (0.5%)   | 2 (1.1%)   | 2 (1.1%)          |
| Shift work                     | 66 (36.3%)     | 54 (29.7%) | 36 (19.8%) | 21 (11.5%) | 5 (2.7%)          |
| Stimulants                     | 168 (92.3%)    | 12 (6.6%)  | 0          | 2 (1.1%)   | 0                 |
| Stressful situations           | 149 (81.9%)    | 30 (16.5%) | 1 (0.5%)   | 2 (1.1%)   | 0                 |
| Self-examination               | 98 (53.8%)     | 34 (18.7%) | 24 (13.2%) | 14 (7.7%)  | 12 (6.6%)         |
| Vitamin intake                 | 85 (46.7%)     | 73 (40.1%) | 13 (7.1%)  | 10 (5.5%)  | 1 (0.5%)          |

Table 3. Opinion of the respondents on products indicated, not recommended and prohibited during pregnancy (N = 182)

| Factor / Number of respondents | Indicated   | Not recommended | Prohibited  |
|--------------------------------|-------------|-----------------|-------------|
| Natural yoghurt                | 161 (88.5%) | 19 (10.4%)      | 2 (1.1%)    |
| Red meat                       | 63 (34.6%)  | 99 (54.4%)      | 20 (11%)    |
| Seafood                        | 19 (10.4%)  | 100 (54.9%)     | 63 (34.6%)  |
| Eggs                           | 143 (78.6%) | 34 (18.7%)      | 5 (2.7%)    |
| Red wine                       | 0           | 2 (1.1%)        | 180 (98.9%) |
| Blue cheese                    | 14 (7.7%)   | 93 (51.1%)      | 75 (41.2%)  |
| Steak tartare                  | 2 (1.1%)    | 50 (27.5%)      | 130 (71.4%) |

product by 65.4% of the respondents. A similar level of strictness and lack of clinical knowledge applied to seafood (as many as 89.5% identified it as not recommended or prohibited) and blue cheeses (92.3% of negative recommendations, with no distinction made for cheeses prepared from pasteurized milk).

The final section of the test was designed to assess the knowledge concerning professional competences of midwives and the organization of reproductive health care. The participants of the study presented the highest level of knowledge in the question concerning the distinctive nature of the midwife and nurse professions (97.3% of correct answers). High percentages of correct answers were also recorded in questions regarding

the required education of the midwife (92.3%), the independent nature of the profession (87.9%) and the possibility of providing prenatal care in the case of a physiological pregnancy by both a doctor and a midwife (85.6%). The lowest percentage of correct answers was recorded for the question regarding the competences of midwives – 57.7% of the respondents stated that midwives only dealt with pregnant women, women in labor and in the postpartum period. Only 37.4% answered that midwives cared for women at every stage of their lives. The question regarding the possible jobs for a midwife received slightly better results. The most frequently selected workplaces included the antenatal ward and the gynecological ward

Table 4. List of Health Criteria (LHC) with rank analysis (N = 182)

| Criteria (LHC)                                        | 1  | 2  | 3  | 4  | 5   | Weighted average | Rank |
|-------------------------------------------------------|----|----|----|----|-----|------------------|------|
| Feel good                                             | 4  | 11 | 21 | 30 | 116 | 4.34             | 1    |
| Have all body parts functioning properly              | 8  | 8  | 25 | 27 | 114 | 4.27             | 2    |
| Have healthy eyes, hair and skin                      | 5  | 5  | 27 | 49 | 96  | 4.24             | 3    |
| Make sure to get enough rest and sleep                | 6  | 5  | 27 | 53 | 91  | 4.20             | 4    |
| Not to smoke                                          | 12 | 9  | 29 | 19 | 113 | 4.16             | 5    |
| Being able to enjoy life                              | 10 | 11 | 34 | 34 | 93  | 4.04             | 6    |
| Eat adequately                                        | 6  | 7  | 32 | 52 | 85  | 4.03             | 7    |
| Not to get sick, at most, get the flu once in a while | 4  | 12 | 26 | 54 | 86  | 4.02             | 8    |
| Maintain a healthy weight                             | 4  | 11 | 32 | 48 | 87  | 4.01             | 9    |
| Feel happy most of the time                           | 9  | 7  | 32 | 47 | 87  | 4.01             | 9    |
| Not to experience any physical issues                 | 10 | 8  | 41 | 44 | 79  | 3.96             | 11   |
| Be able to solve one's own problems                   | 12 | 11 | 38 | 42 | 79  | 3.91             | 12   |
| Be in a good mood                                     | 9  | 7  | 45 | 45 | 76  | 3.91             | 12   |
| Drink little or no alcohol                            | 12 | 14 | 45 | 37 | 74  | 3.81             | 14   |
| Have good social relations                            | 11 | 8  | 42 | 52 | 69  | 3.81             | 14   |
| Accept oneself, know one's own abilities              | 10 | 13 | 35 | 47 | 77  | 3.76             | 16   |
| Be able to work without tension and stress            | 12 | 17 | 34 | 51 | 68  | 3.71             | 17   |
| Be able to adapt to changes in life                   | 12 | 16 | 38 | 47 | 69  | 3.70             | 18   |
| Be able to control one's own feelings                 | 9  | 14 | 50 | 40 | 69  | 3.67             | 19   |
| Live to old age                                       | 13 | 21 | 36 | 61 | 51  | 3.64             | 20   |
| Be responsible                                        | 16 | 21 | 42 | 41 | 62  | 3.51             | 21   |
| Have a job and diverse interests                      | 16 | 17 | 44 | 43 | 62  | 3.51             | 21   |
| Hardly ever need to make doctor's appointments        | 23 | 19 | 32 | 50 | 58  | 3.33             | 23   |
| Take medication only occasionally                     | 16 | 29 | 49 | 38 | 50  | 3.26             | 24   |

(89.0% each), as well as the delivery suite (87.3%). Neonatal intensive care unit was selected slightly less frequently (86.3%). The operating room received the lowest percentage of responses (47.8%).

To provide a more in-depth interpretation of the subjective definitions of health presented by students, the obtained results were categorized and ranked based on weighted averages calculated for each of the 24 LHC criteria (where the score of 1 corresponded to a weight of 1 point, and the score of 5 corresponded to a weight of 5 points). A ranking of health criteria was created based on the average response values. The criteria associated with the somatic and functional dimension and emotional well-being ranked highest in the students' conceptual network.

- Rank 1: *Feel good* (Weighted average: 4.34 points; 63.7% of the respondents gave the highest rating).
- Rank 2: *Have all body parts functioning properly* (Weighted average: 4.27 points; 62.6% of the respondents gave the highest rating).
- Rank 3: *Have healthy eyes, hair and skin* (Weighted average: 4.24 points; 62.1% of the respondents gave the highest rating).
- Rank 4: *Make sure to get enough rest and sleep* (Weighted average: 4.20 points; 51.1% of the respondents gave the highest rating).
- Rank 4: *Not to smoke* (Weighted average: 4.16 points; 50.5% of the respondents gave the highest rating).

Table 5. Health Behavior Inventory (HBI) with rank analysis (N = 182)

| Criteria / Behaviors (HBI)                                      | 1  | 2  | 3  | 4  | 5   | Weighted average | Rank |
|-----------------------------------------------------------------|----|----|----|----|-----|------------------|------|
| I limit smoking                                                 | 26 | 12 | 16 | 15 | 113 | 4.08             | 1    |
| I try to get medical information...                             | 6  | 11 | 26 | 64 | 75  | 3.98             | 2    |
| I have friends and a stable family life                         | 3  | 9  | 27 | 74 | 69  | 3.92             | 3    |
| I eat a lot of fruit and vegetables                             | 1  | 7  | 40 | 77 | 57  | 3.91             | 4    |
| I follow doctors' recommendations                               | 7  | 12 | 25 | 85 | 53  | 3.82             | 5    |
| I care about proper nutrition                                   | 5  | 23 | 60 | 74 | 20  | 3.45             | 6    |
| I avoid catching a cold                                         | 5  | 14 | 41 | 76 | 46  | 3.44             | 7    |
| I think positively                                              | 14 | 30 | 44 | 57 | 37  | 3.41             | 8    |
| I take other people's advice seriously...                       | 10 | 22 | 57 | 60 | 33  | 3.41             | 8    |
| I control my body weight                                        | 14 | 18 | 57 | 60 | 33  | 3.40             | 10   |
| I try to find out how others avoid illness                      | 31 | 25 | 46 | 56 | 24  | 3.04             | 11   |
| I get enough sleep                                              | 23 | 35 | 51 | 51 | 22  | 3.03             | 12   |
| I avoid excessive physical exertion                             | 14 | 37 | 53 | 50 | 28  | 3.01             | 13   |
| I have the phone numbers for emergency services written down... | 65 | 21 | 16 | 27 | 53  | 2.99             | 14   |
| I undergo medical checkups regularly                            | 26 | 39 | 43 | 38 | 36  | 2.91             | 15   |
| I avoid salt                                                    | 19 | 46 | 59 | 39 | 19  | 2.90             | 16   |
| I eat whole grain bread                                         | 15 | 8  | 61 | 49 | 42  | 2.90             | 16   |
| I avoid depressing situations                                   | 22 | 41 | 59 | 43 | 17  | 2.79             | 18   |
| I avoid food with preservatives                                 | 26 | 42 | 51 | 48 | 15  | 2.73             | 19   |
| I limit sugar and animal fats                                   | 16 | 47 | 73 | 31 | 15  | 2.73             | 19   |
| I avoid feelings like anger, anxiety and depression             | 26 | 57 | 48 | 34 | 17  | 2.77             | 21   |
| I get enough rest                                               | 22 | 59 | 55 | 35 | 11  | 2.75             | 22   |
| I try to avoid extreme emotions, stress                         | 29 | 51 | 58 | 32 | 12  | 2.71             | 23   |
| I avoid work overload                                           | 27 | 62 | 50 | 34 | 9   | 2.65             | 24   |

The other end of the hierarchy (the lowest ranks) was occupied by criteria related to a negative attitude to health (defined solely as the lack of contact with medical system) and a purely institutional dimension:

- Rank 23: *Almost never have to go to the doctor* (Weighted average: 3.56 points; only 31.9% of the respondents gave the highest rating).
- Rank 24: *Take medication only occasionally* (Weighted average: 3.43 points; only 27.5% of the respondents gave the highest rating).

The rank system indicates that the respondents placed a high value on criteria related to well-being and fitness, while they rated criteria defining health in terms of a reduced need for medical care or pharmacotherapy lower.

A similar procedure for ranking weighted averages was applied to declared health behaviors (HBI), with responses being assigned scores from 1 (*almost never*) to 5 (*almost always*). This analysis allowed the identification of areas where people paid the most attention to their health and behaviors paid attention to the least frequently. The structure of behaviors occurring with the highest frequency included those concerning conservative prevention and intentional search for knowledge:

- Rank 1: *I limit smoking* (Weighted average: 4.08 points; 62.1% of “almost always” responses).
- Rank 2: *I try to get medical information and understand the causes of health and illness* (Weighted average: 3.98 pts; 41.2% of “almost always” responses).

- Rank 3: *I have friends and a stable family life* (Weighted average: 3.92 points; 37.9% of “almost always” responses).
- The lowest average values were obtained for behaviors related to rest, stress reduction and avoidance of work overload:
- Rank 22: *I get enough rest* (Weighted average: 2.75 points; as much as 48.9% of the participants responded: “rarely” or “almost never”).
- Rank 23: *I try to avoid extreme emotions, stress, tension* (Weighted average: 2.71 points; 44.5% of the participants responded: “rarely” or “almost never”).
- Rank 24: *I avoid overworking* (Weighted average: 2.65 points, 43.5% of the participants responded “rarely” or “almost never”).

In the analyzed sample, the participants reported engaging in selected preventive and information-seeking behaviors relatively more often, while behaviors related to rest and stress reduction were reported less frequently.

## 4. Discussion

The fragmented nature of knowledge regarding reproductive health was also observed in previous studies conducted in students. The obtained results indicate that the surveyed students presented a relatively high level of knowledge on selected issues of reproductive health. However, significant knowledge gaps were found in some of the analyzed areas, which warrants further educational activities. According to the research by Walentynowicz-Moryl and Mianowska (2020), young women had satisfactory general knowledge about the basic issues of reproductive health, while they were much less able to cope with questions requiring a more detailed knowledge of the physiology of reproduction. The obtained results are partly consistent with those observations, indicating a greater knowledge of general issues than specific physiological parameters. The highest level of knowledge was recorded for the principles of intimate hygiene, the impact of lifestyle on fertility and basic information about pregnancy. Similarly

to the cited papers (Walentynowicz-Moryl and Mianowska, 2020), the greatest difficulties identified in the present study concerned biological parameters, including the length of the menstrual cycle and the exact life span of the ovum after ovulation.

The high accuracy of responses regarding the impact of lifestyle factors (stress, stimulants, alcohol, diet) on fertility is consistent with the results of the educational program described by Bączek et al. (2020). The authors also emphasized that young people were becoming increasingly aware of behavioral risk factors affecting fertility and knew how to protect themselves against sexually transmitted infections (STIs), but their knowledge of the strictly biological mechanisms of reproduction remained highly insufficient. One possible explanation for such a pattern of results may be the students’ exposure to information concerning various aspects of reproductive health. However, this hypothesis requires direct verification in further research. This view corresponds directly with the findings of Jabłońska et al. (2018), who pointed to the dominance of the mass media as the primary source of sexual knowledge.

A significant result was noted in the context of contraception: good knowledge of emergency and barrier contraception methods coupled with glaring difficulties regarding the knowledge of the Pearl Index and fertility awareness methods. Similar observations were presented by Musik (2024), indicating that students declared general knowledge of basic methods of contraception, but their expertise remained very limited. This is due to the fact that information about the most common methods is widely available on the Internet, while indicators of effectiveness and natural methods require more careful, expert knowledge acquisition.

The respondents’ relatively good knowledge of the course of pregnancy and childbirth is also noteworthy, which partly aligns with the observations presented by Uzar (2019). This author showed that adolescents had basic knowledge about pregnancy. However, numerous misconceptions were noted regarding the nutrition of pregnant women and management in specific clinical situations. As regards the present study, similar discrepancies concerned such aspects as the correct classification of foods recommended during pregnancy.

It is worth noting a high percentage of overly restrictive beliefs regarding the consumption of certain products during pregnancy. Some products that, when prepared properly, may be part of a well-balanced diet during pregnancy were also classified as not recommended or prohibited. If such beliefs translate into actual eating behaviors, they may lead to the unjustified restriction of selected products. However, this relationship was not assessed in this study.

The study also showed limited knowledge about the professional competences of a midwife. Although the majority of the respondents correctly indicated the independent nature of this profession and the possibility of managing a physiological pregnancy by a midwife, over half of the respondents mistakenly believed that the midwife worked only with pregnant women and women in labor. The results indicate the urgent need to popularize the actual range of competences of midwives and their role in the promotion of women's reproductive health throughout their lives, which was strongly emphasized by Witkowska-Wirstlein (2013), who indicated midwives as key health educators. It is worth mentioning, however, that the study included adults (people studying at universities), so it can be assumed that the group represents a higher level of knowledge than a statistical citizen.

The comparison of the results of individual parts of the study revealed a discrepancy at the group level between the self-reported knowledge regarding selected health factors and the frequency of reporting engaging in the corresponding behaviors. According to the available literature on the subject (e.g., Musik, 2024), these areas were studied in isolation. A comprehensive look at the findings reveals a certain methodological and practical dissonance among the respondents.

The results of the proprietary test of knowledge and attitudes (as shown in Table 1 and Table 2) revealed that as many as 97.8% of the students declared full awareness that stress has a destructive effect on the regularity of the menstrual cycle, and 98.4% explicitly identified stressful situations as a factor directly reducing fertility. Moreover, in the axiological structure measured using the LHC questionnaire (Table 4), as many as 50.0% of the respondents considered "getting enough rest and

sleep" to be the most important criterion for being healthy. This means that, at the declarative and conceptual level, the respondents demonstrated high awareness of the impact of stress on selected aspects of reproductive health.

Conversely, the direct comparison of this knowledge with actual life practices as measured by the Health Behavior Inventory (HBI, Table 5) revealed a clear difference in group distributions. Behaviors related to stress avoidance, adequate rest and avoidance of overwork were the last three items in the ranking of HBI weighted averages, with nearly half of the sample (48.9%) directly admitting to permanent work overload and lack of adequate sleep. These results suggest that the mere awareness of health recommendations does not necessarily coexist with frequent declarations of corresponding behaviors.

The observed pattern may be interpreted as a gap between knowledge and behavior. The respondents showed high awareness of some risk factors, while they were less likely to self-report selected behaviors related to stress reduction and rest. The reasons for the observed discrepancy were not the subject of this study and require further analysis taking account of factors such as academic stress, burden of responsibilities, access to support and environmental conditions. These results are fully in line with the WHO health promotion guidelines (n.d.), according to which effective health education cannot be limited to the dry presentation of information, but must provide practical tools to enable lasting lifestyle changes.

This highlights the fact that reproductive health education programs in higher education institutions cannot rely solely on traditional topics of contraception or STI prevention. They must urgently emphasize stress management, elements of evidence-based nutrition, and sleep hygiene as an integral part of biological fertility protection. Information campaigns in the media alone are insufficient if they are not accompanied by specific preventive measures. Following the example of international solutions (e.g., in Slovenia), young people should be provided with free, universal access to medical tools, as exemplified by that country's program offering free HPV vaccinations to students up to age 26 (European Centre for Disease Prevention and Control, 2026).

### **Strengths of the study**

The strengths of the study include the use of the proprietary knowledge test and two standardized tools for assessing health criteria and health behaviors in the same sample. An additional value is related to the analysis of responses at the level of individual items, enabling the identification of specific areas of knowledge and behaviors requiring further attention.

### **5. Limitations of the study**

The interpretation of the obtained results requires taking account of several important methodological limitations. The use of convenient sampling using the CAWI Internet technique is the key one. Combined with the lack of randomness, it makes the sample unrepresentative and prevents the unconditional generalization of findings to the overall population of Polish students. In addition, the structure of the study group is characterized by strong feminization – women constituted as much as 80.8% of all respondents, which limits the possibility of formulating conclusions regarding male students. The age structure also poses an interpretative challenge. Despite the formally broad range covering individuals aged 18 to 48, as many as 94.51% of the participants belonged to the 18-25 age cohort, meaning that the findings apply primarily to the youngest generation of students. It should also be remembered that all questionnaires used are based on self-reports and subjective declarations, which may be associated with a tendency to provide answers that conform to social expectations (social desirability bias). Due to the cross-sectional nature of the study, the obtained results do not allow for conclusions regarding cause-and-effect relationships. The use of a proprietary knowledge test, the psychometric properties of which require further assessment, also constitutes a limitation. Moreover, an analysis based on aggregated group results does not, in itself, allow us to draw conclusions about discrepancies between knowledge and behavior in individual participants.

### **6. Practical implications and directions for further research**

The obtained results justify considering the expansion of academic health promotion activities to include issues related to reproductive health, sleep, recovery, stress management and nutrition. Such activities could be supplemented by forms of psychological support and promotion of healthy habits available to students. It is also crucial to conduct information campaigns promoting the broad competences of midwives and for public health institutions to create reliable content in social media, which may facilitate access to information consistent with up-to-date medical knowledge.

In the context of further scientific steps, it is advisable to conduct longitudinal studies that would enable the assessment of the actual impact of stress on students' reproductive decisions in the long term. Future projects should also aim to increase the participation of men in the sample and include more diverse age groups and representative academic centers. A direct and in-depth comparison of health indicators between students in medical, humanities and technical programs would also be a valuable addition to the analyses.

### **Conclusions**

- In the study group, the level of knowledge about reproductive health was diverse: a high level of knowledge about some general lifestyle factors was accompanied by gaps in knowledge regarding selected issues of reproductive physiology, nutrition in pregnancy and the scope of midwives' responsibilities.
- As regards nutrition during pregnancy, a high percentage of overly restrictive classifications of selected products was recorded, which indicates the need to strengthen education based on up-to-date recommendations.

- Within the LHC framework, the criteria related to subjective well-being and physical fitness received the highest ratings, while those defining health in terms of a limited need for medical care received lower ratings.
- At the level of group results, a discrepancy was observed between high awareness of the importance of stress and rest for health and a relatively rare declaration of behaviors related to rest, stress reduction and avoiding work overload. Despite the high awareness of selected factors affecting health, behaviors aimed at mental hygiene, physical recovery and avoidance of work overload occupy the lowest positions in the actual structure of health behaviors (HBI).
- The results justify developing educational activities addressed to students, which, in addition to providing medical knowledge, would cover practical competences regarding a healthy lifestyle, coping with stress, sleep, nutrition and the use of professional sources of information on reproductive health.

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# Selected health behaviours related to women's reproductive health among women aged 18–49 years: A cross-sectional study<sup>1</sup>

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**Abstract:** *Background:* Health behaviours comprise actions and habits associated with health status and the risk of its deterioration. They include, among other things, physical activity, sleep-related behaviours, avoidance of stimulants and the use of preventive health services. Health behaviours constitute an important component of lifestyle and are influenced by social, economic and environmental factors. Reproductive health is an important area of research concerning women's health. From a demographic perspective, women's reproductive age is most commonly defined as the period from 15 to 49 years. It is therefore appropriate to monitor health behaviours among women of reproductive age, particularly behaviours related to preventive care and reproductive health. *Aim:* To assess selected health behaviours related to reproductive health among women aged 18–49 years. *Material and Methods:* The study was conducted from April to May 2023. The participants were women aged 18–49 years. The study group comprised 315 women. Purposive convenience sampling was used. Some participants were recruited in secondary schools and a healthcare facility in Lublin, while the remaining respondents were recruited through thematic groups on Facebook. Data were collected using an original questionnaire. The analysis was conducted using IBM SPSS Statistics 27. *Results:* An annual gynaecological examination was reported by 71.1% (224) of respondents. Among women aged 20–49 years, 28.8% (75) had undergone cervical cytology six months previously, while 26.5% (69) had undergone the examination one year previously. Breast self-examination was reported by 217 respondents. Depending on age, 46.4% (13) to 72.7% (32) performed it once a month. Menstrual-cycle length was monitored by 82.5% (260) of participants. In addition, 58.7% (185) of women monitored the main fertility indicators. *Conclusions:* The findings indicate variation in selected preventive and health behaviours in the study group. They also indicate a need for further development of educational and preventive activities concerning reproductive health, delivered by healthcare professionals. This may enable women to make informed decisions and care for their health at every stage of life.

**Keywords:** fertility, health behaviours, lifestyle, prevention, women.

## 1. Introduction

Health behaviours constitute an important component of lifestyle. According to the WHO, lifestyle is a “way of living based on the interplay between broad living conditions and individual patterns of behaviour determined by sociocultural factors

and individual characteristics” (Misiuna, 1994). Accordingly, lifestyle encompasses nutrition, physical activity, leisure activities, rest, smoking and alcohol consumption, as well as regular preventive examinations aimed at the early detection of disease

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Pias.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Pias.pdf)

(Kandel et al., 2021; Nowicki et al., 2018; Perski et al., 2022; Torkel et al., 2026).

Reproductive health is an important dimension of human health. According to the National Health Programme, reproductive health encompasses: “Reproductive health is an important component of the definition of health as a state of complete physical, mental and social well-being, and not merely the absence of disease or disorders, in all matters relating to the reproductive system and reproduction in both sexes at all stages of life. It encompasses puberty and the menopause, fertility and infertility, family planning, health during pregnancy, childbirth and the puerperium, and cancers of the reproductive organs and breast” (Piasecka et al., 2024; Rozporządzenie Rady Ministrów, 2016).

Age is one of the principal biological factors associated with female fertility. Women's reproductive age is generally considered to comprise the age from 15 to 49 years (Drabik et al., 2021; Ford et al., 2020; Ślizień-Kuczapska et al., 2017).

As part of preventive healthcare, including preventive care relating to reproductive health, great importance is attached to regular gynaecological check-ups. This enables the early detection and effective treatment of diseases. One of the tests used in the prevention of cervical cancer is conventional cytology (Gośliński, 2025). Cervical cancer prevention involves screening based on cytology and HR HPV tests. The introduction of HR HPV tests enables the detection of a greater number of CIN2+ lesions compared with conventional cytology (Nowakowski et al., 2026). The cervical cancer prevention programme covers women aged 25–64 (Łucyszyn et al., 2024).

An important element of reproductive health prevention among women is breast self-examination. An important element of breast health prevention is knowing what normal breasts look like and how they are structured, and paying attention to any changes that occur (Banihashemi & Brennan, 2023).

Another important aspect of women's health is dental care. Diseases affecting the tissues surrounding the teeth, in addition to local infection and tooth loss, may contribute to systemic inflammation. This may, in turn, exacerbate systemic conditions such as atherosclerosis, increased blood pressure and glycaemia,

kidney damage, increased left-ventricular mass, increased risk of stroke, preterm birth and a higher incidence of cardiovascular events (Wojtkowska & Wysokiński, 2015). Regular dental check-ups are an important component of oral-disease prevention (Mohd Khairuddin et al., 2024).

Furthermore, women who smoke are particularly vulnerable to disturbances in the functioning of the pituitary gland, hypothalamus, thyroid and adrenal glands. Tobacco smoking may be associated with hormonal disturbances, menstrual-cycle abnormalities, anovulatory cycles and an earlier onset of menopause. Smoking may also adversely affect ovarian function and sex-hormone metabolism. Female smokers have been observed to have an increased risk of fertility problems and a longer time to conception compared with non-smokers (Practice Committee of the American Society for Reproductive Medicine, 2024; Torkel et al., 2026).

According to European Union guidelines, physical activity is “any bodily movement produced by skeletal muscles that results in an increase in energy expenditure above resting levels”. The concept of physical activity therefore encompasses not only sporting activity but also other forms of movement associated with everyday functioning (Komisja Europejska, 2008). The recommended level of physical activity for adults is at least 30 minutes per day at moderate intensity (e.g. swimming or cycling) (Brinson et al., 2023; Warchoń & Skoczylas, 2024).

Sleep also plays an important role in maintaining good health and well-being (Dąbrowska-Galas et al., 2021; Li et al., 2024). It has many functions, including supporting growth, learning and cognitive development (Kopasz et al., 2010). Adult women aged 18–54 years require 7–9 hours of sleep (Hirshkowitz et al., 2015).

A range of menstrual hygiene products is currently available, including sanitary pads, tampons, menstrual cups and menstrual underwear (Hennegan et al., 2021; Krause et al., 2025). Under certain conditions, the use of intravaginal menstrual hygiene products may be associated with a risk of toxic shock syndrome. One factor associated with this risk is inappropriate use of menstrual products, which may promote the proliferation of *Staphylococcus aureus*. Conditions

conducive to this include particular temperatures, the presence of oxygen and the acidic vaginal pH. Release of TSST-1 toxin by *Staphylococcus aureus* can trigger a rapid and uncontrolled immune response leading to toxic shock, which may present with fever, hypotension, a skin rash followed by desquamation and multiple-organ dysfunction (Nonfoux et al., 2018).

A woman's menstrual cycle involves numerous changes resulting from the functioning of the neuroendocrine system. Changes occurring in the ovaries allow three phases of the menstrual cycle to be distinguished: the early follicular phase, the late follicular phase and the luteal phase. These phases can be identified using fertility indicators, including changes in cervical mucus, basal body temperature and cervical position. Observation of cervical position applies to women who have initiated sexual activity (Szymaniak, 2013). Observation of these indicators enables changes occurring throughout the menstrual cycle to be monitored. Knowledge of fertility indicators can be used in fertility-awareness-based methods for planning or postponing conception. Systematic cycle observation may increase awareness of the physiological course of the cycle and facilitate recognition of certain abnormalities requiring medical consultation. Fertility-awareness-based methods can be used both by women who have not yet initiated sexual activity, mainly for preventive purposes, and by women who have already initiated sexual activity. It is important that observations are made accurately and regularly (Bassas et al., 2025; Delbaere et al., 2021; Duane et al., 2022; Knap-Wielgus et al., 2023; Practice Committee of the American Society for Reproductive Medicine & Practice Committee of the Society for Reproductive Endocrinology and Infertility, 2022).

Various contraceptive methods are currently available, including barrier, hormonal and chemical methods. Barrier methods include diaphragms, cervical caps, vault caps and vaginal sponges. Chemical methods include creams, tablets, pessaries, gels and foams containing spermicidal substances such as nonoxynol-9. The use of hormonal contraceptive methods may be associated with certain adverse effects and contraindications, the profile of which depends, among other factors, on the type of preparation

and individual risk factors. *Lactobacillus* bacteria constitute a natural protective barrier against pathogens because they produce substances that limit their abundance. These include lactic acid (which lowers vaginal pH), hydrogen peroxide ( $H_2O_2$ ) and bacteriocins (antibacterial peptides) (Elkafas et al., 2022; Pytko et al., 2019). The absence or deficiency of *Lactobacillus* may lead to bacterial vaginal infections (bacterial vaginosis), which, if untreated, may alter vaginal pH and subsequently contribute to infertility. In the case of vaginal yeast infections (candidiasis), excessive proliferation of microorganisms and the toxins they produce may result in difficulty conceiving (Przybysz-Zaremba, 2017).

Combined hormonal contraception, including oral contraceptive pills, patches and vaginal rings, may be associated with an increased risk of thromboembolic complications and elevated blood pressure. The use of hormonal contraceptive methods may also cause histological changes in the endometrium, the nature of which depends, among other factors, on the type and duration of use of the preparation (Dinh et al., 2015; Dmochowski et al., 2013; Waluszewska et al., 2026). The effect of hormonal contraceptive methods on the vaginal microbiota may vary according to the method used, and the available evidence does not clearly indicate that their use reduces the abundance of *Lactobacillus* species and leads to dysbiosis (Balle et al., 2023; Bastianelli et al., 2021; Elkafas et al., 2022).

Early sexual initiation and a greater number of sexual partners may be associated with increased exposure to certain risk factors affecting sexual and reproductive health (Dora, 2013).

Untreated inflammation and infections may lead to changes in vaginal pH, which may contribute to infertility. Many intimate infections, such as vaginal candidiasis, do not directly cause infertility but may temporarily cause difficulty conceiving. Infection with *Chlamydia trachomatis*, however, may lead to infertility by increasing the risk of adhesions in the fallopian tubes (Passos et al., 2022). Prevention of sexually transmitted infections includes health education and reducing exposure to risk factors through mutual fidelity within a relationship (Kozakiewicz et al., 2019; Przybysz-Zaremba, 2017).

Social changes and the development of digital information sources may influence how knowledge is acquired and how behaviours related to reproductive health are adopted. Health-promotion and preventive activities delivered by healthcare professionals may play an important role in this respect. Systematic monitoring of health behaviours among women of reproductive age is therefore warranted. Current knowledge concerning the co-occurrence of different reproductive-health-related behaviours across age groups remains incomplete, which supports the need for further research in this area.

## 2. Aim of the Study

The aim of the study was to assess selected health behaviours related to reproductive health among women aged 18–49 years and to determine whether the frequency of selected behaviours differs between age groups.

### Research Questions

1. How frequently do the women studied engage in selected preventive behaviours concerning reproductive health?
2. What is the frequency of selected lifestyle-related behaviours, including smoking, physical activity and sleep duration?
3. Which menstrual hygiene products do the women studied use?
4. What proportion of participants monitor menstrual-cycle length and fertility indicators?
5. Which contraceptive methods do women who use contraception report using?
6. Does the frequency of selected health behaviours vary according to the age of the women studied?

### Research Hypotheses

1. The time elapsed since the most recent cervical cytology examination differs significantly between women's age groups.

2. The frequency of breast self-examination differs significantly between women's age groups.
3. The frequency of dental check-ups within the previous six months differs significantly between women's age groups.
4. The frequency of cigarette smoking differs significantly between women's age groups.

## 3. Method

A diagnostic survey method using an original questionnaire was employed. The instrument was used to collect sociodemographic data and information on behaviours related to reproductive health. The study comprised four age groups: 18–19, 20–29, 30–39 and 40–49 years. The original questionnaire was developed on the basis of a review of the literature on health behaviours and reproductive health. The questionnaire content was subjected to expert consultation involving academic staff representing nursing and midwifery at the Medical University of Lublin and John Paul II Catholic University of Lublin. Twenty women participated in the pilot study. Eligibility for the pilot study required student status in nursing and voluntary consent to participate. Selected questionnaire items were revised on the basis of participants' comments. The changes concerned questions 12 and 16 relating to health behaviours, as these were unclear to respondents. The study was conducted from April to May 2023 among women aged 18–49 years. Non-probability purposive convenience sampling was used. Women meeting the inclusion criteria and available at the recruitment sites or through the specified online channels were invited to participate. Participants were recruited from pupils at the Władysław Stanisław Reymont School Complex of Clothing and Textile Industries in Lublin (19 questionnaires), the Stefania Sempołowska 4th General Secondary School in Lublin (21 questionnaires), and patients of the non-public healthcare facility "Farmed" in Lublin (105 paper questionnaires). The remaining questionnaires (210) were collected online through

Facebook groups (Pielęgniarstwo XXI wieku, Pielęgniarki i Pielęgniarze, Grupa Lubelskie Pielęgniarki i Położne, Medyczni na dyżurze–lekarze, pielęgniarki i reszta zespołu). Forty questionnaires were excluded because of incorrect or incomplete responses. A total of 105 correctly completed paper questionnaires and 210 online questionnaires were obtained. The final sample included in the statistical analysis comprised 315 women. The analysis was performed using IBM SPSS Statistics 27. Three levels of statistical significance were adopted, denoted by \*  $p < 0.05$ , \*\*  $p < 0.01$  and \*\*\*  $p < 0.001$ .

The selected statistical analysis, based on the  $\chi^2$  (chi-square) test, was used to assess the association between membership in one of the four age groups and health behaviours concerning the time since the most recent cervical cytology examination, breast self-examination, a dental visit within the previous six months and cigarette smoking. Percentage distributions were also analysed for the frequency of gynaecological examinations, frequency of sporting activity, sleep duration, use of menstrual hygiene products, monitoring of menstrual-cycle length and fertility indicators, contraceptive methods and the number of lifetime sexual partners.

## 4. Results

The mean age of the 315 women in the study group was 29.92 years (SD = 9.56). Participants were divided into four age groups: 18–19 years, 17.5% (55); 20–29 years, 40.6% (128); 30–39 years, 23.8% (75); and 40–49 years, 18.1% (57). Of the study group, 37.5% (118) lived in rural areas, 36.8% (116) in a large city (more than 100,000 inhabitants), and 25.7% (81) in a small or medium-sized town (fewer than 100,000 inhabitants). The largest group had higher education, 67.3% (212); 20.6% (65) had secondary education and 11.4% (36) had primary education. The smallest group had vocational education, 0.6% (2). Most participants were unmarried, 51.7% (163); a slightly smaller proportion, 44.1% (139), were married; divorced women accounted for 3.5% (11), and widows for 0.6% (2).

An annual gynaecological examination was reported by 71.1% (224) of women, every six months by 21.6% (68), once every two years by 3.8% (12), and every three months by 3.2% (10). A further 0.3% (1) reported not undergoing such examinations (Table 1).

The analysis demonstrated a significant association between women's age and the time elapsed since their most recent cervical cytology examination ( $\chi^2 = 123.17$ ;  $p < 0.001$ ). The association was moderate ( $V = 0.356$ ). Among women aged 18–19 years, 63.6% (35) reported that they had never undergone cervical cytology, whereas among those aged 20–29 years, 24.2% (31) had undergone their most recent examination six months previously. In the 30–39-year group, 33.3% (25) had undergone the examination one year previously, while in the 40–49-year group, 38.6% (22) had undergone it six months previously (Table 2).

Due to the wording of the question “Do you perform breast self-examination?”, women who reported that they did not perform breast self-examination ( $n = 98$ ) were excluded from this analysis; consequently, 217 women were analysed. No significant association was found between women's age and the frequency of breast self-examination ( $p > 0.05$ ) (Table 3).

A significant association was found between age and a dental visit within the previous six months ( $\chi^2 = 8.16$ ;  $p = 0.043$ ). The association was weak ( $V = 0.161$ ). Within the previous six months, a dental visit had been attended by 82.5% (47) of women aged 40–49 years, 76.4% (42) of women aged 18–19 years, 72.0% (54) of women aged 30–39 years and 63.3% (81) of women aged 20–29 years (Table 4).

Table 1. Frequency of gynaecological examinations

|                    | N   | %     |
|--------------------|-----|-------|
| Never              | 1   | 0.3   |
| Every 3 months     | 10  | 3.2   |
| Every 6 months     | 68  | 21.6  |
| Once a year        | 224 | 71.1  |
| Once every 2 years | 12  | 3.8   |
| Total              | 315 | 100.0 |

Note: n – number of observations  
Source: authors' own analysis.

A significant association was found between age and cigarette smoking ( $\chi^2 = 11.73$ ;  $p = 0.008$ ). The association was weak ( $V = 0.193$ ). Cigarettes were smoked by 34.5% (19) of women aged 18–19 years, 26.6% (34) of women aged 20–29 years, 13.3% (10) of participants aged 30–39 years and 14.0% (8) of women aged 40–49 years (Table 5).

The largest proportion, 44.1% (139), of women reported engaging in sport less than once a week; 39.4% (124) exercised 1–2 times a week, 14.0% (44) exercised 3–5 times a week, and 2.5% (8) exercised more than five times a week (Table 6).

Among the women studied, 45.4% (143) reported that they usually slept for 7–9 hours. A total of 51.4% (162) slept for 5–6 hours, 1.9% (6) slept for 3–4 hours, and 1.3% (4) slept for more than nine hours (Table 7).

The question regarding the most commonly used personal hygiene products during menstruation was a multiple-choice question; a total of 405 responses were received. During their periods, 56.0% (227) of respondents used sanitary pads, 37.5% (152) used tampons, 4.9% (20) used menstrual cups, and 1.5% (6) used period underwear (Table 8).

The majority of surveyed women, 82.5% (260), monitored the length of their menstrual cycles, while more than half, 58.7% (185), also monitored the main fertility indicators, such as cervical mucus and body temperature (Table 9).

In the question concerning contraceptive use, 195 women who did not use contraception were excluded; the analysis therefore included 120 participants. Of these women, the largest proportion, 56.8% (68), used hormonal contraception, while

Table 2. Time elapsed since the most recent cervical cytology examination by age group

|                   | 18–19 years |       | 20–29 years |       | 30–39 years |       | 40–49 years |       |
|-------------------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|
|                   | N           | %     | N           | %     | N           | %     | N           | %     |
| One month ago     | 1           | 1.8   | 19          | 14.8  | 15          | 20.0  | 3           | 5.3   |
| Six months ago    | 9           | 16.4  | 31          | 24.2  | 22          | 29.3  | 22          | 38.6  |
| One year ago      | 1           | 1.8   | 28          | 21.9  | 25          | 33.3  | 16          | 28.1  |
| Two years ago     | 2           | 3.6   | 12          | 9.4   | 11          | 14.7  | 10          | 17.5  |
| I do not remember | 7           | 12.7  | 12          | 9.4   | 1           | 1.3   | 6           | 10.5  |
| Never             | 35          | 63.6  | 26          | 20.3  | 1           | 1.3   | 0           | 0.0   |
| Total             | 55          | 100.0 | 128         | 100.0 | 75          | 100.0 | 57          | 100.0 |

$\chi^2 = 123.17$ ;  $df = 15$ ;  $p < 0.001^{***}$ ;  $V = 0.356$

Note:  $n$  – number of observations;  $\chi^2$  – test statistic;  $p$  – significance level;  $df$  – degrees of freedom;  $V$  – Cramér's  $V$  coefficient.

Source: authors' own analysis.

Table 3. Frequency of breast self-examination

|                       | 18–19 years |       | 20–29 years |       | 30–39 years |       | 40–49 years |       |
|-----------------------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|
|                       | N           | %     | N           | %     | N           | %     | N           | %     |
| Once a month          | 13          | 46,4  | 64          | 70,3  | 32          | 59,3  | 32          | 72,7  |
| Every few months      | 11          | 39,3  | 25          | 27,5  | 13          | 24,1  | 10          | 22,7  |
| Once every six months | 3           | 10,7  | 1           | 1,1   | 7           | 13,0  | 2           | 4,5   |
| Once a year           | 1           | 3,6   | 1           | 1,1   | 2           | 3,7   | 0           | 0,0   |
| Total                 | 28          | 100,0 | 91          | 100,0 | 54          | 100,0 | 44          | 100,0 |

$\chi^2 = 16.35$ ;  $df = 9$ ;  $p = 0.060$ ;  $V = 0.158$

Source: authors' own analysis.

Table 4. Dental visit within the previous six months

|       | 18–19 years |       | 20–29 years |       | 30–39 years |       | 40–49 years |       |
|-------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|
|       | N           | %     | N           | %     | N           | %     | N           | %     |
| Yes   | 42          | 76.4  | 81          | 63.3  | 54          | 72.0  | 47          | 82.5  |
| No    | 13          | 23.6  | 47          | 36.7  | 21          | 28.0  | 10          | 17.5  |
| Total | 55          | 100.0 | 128         | 100.0 | 75          | 100.0 | 57          | 100.0 |

$\chi^2 = 8.16$ ;  $df = 3$ ;  $p = 0.043^*$ ;  $V = 0.161$

Source: authors' own analysis

Table 5. Cigarette smoking

|       | 18–19 years |       | 20–29 years |       | 30–39 years |       | 40–49 years |       |
|-------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|
|       | N           | %     | N           | %     | N           | %     | N           | %     |
| Yes   | 19          | 34.5  | 34          | 26.6  | 10          | 13.3  | 8           | 14.0  |
| No    | 36          | 65.5  | 94          | 73.4  | 65          | 86.7  | 49          | 86.0  |
| Total | 55          | 100.0 | 128         | 100.0 | 75          | 100.0 | 57          | 100.0 |

$\chi^2 = 11.74$ ;  $df = 3$ ;  $p = 0.008^{**}$ ;  $V = 0.193$

Source: authors' own analysis

39.1% (47) used barrier contraception; withdrawal was used by 3.3% (4), and 0.8% (1) used chemical contraception (Table 10).

In the question concerning the number of lifetime sexual partners, 46 women who had not initiated sexual activity were excluded. The results were therefore presented for 269 respondents. A single lifetime sexual partner was reported by 43.9% (118) of participants, two partners by 16.7% (45), and more than two partners by 39.4% (106) (Table 11).

## 5. Discussion

The aim of the study was to assess selected behaviours related to reproductive health in a group of 315 women aged 18–49 years.

Our findings showed that 71.1% (224) of women underwent gynaecological examinations once a year, 21.6% (68) every six months, 3.8% (12) once every two years, 3.2% (10) every three months, while 0.3% (1) did not undergo gynaecological examinations. In a 2012 study of 100 women, Kowalewska et al. found that among women aged 18–39 years, those undergoing gynaecological examinations every six months predominated, accounting for 34.5% of

Table 6. Frequency of sporting activity

|                             | N   | %     |
|-----------------------------|-----|-------|
| Less than once a week       | 139 | 44.1  |
| 1–2 times a week            | 124 | 39.4  |
| 3–5 times a week            | 44  | 14.0  |
| More than five times a week | 8   | 2.5   |
| Total                       | 315 | 100.0 |

Source: authors' own analysis

Table 7. Sleep duration

|                   | N   | %     |
|-------------------|-----|-------|
| 3–4 hours         | 6   | 1.9   |
| 5–6 hours         | 162 | 51.4  |
| 7–9 hours         | 143 | 45.4  |
| More than 9 hours | 4   | 1.3   |
| Total             | 315 | 100.0 |

Source: authors' own analysis

the group. Annual examinations were reported by 24.0%, while the least frequent interval, once every two years, was reported by 17.0% (Kowalewska et al., 2012). In the study by Kowalewska et al. (2012),

Table 8. Menstrual hygiene products

|                     | N   | %     |
|---------------------|-----|-------|
| Sanitary pads       | 227 | 56.0  |
| Menstrual underwear | 6   | 1.5   |
| Tampons             | 152 | 37.5  |
| Menstrual cup       | 20  | 4.9   |
| Total               | 405 | 100.0 |

Source: authors' own analysis

Table 9. Monitoring menstrual-cycle length and the main fertility indicators

| Monitoring menstrual-cycle length        |     |       |
|------------------------------------------|-----|-------|
|                                          | N   | %     |
| Yes                                      | 260 | 82.5  |
| No                                       | 55  | 17.5  |
| Total                                    | 315 | 100.0 |
| Monitoring the main fertility indicators |     |       |
|                                          | N   | %     |
| Yes                                      | 185 | 58.7  |
| No                                       | 130 | 41.3  |
| Total                                    | 315 | 100.0 |

Source: authors' own analysis

the proportion of women reporting annual gynaecological examinations was lower than in our study. More recent research conducted in Poland confirms these tendencies: nearly half of respondents reported visiting a gynaecologist at least once a year, while one in five underwent an examination every six months (Wdowiak et al., 2024). This comparison should nevertheless be interpreted cautiously because of differences in sample size, structure and sampling method. In the cited study, the sample was three times smaller than that of the present study ( $n = 315$ ) and comprised 100 women from Łomża and the surrounding area. The present study involved a larger sample; however, because non-probability sampling was used, this cannot be taken as evidence of greater representativeness. The two groups had a similar proportion of rural and urban residents.

Table 10. Contraceptive methods

|                                                                                                                         | N   | %     |
|-------------------------------------------------------------------------------------------------------------------------|-----|-------|
| Withdrawal                                                                                                              | 4   | 3.3   |
| Barrier methods<br>(male condoms, female<br>condoms, cervical cap)                                                      | 47  | 39.1  |
| Chemical methods<br>(contraceptive pessaries,<br>vaginal sponge)                                                        | 1   | 0.8   |
| Calendar-based method                                                                                                   | 0   | 0.0   |
| Hormonal methods<br>(contraceptive pills, patches,<br>rings, injections, intrauterine<br>device, contraceptive implant) | 68  | 56.8  |
| Emergency contraception<br>("morning-after" pill)                                                                       | 0   | 0.0   |
| Tubal ligation                                                                                                          | 0   | 0.0   |
| Total                                                                                                                   | 120 | 100.0 |

Source: authors' own analysis

Table 11. Number of lifetime sexual partners

|               | N   | %     |
|---------------|-----|-------|
| One           | 118 | 43.9  |
| Two           | 45  | 16.7  |
| More than two | 106 | 39.4  |
| Total         | 269 | 100.0 |

Source: authors' own analysis

Our findings indicate differences between age groups in the time elapsed since the most recent cervical cytology examination. In the 18–19-year group, 63.6% (35) of women reported never having undergone cytology, whereas in the 20–29-year group, 24.2% (31) had undergone their most recent examination six months previously. In the youngest group, the majority had not undergone the examination, whereas in the older group a proportion had done so recently. In addition, 33.3% (25) of participants aged 30–39 years had undergone the examination one year previously, and 38.6% (22) six months previously. In a 2012 study of 100 women aged 18–39 years, 38.0% underwent cytology annually. The present study assessed the time elapsed since the most recent cytology examination rather than the frequency of screening; therefore, direct comparison

of these values is limited. The relatively large sample is a strength of the study, but it does not eliminate limitations arising from non-probability sampling. Because the outcomes were measured differently, these findings should not be interpreted as evidence of a change in population-level screening frequency (Kowalewska et al., 2012). The association between patient age and engagement in screening was also confirmed by a nationwide analysis by Michałek et al., in which the highest proportion of women reporting cervical cytology within the previous three years was observed in the 25–34 and 35–44 age groups (Michałek et al., 2024). In our 2023 study, the age range was specified as 18–19 years for the youngest group, in which 63.6% (35) reported never having undergone cytology. The high proportion of women who had not previously undergone cytology in the youngest group may partly be related to age criteria applicable to the cervical-cancer prevention programme. The present study cannot, however, determine the reasons for the observed difference. Findings for the youngest group should therefore be interpreted in the context of age criteria applicable to cervical-cancer screening programmes. The healthcare system should consequently support health education and encourage women to participate in screening once they reach the age covered by the programme (Irzmańska-Hudziak et al., 2025; Wdowiak et al., 2024). The proportion of women aged 20–39 years who reported not undergoing cytology indicates the presence of a group not using this preventive service. Similarities between some findings and those of Kowalewska et al. suggest that the issue requires further research using more representative samples. The time elapsed since the most recent cytology examination differed between age groups: in the 20–29-year group, 24.2% (31) had undergone the examination six months previously and 21.9% (28) one year previously; in the 30–39-year group, the corresponding figures were 29.3% (22) and 33.3% (25), and in the 40–49-year group, 38.6% (22) and 28.1% (16).

Regular monthly breast self-examination was reported by between 46.4% (13) and 72.7% (32) of women, depending on age group. The lowest proportion was observed among the youngest women (18–19 years), and the highest among women aged

40–49 and 20–29 years. In a 2011 study by Paździor, Stachowska and Zielińska, 36.0% of women reported performing breast self-examination (Paździor et al., 2011). In our study, the proportion reporting regular breast self-examination was higher than that reported by Paździor et al. (2011); however, because of methodological differences between the studies, this difference cannot be interpreted as evidence of an increase in the frequency of breast self-examination in the population. Contemporary guidance places greater emphasis on breast awareness, namely familiarity with the normal appearance and structure of the breasts and attention to newly occurring changes. Nevertheless, a systematic review by Banihashemi and Brennan indicates that evidence for the effect of such self-observation on earlier breast-cancer detection in young women remains limited (Banihashemi & Brennan, 2023).

Oral health may be relevant both to maternal gut microbiota and to pregnancy outcomes. Among women in the first trimester of pregnancy with periodontitis, differences in gut microbiota composition and faecal metabolite profiles have been observed compared with women without periodontitis, suggesting possible links within the oral–gut axis (Cheng et al., 2024). More recent evidence also indicates an association between periodontitis and a higher risk of preterm birth and low birth weight (Machado et al., 2023). The statistical data show a considerable difference in the frequency of dental visits according to age. In our study, the highest attendance was observed among women aged 40–49 years, at 82.5% (47), and the lowest among women aged 20–29 years, at 63.3% (81). These findings may be compared with the study by Nowicki et al. (2017), in which the corresponding proportion was 82.9% ( $n = 243$ ). In the present study, the lowest attendance was among women aged 20–29 years, at 63.3% (81), while higher figures were recorded among those aged 30–39 years, at 72.0% (54), and 18–19 years, at 76.4% (42).

Most women participating in the study reported that they did not smoke. Across the study groups, between 65.5% (36) and 86.7% (65) reported not smoking. Among 93 students aged 17–19 years, 61.3% did not smoke, while 38.7% smoked (Mizgier

et al., 2016). Given the known negative consequences of smoking for reproductive health, the relatively high proportion of non-smokers may be interpreted as a favourable feature of the health-behaviour profile of the study group. Current evidence indicates that smoking in women is associated with reduced fertility and a higher risk of spontaneous miscarriage and ectopic pregnancy (Practice Committee of the American Society for Reproductive Medicine, 2024). However, socioeconomic status, stress levels, diet and exposure to second-hand smoke may also be relevant, as these factors frequently co-occur with smoking and affect fertility independently of tobacco itself (Li et al., 2023; Peng et al., 2024; Yang et al., 2023).

The largest group of women, 44.1% (139), reported engaging in sporting activity less than once a week. In research by Sochocka and Wojtylko (2013), more than half—57.0% (n = 315)—of students did not engage in regular physical activity. One in four respondents exercised twice a week, while 12.4% (n = 68) did so every day (Sochocka & Wojtylko, 2013). In a 2016 study by Mizgier et al. of 93 students, 50.5% of girls aged 17–19 years did not participate in sport (Mizgier et al., 2016). In our study, the largest group of respondents engaged in physical activity less than once a week, 44.1% (139), while 39.4% (124) reported activity 1–2 times a week. The low level of physical activity observed in our study is consistent with earlier observations by Sochocka and Mizgier, in which more than half of participants did not engage in regular exercise. The importance of physical activity for reproductive health is supported by the systematic review and meta-analysis by Xie et al., in which a moderate level of physical activity was associated with a lower risk of infertility compared with low activity (Xie et al., 2022).

Sleep duration in the cited studies was most commonly 5–6 hours, 51.4% (162), followed by 7–9 hours, 45.4% (143), 3–4 hours, 1.9% (6), and more than 9 hours, 1.3% (4). In the present study, 51.4% (162) of respondents reported usually sleeping 5–6 hours per night. Becker et al. (2018) found that among college students aged 18–29 years (n = 7626), 36.0% slept fewer than seven hours per night. The importance of sleep for women's reproductive health is indicated by a systematic review by Li et al., in which

sleep disturbances were associated with infertility, although findings concerning sleep duration itself remained inconclusive (Li et al., 2024). A limitation of the comparative data is that our findings concern women aged 18–49 years, whereas Becker et al.'s study included both women and men. The study groups also differed substantially in demographic structure, particularly in sex composition and age range.

In the multiple-response question concerning menstrual hygiene products, sanitary pads were selected most frequently, accounting for 56.0% (227) of all responses, followed by tampons at 37.5% (152). Menstrual cups accounted for 4.9% (20) of responses and menstrual underwear for 1.5% (6). A 2022 study by Parent et al. conducted among a large group of women aged 18–50 years (n = 1150) demonstrated the predominant use of traditional menstrual hygiene products during the day (pads 81.0% or tampons 45.6%) over reusable products (cups 9.4% or underwear 1.7%). At night, women used pads almost as frequently as during the day—79.3%—whereas tampons were used less frequently—19.8% (Parent et al., 2022). The widespread use of pads is also confirmed by Choi et al. among 8658 women: 89.0% used disposable pads, compared with 4.2% using tampons and only 1.6% using menstrual cups (Choi et al., 2021). The lower use of tampons at night may have resulted partly from medical recommendations. Wearing a tampon for too long at night (more than eight hours) may promote bacterial growth, thereby increasing the risk of toxic shock syndrome (TSS). The present study showed a similar tendency: more than half of respondents selected pads, followed by tampons. Thus, pads were the most commonly selected hygiene product in both studies, irrespective of sample size. The present study did not analyse factors determining the choice of particular menstrual hygiene products.

The study also examined whether women monitored menstrual-cycle length and the main fertility indicators. These indicators are relevant to monitoring current reproductive-health status. Cycle monitoring may increase awareness of the course of the cycle and the physiological changes observed. Systematic monitoring of menstrual-cycle length was reported by 82.5% (260) of women, including 58.7% (185) who

additionally monitored the main fertility indicators. However, there was no verification of whether these observations were made using mobile applications or paper-based cycle-observation charts. In a 2024 study by Hong et al. involving 700 women aged 20–39 years, as many as 62.3% (431) reported using the “Ovey” mobile application. The principal reason for using the tool was to predict the date of the forthcoming menstruation (Hong et al., 2024). The women did not, however, monitor the principal fertility signs, such as cervical mucus and body temperature. A systematic review by Kalampalikis et al. indicates that menstrual-cycle tracking applications may support the observation of menstruation and fertility, although only some have been evaluated by medical experts (Kalampalikis et al., 2022). The findings show that 82.5% (260) of respondents monitored menstrual-cycle length and 58.7% (185) reported observing the main fertility indicators. The available data do not, however, permit assessment of participants’ level of knowledge or the quality of their observations. The questionnaire did not record how cycle observations were documented, so it was not possible to compare the use of digital applications with traditional recording methods. In-depth knowledge of fertility physiology can be acquired by learning a cycle-observation method under the guidance of a qualified method instructor. Fertility-awareness-based methods enable the observation and interpretation of physiological indicators such as cervical mucus and basal body temperature, and their use may be more effective following appropriate instruction (Duane et al., 2022).

In the present study, 61.9% (195) of women did not use contraception, while 38.1% (120) reported using contraceptive methods. Among these women, hormonal contraception was the most common, at 56.8% (68), while 39.1% (47) used condoms as a barrier method. Research by Bień and Stadnicka showed that lower- and upper-secondary school students most commonly use condoms (83.8%) as a method of preventing pregnancy (Bień & Stadnicka, 2015). In a 2017 study by Dębska et al. among 380 students, the largest proportion of respondents (64.0%) used or intended to use condoms as a contraceptive method, while more than half (51.3%) used contraceptive

pills (Dębska et al., 2017). In a study by Izdebski et al. involving 642 women aged 18–49 years, the most frequently used method was the condom (63.2%), while hormonal methods were used by 34.2% of respondents (Izdebski et al., 2022). In the present study, hormonal contraception was the most frequently used method—56.8% (68)—whereas Bień and Stadnicka and Dębska et al. reported condoms as the most frequently selected method.

Among the 269 respondents who had initiated sexual activity, 43.9% (118) reported one lifetime sexual partner, 16.7% (45) two, and 39.4% (106) more than two. The smallest group comprised women reporting exactly two sexual partners, at 16.7% (45). In Kremska’s 2022 survey of 300 women divided into two age groups—20–30 years ( $n = 100$ ), comprising female medical students, and 45–55 years ( $n = 200$ ), comprising hospital employees—the largest proportion in both age groups reported having only one sexual partner, 61.0% among younger respondents and 67.0% among older respondents. More than three sexual partners were reported by 8.0% of women in the first group and 4.0% in the second (Kremska, 2022). In both studies, the women came from medical environments, which limits the possibility of generalising the findings to the wider female population. In the present study, one sexual partner predominated at 43.9% (118), alongside a high proportion of women reporting more than two sexual partners—39.4% (106). In Kremska’s study, the predominance of one partner was substantially higher (61.0% and 67.0%), with only a small proportion reporting more than three partners. Differences between the studies may be associated with differences in sample structure, study period and methodology. The number of lifetime sexual partners is also epidemiologically relevant in the context of exposure to HPV infection. In a study by Yamaguchi et al. involving 3968 sexually active women, the number of lifetime partners was significantly associated with HPV infection (Yamaguchi et al., 2021).

Care for women’s reproductive health requires regular check-ups and observation of one’s own body (Stępkowska & Przygodzka, 2020; Ślizień-Kuczapska et al., 2017). The findings show that not all women use preventive health services. Incomplete

participation in preventive activities among some respondents indicates a need for further development of health education and improved access to reliable information concerning reproductive-health prevention. The effectiveness of such activities is supported by a systematic review by Suto et al., whose authors demonstrated that information campaigns and education—individual, group-based and online—can increase patients' knowledge and positively influence health-promoting behaviours related to preconception planning (Suto et al., 2025). The findings support the continuation of health-promotion and preventive activities delivered by public-health institutions and healthcare professionals.

## 6. Study Limitations

The study has several important methodological limitations that should be considered when interpreting the findings. The sample was not representative of the population of women of reproductive age in Poland. This resulted from the inclusion of pupils from only two secondary schools and patients from a single healthcare facility in the same city. The sample was additionally supplemented online through recruitment via thematic Facebook groups.

Second, purposive convenience sampling was used. Selection of participants on the basis of availability and proximity prevents full generalisation of the findings to the entire population, as respondents may have differed substantially from women in the wider age group.

A further limitation concerns the design of the research instrument and the nature of the analysis. An original questionnaire was used. Although the questionnaire underwent expert consultation and pilot testing, a full validation procedure was not conducted. The self-report nature of the study entails a risk of recall and social-desirability bias.

An additional limitation was the use of two data-collection modes—paper and online questionnaires—which may have introduced a mode effect and contributed to differences in how respondents understood or answered the questions.

Despite these limitations, the findings provide valuable insights and constitute a strong rationale for further, more in-depth research in this area.

## Conclusions

1. The frequency of individual preventive behaviours varied. An annual gynaecological examination was reported by 71.1% (224) of respondents, while the time elapsed since the most recent cervical cytology examination varied substantially between age groups.
2. Most respondents did not smoke; however, 44.1% (139) reported engaging in sporting activity less than once a week, and 53.3% (168) slept fewer than seven hours per day.
3. Disposable menstrual hygiene products predominated, particularly sanitary pads and tampons.
4. Most respondents, 82.5% (260), reported monitoring menstrual-cycle length, while 58.7% (185) also observed the main fertility indicators.
5. Contraception was used by 38.1% (120) of all respondents. Among women using contraception, hormonal methods were most frequently reported, at 56.8% (68), followed by barrier methods.

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# Motivation for studying midwifery, educational satisfaction, and sense of purpose in life among female midwifery students: A cross-sectional study<sup>1</sup>

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**Abstract:** *Introduction:* Motivation, educational satisfaction, and psychosocial resources of midwifery students may be significant for their engagement in the educational process and preparation for their future professional practice. *Aim:* The study aimed to assess motivation for choosing the field of study and pursuing education, educational satisfaction, career plans, subjective preparedness for work under high-stress conditions, and the presence and search for purpose in life in midwifery students. *Material and methods:* A quantitative cross-sectional study was conducted using the CAWI technique. The study included 140 first- and second-cycle female midwifery students. An original questionnaire, a modified version of the Questionnaire on Motivation in Education, and the Polish version of the Meaning in Life Questionnaire (MLQ) were used. Descriptive statistics and the Friedman's test were applied in the analysis. *Results:* The highest-rated reasons for choosing the field of study included the willingness to help others ( $M = 4.61$ ; 93.6% of positive responses) and the belief in the great social significance of the midwifery profession ( $M = 4.50$ ; 90.0%). Satisfaction with the choice of the major was declared by 84.0% of the respondents. The highest-rated reason for learning was its usefulness in achieving career goals ( $M = 4.59$ ;  $SD = 0.80$ ). The average score in the Search for Meaning in Life subscale was 26.87 ( $SD = 4.21$ ), while in the Presence of Meaning in Life subscale, it was 24.05 ( $SD = 4.88$ ). The lowest-rated element of the educational process was preparedness for work under high-stress conditions ( $M = 3.20$ ;  $SD = 1.28$ ). *Conclusions:* Midwifery students were characterized by high declared professional motivation and a high level of satisfaction with their choice of the major. The lowest-rated area of education was the preparedness for work under high-stress conditions. The results indicate the validity of further research into the needs of students in this regard and the effectiveness of educational interventions aimed to support coping with the emotional demands of clinical practice.

**Keywords:** academic motivation; midwifery students; satisfaction with studies; sense of purpose in life; stress; midwifery education

## 1. Introduction

Midwifery is a medical profession of considerable importance for the care of women and newborns at various stages of life and during the perinatal period. Practicing as a midwife requires both specialized knowledge and clinical skills, as well as developed interpersonal skills, the ability to regulate one's emotions and readiness to provide support to patients. A midwife's scope of competences includes

providing care to women at various stages of life, with a particular focus on reproductive health, pregnancy, childbirth and the puerperium. The tasks of a midwife include taking care of a woman with a physiological pregnancy, during childbirth and puerperium as well as of newborns in their first weeks of life. The scope of professional practice also includes preventive and educational activities,

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Dere.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Dere.pdf)

and women's health promotion, in accordance with applicable legal regulations (Rozporządzenie Ministra Zdrowia, 2025).

Educating midwives in Poland is carried out at the academic level and is subject to national and European standards of vocational education. The curriculum includes theoretical, practical and clinical preparation, aimed at developing competences necessary to practice the profession independently. Clinical training is an essential component of the curriculum. Clinical instruction takes at least half of the required number of training hours. The aim of education is to acquire knowledge, clinical skills and social competences necessary to practice the profession of a midwife safely and independently. After completing their studies, the graduates may continue their professional development through postgraduate programs or further academic education. Graduates of second-cycle studies may continue their education in doctoral schools or develop professional competences as part of specialization and other forms of postgraduate education, in accordance with applicable legal regulations (Rozporządzenie Ministra Nauki, 2024; Ustawa o zawodach pielęgniarstwa i położnej, 2026).

In recent years, the number of institutions providing medical programs, including midwifery, has increased (Ministerstwo Zdrowia, 2026). The growing availability of education may provide more opportunities to train new medical professionals. As access to higher education is wider, ensuring a comparably high quality of instruction across different academic institutions becomes particularly important. The development of medical education requires a systematic evaluation of the quality of education, learning outcomes and compliance of curricula with current standards and needs of the healthcare system (Ministerstwo Zdrowia, 2025). The quality of medical education is subject to external accreditation procedures conducted by competent national institutions.

Reports on the quality of education in medical professions indicate the need for the special control of professional training standards of the graduates (Wasilewski et al., 2023). The quality of professional training is important for patient safety and the quality of care provided. The quality

of education may be important not only for the safety and quality of care, but also for the subsequent professional functioning of female graduates. The external evaluation of the quality of education is supplemented by the analysis of students' experiences and opinions regarding the teaching process. Students' opinions may constitute an important source of information used to improve educational programs. The education of future midwives should include both theoretical and clinical preparation, as well as the development of psychosocial competences important in professional work (Lukasse et al., 2017; Wanot et al., 2020).

Motivation to choose a field of study and to engage in educational activities is an important aspect of students' functioning in the educational process. Motivation includes processes conditioning the choice of the goal, the direction of action, the level of involvement and perseverance in the implementation of educational tasks. According to research, intrinsic factors often play an important role among the motivations for pursuing a medical degree. Autonomous and internally well-established motives may include interest in the field, compliance of the choice of profession with personal values and the need to help others. Some studies showed that external factors, such as the prestige of the profession, the expectations of the environment or financial considerations, played a smaller role than autonomous and pro-social motives (Cullen et al., 2016; Makowska, 2025; Sim-Sim et al., 2022). The motives for choosing midwifery vary depending on the social and cultural context, but often include interest in caring for women and newborns, willingness to help and the possibility of pursuing one's own career plans (Al Hadid et al., 2018; Kraja et al., 2022). Motivation may be related to the level of student engagement, learning outcomes and readiness to undertake future professional roles (Jendrysik et al., 2020). International research indicated that students' experiences during the educational process, especially clinical education, were important for their perceived professional preparedness. Particular importance is attributed to the quality of clinical education, support from experienced midwives and interpersonal relation-

ships in the clinical training setting (Baird et al., 2022; Bass et al., 2020; Vermeulen et al., 2023). High levels of stress, insufficient support and undesirable behaviors during the training may be associated with lower satisfaction with studying, poorer assessment of clinical experiences and a lower sense of being prepared for future work (Capper et al., 2021; Seyedi et al., 2025).

The quality of the educational environment and access to social support are also important elements of students' learning experiences. Mentoring, peer support and positive relationships with clinical training supervisors may be associated with maintaining motivation, a stronger sense of professional belonging and a greater willingness to continue education and work in the profession (Vasilevski et al., 2022).

Satisfaction with studies is an important subjective indicator of students' educational experience and may be related to their commitment and career plans. Higher levels of student satisfaction are associated with greater engagement, stronger professional identification, and greater declared readiness to pursue a career after graduation (Carter et al., 2022; Patterson et al., 2019). The analysis of students' opinions may help to identify areas for improvement and constitute one of the sources of information used in the modification of curricula (Carter et al., 2022; Neiterman et al., 2023; Vasilevski et al., 2022).

Previous research was more often focused on students' motivation, educational satisfaction, clinical experience and psychosocial resources as separate notions. Relatively few analyses combined those areas in one model of describing the experiences of female midwifery students, especially comprising the sense of purpose in life. An analysis of the experiences of female midwifery students may provide information useful in identifying the strong and weak areas of the educational process. The present study aimed to analyze the motivation for choosing midwifery and education, satisfaction with education, career plans, perceived preparedness for work and the presence and search for the meaning in life in midwifery students. The study is exploratory in nature and provides a starting point for further analyses of the determinants of educational experiences and career plans of female midwifery students.

## **2. Own research**

### **2.1. The main aim of the study**

The primary aim of the study was to analyze the motivations for choosing midwifery and education, satisfaction with education, career plans, perceived preparedness for work and the presence and search for the meaning in life in midwifery students.

### **2.2. Research questions and hypotheses**

The following questions were posed, along with the corresponding research hypotheses:

- Q1. What motives are most important when choosing to study midwifery?
- H1. Prosocial and autonomous motives are rated higher than economic and external motives.
- Q2. What learning motives are highest rated by female students?
- H2. Motives related to the achievement of professional goals and the development of competences are rated higher than the motive of learning for the sake of pleasure only.
- Q3. What is the declared level of satisfaction with their choice of major and how do the students assess individual areas of education?
- H3. Being prepared for working in high-stress environment is rated lower than the other areas of the educational process under review.
- Q4. What is the level of the presence and search for meaning in life in the study group?

### **2.3. Material and methods**

A quantitative cross-sectional study was carried out using the CAWI (Computer-Assisted Web Interview) technique in the years 2024-2025. All participants gave their informed consent to participate in the study. The study was a non-invasive opinion survey conducted using a fully anonymous questionnaire administered to adult, voluntary participants (students). The study did not constitute a medical experiment, nor did it interfere with the physical or mental integrity of the subjects (no approval of the

Bioethics Committee was requested). Non-probability convenience sampling was used. The inclusion criterion was the active status of a first-cycle or second-cycle student in midwifery. Participation was possible if informed consent was provided. Incomplete questionnaires and responses that did not meet the inclusion criteria were excluded from the analysis. The study was conducted in students of midwifery at a medical university in Warsaw. Participants were recruited by sharing a link to the survey on social media and in the communication groups of individual years of midwifery. The recruitment was open and voluntary. The analysis included 140 female students. There were no men in the analyzed sample.

Three research tools were used in the study:

1. A proprietary questionnaire included socio-demographic questions and items concerning the motives for choosing a major, satisfaction with studies, assessment of the educational process and career plans. The items were rated on a 5-point Likert scale, from 1 (“completely disagree”) to 5 (“completely agree”). The scope of the questionnaire was developed on the basis of an overview of existing tools regarding satisfaction, professional interests, empathy and job satisfaction; items from these scales were not used directly. When developing the content of the questions, the concepts present in the tools concerning satisfaction with life, professional interests, empathy and job satisfaction were used. The scope and method of using these sources are described in the tool construction procedure. The accuracy of the questionnaire was assessed by three experts representing medical didactics, public health and midwifery. All the experts considered the items adequate in terms of the content. The internal consistency of the items of the analyzed scales was assessed using the Cronbach’s alpha coefficient. The Cronbach’s alpha coefficient was  $\alpha = 0.90$  for the George and Mallery scale.
2. The Questionnaire on Motivation in Education by Gózdź (2015) was used to assess motivation to learn. For the purposes of this study, a short-

ened version of the questionnaire was used. As regards the context of higher education, 22 items were deemed unsuitable and were removed. The items were rated on a 5-point Likert scale, from 1 (“completely disagree”) to 5 (“completely agree”). In the tested sample, the internal consistency of the abridged version of the questionnaire was  $\alpha = 0.97$ .

3. The Meaning in Life Questionnaire (MLQ) (Steger et al., 2006; Polish adaptation: Kosakowska et al., 2013). The questionnaire consists of 10 items rated on a 7-point Likert scale, from 1 (“definitely not”) to 7 (“definitely yes”). The MLQ measures two dimensions: the Presence of Meaning and the Search for Meaning. The inclusion of this construct was justified by the specific nature of a midwife’s work, which involves dealing with both childbirth and situations that are clinically and emotionally stressful. The measurement of both dimensions of the MLQ made it possible to characterize the study group in terms of the presence and search for the purpose of life. The importance of these constructs for functioning in care professions may be subject to further analyses. The internal consistency of the items of both MLQ subscales was assessed using the Cronbach’s alpha coefficient. In the tested sample, the Cronbach’s alpha coefficient was  $\alpha = 0.66$  for the Presence of Meaning subscale and  $\alpha = 0.80$  for the Search for Meaning subscale.

Statistical analysis: The data were subjected to statistical analysis including descriptive statistics and non-parametric tests. Arithmetic means (M) and standard deviations (SD) were calculated for items assessed on the Likert scales, and numbers and percentages for categorical variables. The Friedman’s test was used to compare the ranks of several related positions or dimensions within the same group. In the case of a significant Friedman’s test result, post hoc comparisons were made with a correction for multiple testing. The level of statistical significance was assumed at  $\alpha = 0.05$  in all analyses. The analyses were carried out in Excel, Microsoft Office 365.

### 3. Results

The analysis covered the data of 140 female students of midwifery. Most of the participants were aged 19–23 (89.3). The mean age of the participants was  $M = 21.8$  years, the standard deviation of the age of the participants was  $SD = 4.3$  years, and the median was  $Me = 21$  years.

First-cycle female students accounted for 74.5% of the sample. First-year students made up 12.8% of the group, second-year – 31.9%, and third-year students – 29.8%. Second-cycle students accounted for 25.5% of the sample, including 19.9% of first-year and 5.6% of second-year students. A total of 92.2% of the participants were enrolled in full-time programs, and the remaining 7.8% in part-time ones. As regards the marital status, 95.7% of the participants declared to be unmarried, and 4.3% were married. The largest groups lived in towns with up to 50,000 inhabitants (46.1%) and from cities with over 500,000 inhabitants (32.6%).

The highest-rated reasons for choosing midwifery were the desire to help others ( $M = 4.61$ ; 93.6% of positive answers) and the belief in the high social importance of the midwifery profession ( $M = 4.50$ ; 90.0%). Both motives were among the highest rated in both first-cycle and second-cycle students. Both groups chose “completely agree” the most frequently when responding to the statement regarding the willingness to help others in their future professional work (79.8% of first-cycle and 66.7% of second-cycle students). A total of 73.1% of first-cycle and 69.4% of second-cycle students completely agreed with the statement that the profession of a midwife is of great value and social importance. The interest in midwifery was also highly rated ( $M = 4.40$ ; 87.0% of positive responses), i.e., 67.3% of first-cycle and 75.0% of second-cycle students completely agreed with the statement. Willingness to work with women also obtained high rates ( $M = 4.37$ ; 86.0% of positive responses). The response “completely agree” to the statement was selected by 61.5% of first-cycle students and 52.8% of second-cycle students. Interest in medicine was another highly rated aspect ( $M = 4.36$ ; 89.0% of positive responses). Fondness for children

( $M = 4.21$ ; 82.0%) and the belief that studies help to better understand oneself and others ( $M = 4.16$ ; 81.0%) were rated relatively high. The percentage of the highest rates for fondness for children differed numerically between first- and second-cycle students. The percentage of “completely agree” responses was 60.6% in the first-cycle and 38.9% in the second-cycle study group. Prior knowledge of the midwifery profession was rated lower as a motive for choosing a major ( $M = 3.97$ ; 76.0% of positive answers). In both groups, prior knowledge of the midwifery profession was rated lower than prosocial and interest-related motives. Lower rates were assigned to the opportunity to work in various settings ( $M = 3.68$ ; 60.0%) and the expected good remuneration ( $M = 3.31$ ; 44.0%). The “completely agree” response to the statement concerning work in various settings was selected by 34.6% of first-cycle and 16.7% of second-cycle students. The “completely agree” response to the statement concerning expected good remuneration was indicated by 17.3% of first-cycle students and 11.1% of second-cycle students. The statement that midwifery was the first-choice major received the mean of 3.64 and 62.0% of positive answers. The statement “I wasn’t accepted into another degree program” received low rates ( $M = 1.84$ ; 18.0% of positive answers). Midwifery as the first-choice major was declared by 71.1% of first-cycle and 80.6% of second-cycle students. The lowest rates were assigned to the influence of having a midwife in the family or environment ( $M = 1.76$ ), not being accepted into another program ( $M = 1.84$ ) and persuasion by family or the environment ( $M = 1.94$ ). Persuasion by family was completely denied by 73% of first-cycle and 77.8% of second-cycle students. The dominant response to the question regarding the ease of working abroad was “difficult to say” in both groups. The respective percentages were 37.5% in first-cycle and 38.9% in second-cycle students. Means ( $M$ ) and standard deviations ( $SD$ ) were calculated for individual motives. The values were then used to present the relative rank order. The hierarchy of the importance of motives is presented in Table 1. In addition, the percentages of selected categories of responses in groups of first- and second-cycle students were presented.

Table 1. Hierarchy of factors motivating to study midwifery (N=140)

| No. | Czynnik motywacyjny                                                              | Mean (M) | Standard deviation (SD) |
|-----|----------------------------------------------------------------------------------|----------|-------------------------|
| 1.  | I want to help others in my professional work                                    | 4.61     | 0.91                    |
| 2.  | I believe that the midwifery profession is of great value and social importance  | 4.50     | 1.02                    |
| 3.  | I am interested in midwifery                                                     | 4.40     | 1.00                    |
| 4.  | I would like to work with women                                                  | 4.37     | 0.95                    |
| 5.  | I am interested in medicine                                                      | 4.36     | 1.02                    |
| 6.  | I like children                                                                  | 4.21     | 1.14                    |
| 7.  | I believe that this field of study helps to better understand oneself and others | 4.16     | 1.09                    |
| 8.  | Before starting my studies, I knew what a job of a midwife entailed              | 3.97     | 1.10                    |
| 9.  | After graduation, I will have the opportunity to work in various settings        | 3.68     | 1.20                    |
| 10. | Studying midwifery is my first choice                                            | 3.64     | 1.62                    |
| 11. | My studies provide me with a good income                                         | 3.31     | 1.13                    |
| 12. | My studies allow me to easily take up a job abroad                               | 3.27     | 1.12                    |
| 13. | I thought about studying midwifery even as a child                               | 2.28     | 1.23                    |
| 14. | Someone from my family/ environment encouraged me to pursue this major           | 1.94     | 1.32                    |
| 15. | I wasn't accepted into another degree program                                    | 1.84     | 1.38                    |
| 16. | Someone from the family/ environment is a midwife                                | 1.76     | 1.45                    |

Explanation: Friedman's ANOVA test  $\chi^2(15) = 1553.12$ ;  $p < 0.001$

The Friedman's test was used to assess the differences between the ratings of individual motives. The Friedman's test showed significant differences in the ratings of individual motives,  $\chi^2(15) = 1553.12$ ;  $p < 0.001$ ; the Kendall's  $W = 0.74$ . The result indicated that the level of ratings of individual motives differed significantly within the study group.

Tabela 2. Poziom satysfakcji oraz plany edukacyjno-zawodowe respondentów (N = 140)

| Lp. | Analyzed aspect (statement)                                                     | Mean (M) | Standard deviation (SD) |
|-----|---------------------------------------------------------------------------------|----------|-------------------------|
| 1.  | After completing my first-cycle studies, I want to pursue second-cycle studies  | 4.45*    | 1.04*                   |
| 2.  | After completing my first-cycle studies, I want to start my professional career | 4.47*    | 0.95*                   |
| 3.  | I am satisfied with the choice of a major                                       | 4.29     | 0.92                    |
| 4.  | After completing my first-cycle studies, I want to start working at a hospital  | 4.14     | 1.17                    |
| 5.  | I would decide to study midwifery again                                         | 4.10     | 1.24                    |
| 6.  | I intend to study a different field of medicine                                 | 2.48     | 1.23                    |
| 7.  | I intend to study a different field, one outside the medical sciences           | 2.01     | 1.27                    |

Explanation: Friedman's ANOVA test  $\chi^2(6) = 663.48$ ;  $p < 0.001$ , \*values calculated only for a subgroup of first-cycle students (N=104)

Satisfaction and educational and career plans were assessed using the 5-point Likert scale. This allowed to determine the means (M) and standard deviations (SD) for each of the analyzed statements (Table 2).

The Friedman's test was used to compare the level of agreement with individual statements about satisfaction and career plans. The Friedman's test showed significant differences in the level of agreement with the analyzed statements,  $\chi^2(6) = 663.48$ ;  $p < 0.001$ ; the Kendall's  $W = 0.79$ . The result indicated that the level of agreement varied across individual statements regarding satisfaction, and educational and career plans.

Individual areas of the educational process in midwifery were rated. The mean (M) and standard deviation (SD) were calculated for each item (Table 3). The Friedman's test was used to compare the ratings of individual areas of education. The students allocated the highest rates to the practical (M = 4.01) and theoretical (M = 3.91) aspects of their studies. Statistically, preparation for work under stress was

Table 3. Evaluation of the educational process based on the students' opinions (N=140)

| No. | Aspect of the educational process                | M    | SD   | Interpretation               |
|-----|--------------------------------------------------|------|------|------------------------------|
| 1.  | Acquisition of necessary practical knowledge     | 4.01 | 0.98 | Highest rating               |
| 2.  | Acquisition of necessary theoretical knowledge   | 3.91 | 0.94 | High rating                  |
| 3.  | Good preparation for the midwifery profession    | 3.67 | 0.97 | Average rating               |
| 4.  | Preparation in the area of interpersonal skills  | 3.61 | 1.07 | Average rating               |
| 5.  | Preparation for work in high-stress environments | 3.20 | 1.28 | Lowest rating (Deficit area) |

Explanation: Friedman's ANOVA test  $\chi^2(4) = 76.43$ ;  $p < 0.001$

Table 4. Factors motivating to pursue education according to the scale by J. Gózdź (2015), (N=140)

| No. | What are your reasons for studying? (Statement)                     | M    | SD   | Motivation type/ Rank     |
|-----|---------------------------------------------------------------------|------|------|---------------------------|
| 1.  | It is necessary for achieving my career goals                       | 4.59 | 0.80 | Goal-oriented / Highest   |
| 2.  | It promotes the development of competences needed in the profession | 4.56 | 0.80 | Autonomous / Very high    |
| 3.  | It brings me closer to my chosen career goal                        | 4.56 | 0.81 | Goal-oriented / Very high |
| 4.  | It is necessary due to the chosen career path                       | 4.52 | 0.81 | Practical / High          |
| 5.  | It is necessary for my life choices                                 | 4.44 | 0.84 | Identity-based / High     |
| 6.  | It provides preparation for the profession I dreamed of             | 4.30 | 1.03 | Intrinsic / High          |
| 7.  | It helps me better prepare for the chosen degree program            | 4.28 | 1.03 | Adaptive / Moderate       |
| 8.  | Because it gives me pleasure                                        | 3.72 | 1.13 | Hedonic / Lowest          |

Explanation: The Friedman's ANOVA test  $\chi^2(7) = 154.12$ ;  $p < 0.001$

Table 5. Evaluation of the components of the sense of meaning in life based on the MLQ scale (N=140)

| No. | Statement from the MLQ questionnaire                            | M    | SD   | Subscale            |
|-----|-----------------------------------------------------------------|------|------|---------------------|
| 1.  | I always look to find my purpose in life                        | 5.79 | 1.05 | Search for Meaning  |
| 2.  | I understand the meaning of my life                             | 5.66 | 1.37 | Presence of Meaning |
| 3.  | I'm looking for something that makes my life feel meaningful    | 5.62 | 1.24 | Search for Meaning  |
| 4.  | I always look for something that makes my life feel significant | 5.44 | 1.29 | Search for Meaning  |
| 5.  | I am looking for a purpose or mission in my life                | 5.30 | 1.45 | Search for Meaning  |
| 6.  | I have discovered a satisfying life purpose                     | 5.16 | 1.58 | Presence of Meaning |
| 7.  | I have a good sense of what makes my life meaningful            | 5.15 | 1.45 | Presence of Meaning |
| 8.  | I'm looking for meaning in my life                              | 4.72 | 1.77 | Search for Meaning  |
| 9.  | My life has a clear purpose                                     | 4.65 | 1.59 | Presence of Meaning |
| 10. | My life has no clear purpose (reversed)                         | 3.43 | 1.91 | Presence of Meaning |

Explanation: The Friedman's ANOVA test  $\chi^2(9) = 384.91$ ;  $p < 0.001$

the weakest link in education ( $M = 3.20$ ), where the distribution of rates showed the highest polarity and variability ( $SD = 1.28$ ).

The analysis of motivation to study using a standardized tool allowed for the selection of an order of factors determining the students' cognitive engagement (Table 4). The applied Friedman's ANOVA

test confirmed that the structure of educational goals was significantly heterogeneous:  $\chi^2(7) = 154.12$ ;  $p < 0.001$ . Midwifery students were characterized by mature motivation focused on a specific goal and professional profile ( $M = 4.59$ ). Learning was viewed pragmatically and professionally, but less often as a direct source of spontaneous pleasure ( $M = 3.72$ ). Un-

derstanding the main factors that motivate students to learn made it possible to identify a relationship between motivation to pursue higher education and factors that motivated students to learn. The result was statistically significant ( $p < 0.001$ ), which indicates that an increase in motivation to pursue higher education was associated with an increase in motivation for learning and professional development.

The respondents were asked to assess the purpose in life based on the MLQ (Kossakowska et al., 2013). In order to fully implement the methodological assumptions, the raw results of the MLQ were standardized and grouped into two official subscales: *The Presence of Meaning in Life* (the existential aspect) and *The Search for Meaning in Life* (the motivational aspect). The mean results for individual statements are presented on a scale of 1 to 7 in Table 5. The Friedman's ANOVA test showed that the respondents were characterized by a non-random, structured architecture of the psychological profile:  $\chi^2(9) = 384.91$ ;  $p < 0.001$ . Based on the psychometric key, total means were calculated for both subscales (range: 5 to 35 points). In the "Search for Meaning in Life" subscale, the overall mean was 26.87 points ( $SD = 4.21$ ) in the group. In the "Presence of Meaning in Life" subscale, the overall mean was 24.05 points ( $SD = 4.88$ ) in the group. This indicates a high motivational and existential foundation potential of future midwives.

## 4. Summary

The analysis of the results indicated both similarities and differences in the motivation of first- and second-cycle female midwifery students. What both groups primarily have in common is the strong influence of intrinsic and altruistic factors on their choice of major.

The most important motives for pursuing studies, indicated by both first- and second-cycle students, were willingness to help others and the belief in the great value and social significance of the midwifery profession. However, intergroup differences are notable in the intensity of individual motives.

First-cycle students declared more often than second-cycle students that the choice of midwifery was associated with the willingness to help others – 79.8% of first-cycle students completely agreed with the statement compared to 66.7% of second-cycle students. Similarly, willingness to work with women was more important for first-cycle students (61.5% vs. 52.8%). Conversely, second-cycle students more often indicated a strong interest in midwifery and gynecology, i.e., 75.0% of them completely agreed that they were interested in this field compared to 67.3% of first-cycle students.

A clearer difference was also observed in the case of fondness for children. This motive was more important for first-cycle students – 60.6% of them completely agreed with this statement, while in the group of second-cycle students, the respective percentage was 38.9%. Furthermore, the possibility of working in a variety of settings and good income were more often indicated by first-cycle students, although in both groups financial factors and those related to employment opportunities were less important than motives related to helping, interest in midwifery and the social value of the profession. Both groups were also characterized by relatively high autonomy of the decision on the choice of major.

Midwifery was the first choice for the majority of the respondents, i.e., 71.1% of first-cycle and 80.6% of second-cycle students. At the same time, the persuasion of the family was of little importance among both first- and second-cycle students. Persuasion of the family was completely denied by 73% of first-cycle and 77.8% of second-cycle students. The dominant response to the question regarding the ease of taking up a job abroad was "difficult to say" in both groups.

To sum up, the students of both cycles of education shared the feeling of a calling to work as a midwife, based on the willingness to help others, a sense of a high social standing of the profession and interest in midwifery. First-cycle students more often emphasized the importance of altruism, working with women, fondness for children and the possibility of various employment options, while second-cycle students relatively more often highlighted

the mere interest in midwifery and gynecology and more often declared that midwifery was their first choice of major.

The results concerning the overall satisfaction with the major, assessment of the educational process, motivation to learn and sense of meaning in life were presented primarily for the entire study group. In the whole population, a high level of satisfaction with the choice of the major, strong professional motivation and a high level of search and the presence of meaning in life were demonstrated. At the same time, being prepared for work under high stress was the lowest rated element of education. Therefore, the obtained results indicate that, regardless of the level of education, female midwifery students presented primarily intrinsic and prosocial motivation for choosing a profession. At the same time, visible differences in the hierarchy of individual motives showed that the importance of some aspects of choosing a major might change with the level of education, from more general and related to helping and working with women in the group of first-cycle students to a stronger interest in the area of midwifery and gynecology in the group of second-cycle students.

## **5. Discussion**

The study included a homogeneous group of 140 female midwifery students, mostly aged 19–23, studying full-time, mainly at first-cycle studies. Such a profile of the respondents corresponds to the characteristics of the population described in the literature, in which the midwifery program is most often chosen by young women who start their studies immediately after graduating from secondary school. This similarity allows us to relate the obtained results to previous reports, while taking account of a different cultural and systemic context of education in Poland.

The most important finding in the area of motivation is the clear, statistically confirmed by the Friedman's test ( $p < 0.001$ ), predominance of intrinsic over extrinsic factors. The respondents indicated that the willingness to help others (93%;  $M = 4.61$ ) and the belief in the high social value

of the midwifery profession (90%;  $M = 4.50$ ) were decisive factors. This pattern is fully consistent with the results by Cullen et al. (2016), who conducted a study in young midwifery students and indicated altruism understood as the willingness to help and the perception of midwifery as a satisfactory career path to be dominant motives. Similarly, Sim-Sim et al. (2022) described the motivation of female students in terms of building a professional identity directly related to the caring nature of the profession. A similar picture, in which the choice of a medical major resulted directly from intrinsic factors, was also described in more recent Polish papers (Jendrysik & Knapik, 2020; Makowska, 2025; Wanot & Wanot, 2020) and analyses conducted in other healthcare systems (Al Hadid et al., 2018).

However, it is worth noting the sharp contrast with some international reports. Kraja et al. (2022) described a sample of female students in Albania and showed that the dominant reasons for the decision included pragmatic factors, such as job security or the possibility of working abroad. The present study revealed that financial and extrinsic motives were rated the lowest: the prospect of high income was confirmed by only 45% of the respondents ( $M = 3.31$ ), and the ease of taking up a job abroad was indicated by 41% ( $M = 3.27$ ). The differences between the results of Polish and Albanian research may partly reflect a different socio-economic context and the organization of the labor market. However, this hypothesis requires direct comparative research. In the sample studied, greater importance was attributed to motives associated with helping others and the social significance of the profession than to some financial motives or those related to the impact of the environment. The results indicates that motives related to the future professional role played a significant role in the study group.

The low level of declared family influence and random selection indicates that the factors were of little importance for the majority of the respondents. The majority of the respondents declared that no one in their environment practiced the profession of a midwife (82%), no one encouraged them to pursue this major (73%), and factors such as family pressure ( $M = 1.94$ ) or the case of not being accepted into an

other program ( $M = 1.84$ ) obtained the lowest rates. Low rates for statements regarding random selection or preferences for other degree programs indicate that such motives were relatively rarely declared in the study group. The study group was also characterized by a high percentage of declared satisfaction with the choice of the major ( $M = 4.29$ ), which was expressed by as many as 84% of the respondents. In total, 75% of the respondents would choose to study midwifery again ( $M = 4.10$ ), and the vast majority planned to start working in the profession immediately after obtaining their diploma (85%;  $M = 4.46$ ), indicating hospital as the preferred place of employment (76%). Moreover, as many as 75% of the respondents intended to continue their education at second-cycle level ( $M = 4.55$ ). The high declared satisfaction with the choice of the major was accompanied by frequent declarations about continuing education and taking up a job in the profession after graduation (Carter et al., 2022; Patterson et al., 2019). Previous research in groups of female graduates revealed that positive experiences related to education might be related to the subsequent professional performance and the intention to remain in the profession (Patterson et al., 2019). The assessment of the quality of education may constitute one of the factors related to the future professional functioning of graduates (Lukasse et al., 2017).

The ratings of the individual elements of the educational process varied, with higher values being recorded for theoretical and practical preparation than for some psychosocial aspects. The results indicate differences between the assessment of theoretical preparation and the declared preparedness for some of the psychosocial requirements of future work. The respondents highly rated the acquired theoretical (82%) and practical knowledge (78%), while the general preparation for the profession (60%) and the development of interpersonal skills (61%) were rated lower. As regards the analyzed aspects of the educational process, being prepared for working under increased stress obtained the lowest rates. The result is consistent with previous reports indicating significant emotional and organizational burden associated with the clinical education of midwifery students. A systematic review by Seyedi et al. (2025) demonstrated that stressors accompanying

the clinical education of midwives included relational difficulties, insufficient support and structural burden related to the organization of practical training. The present study revealed that both preparedness for some interpersonal aspects and for work under stress were assessed lower than theoretical and practical knowledge. However, the relationship between these areas requires a separate analysis. Capper et al. (2021) highlighted the special contribution of relational and organizational conditions in the environment of clinical practical training. The issue gains additional significance in light of the observation by Cullen et al. (2016) that female students often started their education with an idealized image of the profession. According to the literature, the discrepancy between expectations of the profession and clinical experience may constitute an additional source of stress for female students and recent graduates. The relatively high diversity of responses ( $SD = 1.28$ ) indicates that the subjective sense of preparedness for work under stress was not uniform in the study group. The sources of this diversity require further analyses.

A higher rating for practical preparation than for general readiness to work independently may indicate that the respondents assessed their mastery of practical skills and their own readiness to play a professional role differently. Some authors described various didactic solutions that might support the preparation of students for the requirements of clinical practice. Medical simulation makes it possible to practice complex clinical situations under controlled conditions, and research indicated that female students had a positive opinion concerning such a form of education (Vermeulen et al., 2021). Prolonged practical training implemented in models of the continuity of care are conducive to building self-confidence (Baird et al., 2022), working with structured models of reflection makes it possible to work through difficult experiences (Bass et al., 2020), and practice-oriented ethical education strengthens soft skills (Megregian et al., 2021). Mentoring and peer support were also identified in the literature as potentially relevant to learning experiences and student retention in academic programs (Neiterman et al., 2023; Vasilevski & Carolan-Olah, 2022). The results indicate that with high rates of numerous

professional motives, the subjective preparedness of students to function under emotional stress remained an important area requiring attention. The psychological profile of the study group is supplemented by the results obtained in the MLQ questionnaire, introducing an existential perspective to the analysis. The MLQ results supplement the characteristics of the study group with two dimensions of the sense of meaning in life: its presence and search. The majority of the respondents could see the meaning of their own lives (86%) and had clearly defined life goals (52%).

A relatively high score in the area of the search for meaning may be viewed in the context of the developmental processes characteristic of early adulthood. However, such an interpretation requires reference to appropriate normative or comparative data. The results indicate the availability of resources related to the sense of meaning of life in the study group, but their sources and relationships with the experience of midwifery education were not the subject of this study. A sense of meaning in life may be an important psychological resource in the context of functioning in emotionally demanding professions. However, determining its potential protective role against stress or burnout requires longitudinal studies.

### **5.1. Strengths of the study**

The inclusion of 140 female students in the analysis and the simultaneous inclusion of several complementary areas related to motivation, assessment of education and sense of meaning in life constitute the strengths of the study. Such a multidimensional approach allows for the simultaneous analysis of several aspects relevant to the educational experience of midwifery students. The use of two standardized research tools of confirmed reliability and accuracy, i.e., the Polish adaptation of the Meaning in Life Questionnaire (MLQ) and the Questionnaire on Motivation in Education by J. Gózdź (2015) in addition to the proprietary questionnaire was an additional methodological advantage. The use of standardized tools enabled the assessment of selected constructs using methods with previously described psychometric properties. The obtained results may have practical applications, indicating areas of the

educational process that require further assessment and potential improvement. The set of tools may be used in future comparative studies covering subsequent years or other centers, after appropriate confirmation of the psychometric properties of the proprietary questionnaire.

### **5.2. Limitations of the study**

This study has several methodological limitations that should be comprised when interpreting the results and assessing the possibility of their generalization. Firstly, non-probability convenience sampling was used, and the participants were recruited in only one academic center. This limits the possibility of generalizing the obtained results to the entire population of individuals studying midwifery in Poland. Secondly, women aged 19–23, studying full-time at first-cycle studies constituted the majority of the sample. As a consequence, the results may only partially reflect the experiences of part-time students, second-cycle students and men enrolled in midwifery programs.

Thirdly, the study used only self-reporting tools, which may increase the risk of response errors characteristic of this type of measurement. The use of only self-reporting methods is associated with the risk of social desirability bias, which could lead to the selection of answers perceived by the respondents as more socially desirable, especially in relation to altruistic motivation. Moreover, the cross-sectional nature of the study means that the analyzed variables were assessed at one time point. Therefore, the obtained results do not allow for making conclusions regarding cause and effect relationships between the analyzed variables. Future research should include larger and more diverse samples recruited in numerous academic centers, which would enable the assessment of the repeatability of the obtained results. It would be advisable to include students recruited both from medical universities and from other universities providing midwifery education. Additional limitations include the lack of control of potential confounding variables, e.g., the year of study, previous professional experience in healthcare, family situation, previous clinical experience and limitations of the proprietary questionnaire.

### **5.3. Practical implications and directions for further research**

From a practical perspective, the obtained results indicate a high level of declared motivation to study midwifery in the study group, with simultaneous difficulties in preparing for functioning in situations of emotional stress. The results suggest that educational programs should place greater emphasis on developing competences that support students in coping with the emotional burden associated with clinical practice. One possible direction for improving educational programs could be the introduction of evidence-based interventions that support mental resilience and coping skills, structured reflection on clinical experiences, and mentoring and peer support available to female students, whose potential importance for supporting medical students was also highlighted in previous studies (Bass et al., 2020; Neiterman et al., 2023; Vermeulen et al., 2021). In future research, it would be advisable to conduct longitudinal studies to assess whether the levels of motivation and satisfaction declared during the study period are associated with subsequent employment as a midwife and maintaining professional activity. It would also be valuable to conduct multicenter research using multivariate analyses, allowing the assessment of relationships between motivation to study, assessment of the educational process and a sense of being prepared for professional work while controlling for potential confounders. Another step should involve interventional research to assess the effectiveness of specific educational and psychological programs preparing students to perform under conditions of increased clinical stress. In the light of previous research, it also seems reasonable to develop organizational solutions that reduce the risk of undesirable behaviors in clinical practice settings and provide students with easy access to support in emotionally demanding situations (Capper et al., 2021; Seyedi et al., 2025). Such a solution would enable the systematic identification of areas for improvement and the assessment of the effects of the introduced program and organizational changes.

## **Conclusions**

The following conclusions were drawn from the research:

- Predominance of intrinsic and altruistic motivation.

The most frequently declared motives for choosing midwifery in the study group were those associated with interest in the field of medicine, willingness to help others and a high rating of the social value of the midwifery profession. Extrinsic motives, such as suggestions from people around or a random choice of major, were declared much less frequently.

- A high level of satisfaction with the choice of major and declared intention to continue education and work in the profession.

The high declared satisfaction with the choice of the major was accompanied by frequent declarations about pursuing the second-cycle program and taking up a job in the profession.

- A sense of meaning in life as a potential personal resource of female students.

In the studied sample, we observed a relatively high level of both analyzed dimensions of the meaning of life: the presence of meaning and the search for meaning. The obtained results indicate that the sense of meaning in life may constitute an important area of psychological resources of the surveyed students. However, the importance of this resource for functioning in future professional work requires further research.

- Limited sense of preparedness for functioning under conditions of occupational stress.

The sense of inadequate preparedness for working under conditions of increased stress declared by a significant part of the respondents is a significant area requiring attention. Almost half of the respondents declared insufficient preparedness for working under conditions of increased stress.

• Application recommendation:

The obtained results indicate the need to consider incorporating more content and activities into midwifery curricula to prepare students to cope with stress related to clinical work. It is worth considering supplementing educational programs with more systematic activities designed to develop stress management skills and prepare female students for the emotional demands of clinical practice.

Possible actions may include evidence-based programs to develop stress management skills, elements of psychological preparation for crisis situations, and structured forms of support for female students during clinical education. The effectiveness of such activities in improving the psychological preparation of female students and their subsequent professional performance should be the subject of future interventional and longitudinal research.

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# Ressentiment and symptoms of depression in mothers of hospitalised children<sup>1</sup>

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**Abstract:** Effective psychological, pedagogical and counselling assistance addressed to the family requires a reliable recognition of its resources, burdens and mechanisms of functioning in crisis situations, as indicated by Maria Ryś in her book *Psychological determinants of relationship formation in normal and dysfunctional family systems. Test methods* [Psychologiczne uwarunkowania kształtowania relacji w prawidłowych i dysfunkcyjnych systemach rodzinnych. Metody badań] (2025) indicate that an accurate diagnosis is a basic condition for effective support for marriages and families. It is particularly important in the situation of illness and hospitalisation of a child, which may disturb the emotional and relational balance of the entire family system. The aim of this article is to identify psychological risk factors, especially resentment as a silent destructor of these relationships, and to identify protective factors associated with the severity of depressive symptoms in mothers of children hospitalised in the paediatric ward. The study involved 198 mothers whose children were in the district hospital ward. The subjects completed a set of questionnaires including the Depression Scale, the Universal Life Needs Satisfaction and Frustration Measurement Scale, the Relationship Quality Inventory and the Resentment Questionnaire. The relationship between resentment, quality of the partner relationship, satisfaction and frustration of basic psychological needs, professional activity, hobbies and perceived involvement of the partner in childcare and household duties and the severity of depressive symptoms was analysed. The results obtained mostly confirmed the accepted research hypotheses. It has been shown that important predictors of depressive symptoms are resentment ( $r = 0.67$ ;  $p < 0.01$ ), frustration; needs for autonomy and competence ( $r = 0.47$ ,  $p < 0.01$ ), satisfaction of the need for competence ( $r = -0.50$ ,  $p < 0.01$ ), hobbies and perceived involvement of the partner in childcare and household duties. Relational and motivational variables were of particular importance, highlighting the role of satisfaction and competence. The results also indicate that the protective factors that weaken the relationship between resentment and the severity of depressive symptoms are the depth of the relationship with the partner, his involvement in household duties and childcare, and perceived support. An interesting result, however, turned out to be that having hobbies and professional activity strengthened the relationship between resentment and depression. This may suggest that, under high care workload, potentially supportive activities may lose their protective significance if the mother does not have a real possibility of implementing them satisfactorily. The results of the study are important for a psychological diagnosis that includes both individual emotional-cognitive mechanisms and family context. Also pointing to the need for further research, especially of a longitudinal nature, which would allow to better capture the dynamics of the relationship between resentment, quality of partner relationship, frustration of psychological needs and depressive symptoms in mothers of hospitalized children.

**Keywords:** depression, resentment, motherhood, relationship quality, family, child hospitalization

## 1. Introduction

Nowadays, the experience of motherhood is increasingly a subject of public discourse, in both individual and social dimensions, with particular emphasis on social media (Mary et al., 2025). Women in the role of mothers share not only the positive aspects of parenting, but also reflections on the emotional, cognitive and somatic burdens associated with caring

for a child (Sabri et al., 2026). Although motherhood is often socially idealised and presented as a period of fulfilment, personal development and deepening the bond with the child, a growing body of research indicates that this experience is also ambivalent and may be associated with increased psychological distress (Sabri et al., 2026).

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Karb.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Karb.pdf)

The literature emphasises that motherhood should not be understood solely in terms of positive experiences, satisfaction, and development, as it also encompasses overload, frustration, fatigue, limited autonomy, and emotional tension (Raneberg & MacCallum, 2024). Mothers who speak out on online forums describe parenthood as an experience sometimes associated with chronic fatigue, sadness, bitterness, loneliness and frustration (Rusu et al., 2025), resulting from the discrepancy between the social image of motherhood and its everyday practice (Garncarek, 2019). Similar conclusions appear in the research by Tataj-Puzyna et al. (2017), in which respondents pointed to the negative aspects of motherhood, such as fatigue, anxiety, irritability, repetition and monotony of everyday duties, limitation of autonomy, as well as temporary or permanent withdrawal from professional activity.

An important element of mothers' psychological functioning is also the confrontation with the realities of childcare, which do not always align with previous expectations and socially established patterns of motherhood. The collision with daily caregiving efforts, responsibilities, sleep deficits, the need to reorganise family and professional life, and social pressure can lead to mental and physical overload (Czerwionka, 2022). In this context, motherhood can be understood as a complex developmental experience that, in addition to its empowering potential, can also generate emotional tension, cognitive burden and the risk of reduced mental well-being (Mehra et al., 2026).

The importance of maternal mental health is particularly relevant in situations of increased family stress, which include the child's hospitalisation (Zdun-Ryżewska et al., 2021). A child's stay in a paediatric ward is a highly emotionally taxing experience for the mother, as it is associated with a sense of threat, diagnostic uncertainty, fear for the child's health, the need to comply with medical procedures and limited control over the course of treatment (Abdi et al., 2024). In such conditions, there may be an intensification of the stress reaction, an increase in anxiety, a decrease in mood and the development or intensification of depressive symptoms (Negri-Schwartz et al., 2026). Long-term psychological discomfort,

especially when it co-occurs with a sense of helplessness, care overload and a lack of sufficient social support, can be a risk factor for mental deterioration (Holt-Lunstad, 2024). Postpartum depressive symptoms in mothers can manifest themselves not only in low mood, but also in loss of energy, guilt, irritability, sleep disorders, difficulty concentrating, pessimistic assessment of the situation and reduced ability to adjust emotions adaptively (Khamidullina et al., 2025). In the case of mothers of hospitalised children, these symptoms can be exacerbated by chronic tension, lack of predictability of the medical situation, and a sense of responsibility for the child's well-being (Verhelst et al., 2024). In this context, the level of resentment, understood as a relatively fixed set of negative emotions, beliefs, and evaluations associated with harm, injustice, bitterness, regret, frustration, and difficulty constructively working through incriminating experiences, is of particular importance (Karbowski, 2025). Resentment can be a psychological mechanism that sustains emotional tension, especially when an individual feels limited influence over a situation, perceives injustice, or interprets their situation as deprivation, loss, or misunderstanding (Karbowski & Nowicka, 2024). In the case of mothers of hospitalised children, resentment may co-occur with care overload, reduced sense of agency and intensification of depressive symptoms.

Parenthood, especially in the situation of a child's illness, is associated with the need to adapt to numerous changes in personal, family and social functioning, as pointed out by Gold et al. (2024) and Pfund et al. (2020). Previous studies have indicated that the transition to parenthood can have both positive and negative consequences for an adult's well-being (McLanahan & Adams, 1987). Contemporary approaches to health psychology and family psychology allow us to broaden this perspective, indicating that the level of mental burden on parents depends on personal resources, social support, the quality of family relationships, economic situation, prior stress experiences, and emotion regulation strategies. Therefore, it can be assumed that mothers of hospitalized children are a group particularly exposed to the intensification of depressive symptoms, especially when the child's experience of illness is accompanied

by chronic stress (Lazarus, 1993), feeling helpless after the child is hospitalized in the paediatric intensive care unit (Logan et al., 2020), frustration and persistent experience of harm or injustice (Karbowski et al., 2026). Therefore, it seems reasonable to further explore this area, because despite the growing number of studies on depressive symptoms among mothers, relatively little attention has been paid to the phenomenon of resentment as a complex psychological phenomenon that can play a role in these relationships. Resentment manifests as a relatively permanent emotional-cognitive attitude, developing under conditions of frustration, experienced injustice, and a sense of powerlessness in the context of illness (Karbowski, 2026b).

At this point, the author's position is justified because, from the perspective of mothers of hospitalised children, resentment appears as an imperceptible variable, where the effect of resentment intensifies especially in conditions of reduced satisfaction and long-term tensions in relationships (Karbowski, 2026c). Longitudinal studies by Bühler and Orth (2024) over a partnership show that its decline is associated with an intensification of negative affect (resentment) and costly patterns of interaction (e.g. negative communication and conflicts), which promote the accumulation of frustration and emotions, such as anger, resentment or jealousy (Bühler & Orth, 2024; Jolin et al., 2023; Pirrone et al., 2023; Zorlular & Uzer, 2022). Therefore, from this perspective, the analysis of the relationship between resentment and the severity of depressive symptoms in mothers of children hospitalised in the paediatric ward seems to be relevant both cognitively and clinically. It allows for a better understanding of the psychological mechanisms of mothers' functioning in the situation of a child's illness, as well as to indicate potential areas of psychological intervention, against the background of symptoms of depression that may be caused by interpersonal conflict, frustration of autonomy or competence, or key resentment.

## **2. Own research**

### **2.1. Subject and purpose of the research**

The aim of the study is to analyse the relationship between the level of resentment and the severity of depressive symptoms in mothers of children hospitalised in the paediatric ward. The study also aimed to determine whether the high quality of the partnership and the satisfaction of basic psychological needs can act as protective factors, reducing the risk of depressive symptoms in mothers in a situation of emotional and caring burden.

### **2.2. Research hypotheses**

On the basis of the presented theoretical premises and the results of the empirical research to date, the following research hypotheses have been formulated:

- H.1. It is assumed that a higher level of resentment will be positively associated with a higher severity of depressive symptoms in mothers of children hospitalised in the paediatric ward.
- H.2. It is assumed that a higher quality of the partnership will be negatively associated with the severity of depressive symptoms in the mothers of children.
- H.3. It is assumed that a higher level of satisfaction with the need for autonomy and the need for competence will be negatively associated with the severity of depressive symptoms, while a higher level of frustration of these needs will be positively associated with the severity of depressive symptoms.
- H.4. It is assumed that having hobbies, professional activity and a higher level of perceived involvement of the partner in household chores and childcare will act as moderators, weakening the relationship between the level of resentment and the severity of depressive symptoms.

**2.3. Data collection method, research sample, and research tools**

The study group consisted of 198 mothers aged 19 to 39, whose children were hospitalised at the Paediatric Ward of the Independent Public Health Care Institution in Kępno. The recruitment of participants was carried out through targeted selection, taking into account the specific nature of the clinical situation and the direct experience of the child's hospitalisation. Empirical data were collected between June 2025 and March 2026. Participation in the study was voluntary and was preceded by obtaining informed consent from each participant. The research project received a positive opinion from the Ethics Committee of the Jan Kochanowski University in Kielce (consent no.: 5/2025), and the implementation of the project was carried out in accordance with the generally accepted ethical standards of conducting scientific research with the participation of the respondents (project no.: SUPB. RN.25.002). The criteria for inclusion in the study were: mothers of children hospitalised in the paediatric ward who gave informed consent to participate in the research project. The study was conducted in a stationary form, using the "paper-pencil" method.

The study used a sociodemographic metric, additional questions and four psychometric tools. The birth certificate included data on age, place of residence, relationship status, number of children and their age. Additional questions concerned the frequency of childcare support received, professional

status, hobbies, current pregnancy, and previous diagnosis of depression, postpartum depression, or other mental disorders.

The Depression Scale (*Depression Scale – CES-D*) by Radloff (1977) adapted by Jankowki in Poland (2016). To measure satisfaction and frustration of needs, the Universal Life Needs Satisfaction and Frustration Measurement Scale (*Basic Psychological Need Satisfaction and Frustration Scale (BPNSNF)*) by Chen et al. (2015) was adapted in Poland by Kuźma et al. (2021). Ressentiment measurements were taken using the *Psychological Ressentiment Questionnaire (KRe-Psy)* prepared by Karbowski (2025). On the other hand, the Relationship Quality Inventory was used to measure the quality of the relationship and assess the dyadic relationships of the partners *The Quality of Relationships Inventory (QRI)* by Pierc and Sarason, adapted in Poland by Suwalska-Barancewicz; et al., (2012).

**2.4. Results of the study**

In order to verify the hypotheses, a statistical analysis of the collected data was carried out, presented in Table 1. In the first stage, descriptive statistics were calculated, and Pearson r correlation analysis and multivariate regression analysis were performed using the IBM SPSS package. Moderation analyses were then performed using the PROCESS macro developed by Hayes (2018). The significance of regression and moderation effects was assessed by bootstrapping using 10,000 samples and 95% confidence intervals.

Table 1. Descriptive statistics with Kolmogorov-Smirnov tests

|                           | M     | SD    | Sk.    | Kurt.  | K-S   | p       |
|---------------------------|-------|-------|--------|--------|-------|---------|
| Perceived support         | 3.308 | 0.516 | -1.149 | 1.007  | 0.145 | < 0.001 |
| Interpersonal conflict    | 2.078 | 0.626 | -0.159 | -0.023 | 0.132 | < 0.001 |
| Relationship depth        | 3.148 | 0.429 | -1.289 | 1.915  | 0.179 | < 0.001 |
| Satisfaction of autonomy  | 3.485 | 0.839 | -0.169 | -0.629 | 0.083 | < 0.001 |
| Autonomy frustration      | 3.211 | 0.899 | -0.041 | -0.951 | 0.121 | < 0.001 |
| Competence satisfaction   | 3.872 | 0.799 | -0.754 | -0.049 | 0.139 | < 0.001 |
| Frustration of competence | 2.435 | 1.084 | 0.695  | -0.392 | 0.149 | < 0.001 |
| Ressentiment              | 2.617 | 1.533 | 0.869  | -0.139 | 0.155 | < 0.001 |
| Symptoms of depression    | 1.999 | 0.659 | 0.661  | -0.501 | 0.147 | < 0.001 |

Source: Own study.

The Kolmogorov-Smirnov test indicated significant deviations from the normality of the distributions of the variables studied. At the same time, the values of skewness and kurtosis did not exceed  $\pm 2$ , indicating that the distributions are acceptably close to normal (Gravetter et al., 2021).

#### 2.4.1. Correlation analysis

Pearson's correlation analysis ( $r$ ) showed several statistically significant relationships among the psychological variables presented in Table 2. Of particular importance are the relationships between depressive symptoms and resentment, autonomy frustration, interpersonal conflict, competence satisfaction and autonomy satisfaction. A strong positive relationship was observed between resentment and depressive symptoms,  $r = 0.67$ ,  $p < 0.01$ . It suggests that higher levels of resentment co-occur with greater severity of depressive symptoms. He points out that resentment may be a significant correlate of reduced emotional functioning of the mothers studied. A strong positive correlation was also noted between autonomy frustration and depressive symptoms,  $r = 0.61$ ,  $p < 0.01$ . The result indicates that the greater the feeling of limited autonomy and the lack

of the possibility of self-determination, the greater the severity of depressive symptoms. There was also a strong positive relationship between interpersonal conflict and depressive symptoms,  $r = 0.59$ ,  $p < 0.01$ , indicating that a higher intensity of conflict in relationships co-occurs with a higher level of depression. Symptoms of depression are negatively correlated with competence satisfaction,  $r = -0.50$ ,  $p < 0.01$ . This relationship is strong and proves that the higher the sense of effectiveness, agency and competence, the lower the severity of depressive symptoms. Similarly, autonomy satisfaction correlated negatively with depressive symptoms,  $r = -0.45$ ,  $p < 0.01$ , indicating a moderate relationship: a greater sense of autonomy is associated with lower levels of depression.

A positive relationship was also found between competence frustration and depressive symptoms,  $r = 0.37$ ,  $p < 0.01$ . It can be interpreted that the greater the feeling of ineffectiveness, lack of competence or difficulties in performing tasks, the higher the level of depressive symptoms. This relationship is moderate.

With regard to relational variables, it was found that the depth of the relationship was weakly and negatively associated with depressive symptoms,  $r = -0.19$ ,  $p < 0.01$ . Perceived partner engagement

Table 2. Pearson's correlation matrix  $r$

|                                 | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8      | 9      | 10 |
|---------------------------------|---------|---------|---------|---------|---------|---------|---------|--------|--------|----|
| 1. Perceived partner engagement | -       |         |         |         |         |         |         |        |        |    |
| 2. Perceived support            | 0.45**  | -       |         |         |         |         |         |        |        |    |
| 3. Interpersonal conflict       | -0.28** | -0.57** | -       |         |         |         |         |        |        |    |
| 4. Depth of relationship        | 0.33**  | 0.65**  | -0.40** | -       |         |         |         |        |        |    |
| 5. Satisfying autonomy          | 0.21**  | 0.33**  | -0.37** | 0.18*   | -       |         |         |        |        |    |
| 6. Autonomy frustration         | -0.22** | -0.35** | 0.53**  | -0.17*  | -0.57** | -       |         |        |        |    |
| 7. Competence satisfaction      | 0.08    | 0.25**  | -0.22** | 0.05    | 0.58**  | -0.31** | -       |        |        |    |
| 8. Frustration of competence    | -0.09   | -0.28** | 0.44**  | -0.07   | -0.61** | 0.50**  | -0.88** | -      |        |    |
| 9. Resentment                   | -0.40** | -0.75** | 0.59**  | -0.61** | -0.51** | 0.47**  | -0.31** | 0.39** | -      |    |
| 10. Symptoms of depression      | -0.13*  | -0.27** | 0.59**  | -0.19** | -0.45** | 0.61**  | -0.50** | 0.37** | 0.67** | -  |

Source: Own study.

was also weakly negatively associated with depressive symptoms,  $r = -0.13$ ,  $p < 0.05$ , which allows us to note that greater partner involvement may be associated with slightly lower levels of depression. Sentiment indicates a very strong negative relationship with perceived support,  $r = -0.75$ ,  $p < 0.01$ , and a strong negative relationship with the depth of the relationship,  $r = -0.61$ ,  $p < 0.01$ . The results indicate that the greater the perceived support and the deeper the relationship, the lower the level of resentment. Resentment also correlated strongly with interpersonal conflict,  $r = 0.59$ ,  $p < 0.01$ , suggesting that greater conflict in relationships co-occurs with higher intensity of resentment. In addition, resentment was strongly negatively associated with autonomy satisfaction,  $r = -0.51$ ,  $p < 0.01$ , and positively with autonomy frustration,  $r = 0.47$ ,  $p < 0.01$ .

The results suggest that depressive symptoms in the mothers studied are particularly strongly associated with the severity of resentment, autonomy frustration and interpersonal conflict. At the same time, higher satisfaction with autonomy and competence, greater support and better quality of relationships can have a protective meaning, as they co-occur with lower levels of resentment and depressive symptoms.

#### 2.4.2. Regression analysis

In order to check the cumulative effect of predictors on depressive symptoms, a hierarchical regression analysis was performed using the variable input method (Table 3).

The models showed good matching to the data. The analysis carried out in the first step showed that variables such as age, hobbies, professional status, and perceived engagement of the partner explained 5% of the variance of the dependent variable (*Skor.*  $R^2 = 0.05$ ;  $F(4,101) = 3.191$ ;  $p = 0.01$ ). In the first model, the important predictors of depressive symptoms were having hobbies and the partner's perceived involvement. Having a hobby negatively predicted the severity of depressive symptoms,  $B = -0.24$ ;  $SE = 0.10$ ;  $p = 0.008$ ; 95% CI  $[-0.45; -0.07]$ . This result indicates that mothers with their own activities, not directly related to caring responsibilities, obtained lower scores in terms of depressive symptoms. This suggests

that hobbies serve as a protective resource, conducive to regulating emotions, maintaining a sense of autonomy, and keeping in touch with one's own needs in situations of caring overload. Perceived partner engagement was also a significant negative predictor,  $B = -0.11$ ;  $SE = 0.05$ ;  $p = 0.04$ ; 95% CI  $[-0.18; -0.01]$ . This suggests that a higher rating of a partner's involvement in family and caring responsibilities was associated with a lower severity of depressive symptoms. This result can be related to the importance of partner support as a potential protective factor against the intensification of emotional burden in mothers of hospitalised children. Age and occupational status were not significant predictors of depressive symptoms in the first model.

In the second step, psychological and relational variables were additionally introduced into the model, including perceived support, interpersonal conflict, depth of relationships, satisfaction and frustration of autonomy, satisfaction and frustration of competence, and resentment. The second model was statistically significant,  $F(10, 197) = 26.045$ ;  $p < 0.001$ , and explained 59% of the variance in depressive symptoms,  $R^2 = 0.59$ . This allows us to believe that, after taking into account psychological and relational variables, the accuracy of explaining depressive symptoms increased significantly. The results show that depressive symptoms in the study group are much more closely related to the experience of frustration of basic psychological needs, a sense of competence and resentment than to sociodemographic variables alone. In the second model, the important positive predictors of depressive symptoms turned out to be autonomy frustration, competence frustration and resentment. Autonomy frustration positively predicted the severity of depressive symptoms,  $B = 0.13$ ;  $SE = 0.07$ ;  $p = 0.04$ ; 95% CI  $[0.003, 0.24]$ . This allows us to believe that the stronger the feeling of restriction of freedom, dependence on the situation and lack of influence on one's own actions, the greater the severity of depressive symptoms. In the context of hospitalisation of a child, this may indicate that loss of control and restriction of the mother's autonomy are a significant risk factor for the deterioration of emotional functioning.

Competence frustration was also a significant positive predictor of depressive symptoms,  $B = 0.22$ ;  $SE = 0.06$ ;  $p < 0.001$ ; 95% CI [0.09, 0.32]. The data obtained allow us to notice that the stronger the feeling of ineffectiveness, helplessness or lack of agency, the higher the level of depressive symptoms. Competence frustration was among the strongest predictors in the model, suggesting that a reduced sense of competence and effectiveness in a child's illness may play a particularly important role in exacerbating depression. Ressentiment was also a significant positive predictor of depressive symptoms,  $B = 0.15$ ;  $SE = 0.03$ ;  $p < 0.001$ ; 95% CI [0.08, 0.21].

### **3. Discussion of research results and hypotheses**

The aim of the discussion is to interpret the results obtained in search of relationships between resentment and the occurrence of depressive symptoms in mothers of children hospitalised in the paediatric ward. In this respect, the verification of the partnership, satisfaction and frustration of basic psychological needs, the partner, and sociodemographic variables were also checked.

Hypothesis one assumed that a "higher level of resentment will be positively associated with a greater severity of depressive symptoms in mothers of children hospitalised in the paediatric ward". The results confirmed the hypothesis. The study found a strong positive relationship between the level of resentment and the severity of depressive symptoms (Table 2;  $r = 0.67$ ;  $p < 0.01$ ). This means that as the severity of resentment increases, so does the level of depressive symptoms. An important result was that resentment was the strongest predictor of depressive symptoms in the analysed model. This result can be interpreted as a confirmation of the importance of persistent emotional tension, feelings of harm and bitterness, and difficulties in the adaptive processing of burdensome experiences (Karbowski, 2026a). It allows us to believe that resentment is conducive to maintaining a negative assessment of one's own life situation and reinforces the feeling of helplessness and inaction. These mechanisms

may increase an individual's susceptibility to the development or persistence of depressive symptoms. The result is consistent with the results of studies that indicate that negative emotional states such as grief, resentment, feelings of harm or hostility may co-occur with a higher severity of depressive symptoms (Sousa et al., 2017). In this approach, resentment can be understood as a relatively permanent affective-cognitive configuration that perpetuates negative patterns of interpretation of oneself, other people and one's own situation. As a consequence, it can act as a mechanism that maintains depressed mood and maladaptive ways of regulating emotions. In addition, it is indicated that some manifestations of resentment, especially chronic bitterness, a sense of worthlessness, aversion, emotional isolation and pessimistic assessment of reality, may coincide with selected components of the depressive picture (Wojnarska & Korona, 2017). This relationship can also be reinforced by the experience of emotional and social loneliness, which, as research shows, remains strongly associated with the severity of depression (Wolters et al., 2023). In this context, resentment can be treated not only as a correlate of depressive symptoms, but also as an important psychological indicator of difficulties in regulating emotions, processing experiences of harm, and maintaining adaptive coping strategies by the mother.

The second hypothesis assumed that a "higher quality of partner relationship will be negatively associated with the severity of depressive symptoms in mothers of children". The analysed relationship encompassed all aspects of partnership quality, i.e., perceived support, interpersonal conflict, and relationship depth. It turned out to be particularly important that the strongest positive association with the severity of depressive symptoms was observed with interpersonal conflict (Table 2;  $r = 0.59$ ;  $p < 0.01$ ). This result indicates that the higher the level of tension and negative interactions in the relationship, the greater the severity of depressive symptoms in the mothers studied.

The results obtained are consistent with the existing empirical findings, which indicated the significant importance of the quality of the partner relationship for the psychological functioning of

Table 3. Regression Analysis for Depression Symptoms as an Elucidated Variable

|                              | <i>B</i> | <i>SE</i> | <i>p</i> | 95% confidence interval |             | Model statistics                                         |
|------------------------------|----------|-----------|----------|-------------------------|-------------|----------------------------------------------------------|
|                              |          |           |          | Lower limit             | Upper limit |                                                          |
| 1. Age                       | 0.007    | 0.01      | 0,56     | -0,01                   | 0,03        | $R^2 = 0,05$ ;<br>$F(5, 101) = 3,191$ ;<br>$p = 0,01$    |
| Professional status          | 0.1      | 0.10      | 0.25     | -0.08                   | 0.30        |                                                          |
| Hobbies                      | -0.24    | 0.10      | 0.008    | -0.45                   | -0.07       |                                                          |
| Perceived partner engagement | -0.11    | 0.05      | 0.04     | -0.18                   | -0.01       |                                                          |
| 2. Age                       | -0.006   | 0.007     | 0.38     | -0.02                   | 0.006       | $R^2 = 0,59$ ;<br>$F(10, 197) = 26,045$ ;<br>$p < 0,001$ |
| Professional status          | -0.004   | 0.07      | 0.95     | -0.13                   | 0.11        |                                                          |
| Hobbies                      | -0.08    | 0.07      | 0.30     | -0.22                   | 0.05        |                                                          |
| Perceived partner engagement | 0.06     | 0.04      | 0.07     | -0.003                  | 0.12        |                                                          |
| Perceived support            | 0.006    | 0.08      | 0.96     | -0.17                   | 0.18        |                                                          |
| Interpersonal conflict       | 0.07     | 0.08      | 0.32     | -0.07                   | 0.22        |                                                          |
| Relationship depth           | -0.04    | 0.10      | 0.68     | -0.22                   | 0.14        |                                                          |
| Satisfaction of autonomy     | -0.05    | 0.05      | 0.38     | -0.17                   | 0.07        |                                                          |
| Autonomy frustration         | 0.13     | 0.07      | 0.04     | 0.003                   | 0.24        |                                                          |
| Competence satisfaction      | 0.13     | 0.09      | 0.06     | 0.003                   | 0.24        |                                                          |
| Frustration of competence    | 0.22     | 0.06      | <0.001   | 0.09                    | 0.32        |                                                          |
| Ressentiment                 | 0.15     | 0.03      | <0.001   | 0.08                    | 0.21        |                                                          |

Source: Own study.

the mother (Burke, 2003; Burns et al., 1994; Mackinnon et al., 2012). The literature emphasises that depression is associated with lower relationship satisfaction, a limited sense of support and security in the relationship, as well as a higher frequency of negative verbal and non-verbal interactions and fewer supportive and positive behaviours (Vujeva & Furman, 2011). In this approach, a partner relationship can be both a protective resource and a potential source of additional emotional burden. In light of psychological knowledge, the function of supporting a romantic relationship is particularly important. Partner relationships, by providing emotional support, a sense of belonging, acceptance and security, can promote mental well-being and better adaptation to stressful situations (Jakubiak & Tomlinson, 2020). Engaging in a satisfying romantic relationship can therefore reduce the risk of mental health problems, including the severity of depressive symptoms (Uecker, 2012). This is indicated by David Myers' research, which highlighted positive correlations between happiness and the number of relationships and concluded that the quality of interpersonal bonds remains significantly related

to the level of depression (2000). In this context of successful relationships, successful relationships can be the most important source of happiness (McIntyre et al., 2023; Reis & Gable, 2003). The results of this study can also be interpreted in the light of the theory of basic psychological needs. Previous research indicates that the need for autonomy, competence and relationality is associated with higher levels of malaise, including the severity of depressive symptoms. In turn, satisfying these needs promotes greater life satisfaction, vitality and better mental functioning, and these relationships are observed in different groups of respondents (Vansteenkiste et al., 2020). Studies conducted among pregnant women also show that meeting basic psychological needs is associated with greater satisfaction with the partner relationship and a lower severity of depressive symptoms (Brenning et al., 2019). In light of the results obtained and the literature, it can be assumed that the quality of the partnership and the level of satisfaction of basic psychological needs are important psychosocial resources that can support mothers' psychological well-being. On the other hand, interpersonal conflict and a deficit of support in the

relationship can increase susceptibility to depressive symptoms, especially in a situation of increased emotional burden related to caring for a child.

Third hypothesis assumed that a “higher level of satisfaction with the need for autonomy and the need for competence will be negatively associated with the severity of depressive symptoms, while a higher level of frustration of these needs will be positively associated with the severity of depressive symptoms”. The strongest predictors of depression symptoms turned out to be frustration with the needs for autonomy and competence and satisfaction with the need for competence. These results can be interpreted in the light of the assumptions of the Theory of Basic Psychological Needs (*Basic Psychological Need Theory*) according to which the satisfaction of psychological needs is a predictor of positive mental functioning (Klein et al., 2024), expressed, m.in example, by positive affect and satisfaction with life, while the frustration of these needs is more explained by negative psychological functioning, including m.in anxiety, stress and depression. The regression analysis presented in Table 3 also shows that the predictors of depressive symptoms – in addition to the previously indicated frustrations, needs for autonomy and competence, satisfaction, need for competence, and level of resentment – are hobbies and the partner’s perceived involvement in childcare and household duties. The data obtained in the study support the hypothesis regarding the moderating role of several analysed variables: autonomy frustration, perceived partner involvement, hobbies and depth of the relationship – in the case of the level of resentment as an independent variable – as well as the depth of the relationship, hobbies and professional status in the case of the family level of resentment as an independent variable. This means that the indicated characteristics can appropriately intensify or weaken the relationship between resentment and depressive symptoms. The factors that intensified the symptoms of depression turned out to be: frustration of autonomy, professional status and hobbies. On the other hand, the factors that sought to protect women from symptoms of depression in this study were: the partner’s involvement in household duties and childcare, as well as a deep relationship with the partner.

Fourth hypothesis assumed that “having hobbies, professional activity, and a higher level of perceived involvement of the partner in household chores and childcare will act as moderators, weakening the relationship between the level of resentment and the severity of depressive symptoms”. An interesting result was a statistical tendency indicating the moderating role of professional status and hobbies. The results indicate that professional status strengthens the relationship between resentment and the severity of depressive symptoms. The explanation for this relationship can be found in studies indicating that working mothers often experience difficulties reconciling domestic and professional duties, a significant source of burden and stress for them (Cha & Lee, 2024; Farrell et al., 2023; Olivieri et al., 2024). According to this study, working mothers experience stress and anxiety due to the need to maintain a balance between family and work life (Ma et al., 2025). This tension can be especially strong due to guilt stemming from the belief that they do not devote enough time to their children and partner (Maclean et al., 2021). The relationship in question is sometimes described as mothers’ separation anxiety, in which the woman experiences unpleasant emotional states related to separation from her child, even if it is short-lived, e.g. in a nursery (Zubair et al., 2021). An additional factor that can explain the results obtained is the work environment. Unsupportive working conditions, conducive to overload and emotional exhaustion, may increase the susceptibility of mothers to deteriorating mental functioning, including the occurrence of symptoms of postpartum depression (Fejfer-Szpytko et al., 2016; La Rosa et al., 2025; Thompson et al., 2022). Regarding hobbies, the hypothesis has not been confirmed. The results obtained indicate that having a hobby strengthens the relationship between resentment and depressive symptoms. This result requires careful interpretation, as in many countries, hobby activities are recommended as one way to support and improve mental health. This is also supported by studies indicating that hobbies can have a beneficial effect on various aspects of health, including mental functioning, as well as alleviating symptoms of depression and other mental disorders (Bone et al., 2022). On the other

hand, the intensification of the relationship between resentment and depression in the group of women with hobbies may result from a limited ability to fully pursue their own interests. In situations of significant childcare and family responsibilities, hobbies, instead of serving a protective function, can become a source of frustration, especially when a woman experiences a time deficit, a lack of autonomy, and a lack of space for herself. This interpretation remains consistent with the cited research, which highlights the importance of hobby activity but also suggests that its beneficial impact may depend on the real possibility of engaging in it satisfactorily. It is also worth noting that the partner's hobbies and involvement were significant in the first regression analysis model (Table 3), but lost their significance after the introduction of psychological variables. This may suggest that their protective significance is partly related to deeper psychological mechanisms, such as feelings of autonomy, agency, and resentment.

The presented study has some methodological limitations. Firstly, its transversal nature makes it impossible to draw cause-and-effect conclusions. Secondly, relying solely on self-report methods may limit the objectivity of the data obtained. Another limitation is the deliberate selection of the sample, including mothers with children during hospitalisation in the paediatric ward, which limits the generalisability of the results to the wider population. The relatively small sample size ( $N = 198$ ) should also be taken into account, as it may have limited the statistical power of moderation analyses, especially since interaction effects tend to be weak and require larger research samples (Chaplin, 1991). Despite these limitations, the study makes an important contribution to the understanding of the psychological functioning of mothers of hospitalised children, pointing to the importance of resentment, quality of partner relationships and basic psychological needs as variables important for the severity of depressive symptoms.

## Summary

The issue of this paper concerned "Resentment and severity of depressive symptoms in mothers of children hospitalised in the paediatric ward". To summarise, conclusions can be drawn that organise both the results of the empirical part and their embedding within the current psychological literature.

Firstly, the conducted study shows that resentment is an important psychological variable associated with the severity of depressive symptoms in mothers who are in a situation of particular emotional burden, which is the hospitalisation of the child. The obtained strong positive relationship between the level of resentment and depressive symptoms allows us to assume that a persistent sense of harm, bitterness, regret, injustice and difficulties in adaptive processing of burdensome experiences may contribute to the intensification of the depressive way of experiencing oneself and one's own situation. Resentment can perpetuate negative cognitive patterns, perpetuate feelings of helplessness, and limit the ability to constructively regulate emotions. In this sense, it is not only a simple consequence of a difficult life situation but also a mechanism that maintains low mood and maladaptive coping.

Secondly, an important result is the demonstration of the importance of partnership quality for mothers' mental functioning. A particularly strong relationship with the severity of depressive symptoms was obtained in relation to interpersonal conflict. This means that a peer relationship can be both a protective resource and an additional burden. The support, depth of the relationship, sense of security and emotional availability of the partner can promote better adaptation to the stress associated with the child's illness. On the other hand, conflict, tension and negative interactions in a relationship can increase susceptibility to depressive symptoms. This result is consistent with the psychological understanding of a close relationship as a space for regulating emotions, affirming one's own value and obtaining support in crisis situations. Thirdly, basic psychological needs, especially autonomy and competence, are important. The frustration of these needs turned out to be one of the strongest predictors of depressive symptoms. Therefore, it should

be recognised that mothers who, in the situation of hospitalisation of their child, experience limited influence, lack of agency, overload of responsibilities or a sense of ineffectiveness, are more likely to have their mental well-being deteriorate. On the other hand, the satisfaction of the need for competence can support a sense of effectiveness, better organisation of behaviour, and greater resistance to stress. These results are consistent with the assumptions of the Theory of Basic Psychological Needs, according to which satisfying needs is conducive to positive functioning, while their frustration is associated with anxiety, stress and depression.

Fourth, moderation analyses indicated that selected psychosocial variables intensify or weaken the relationship between resentment and depressive symptoms. The results on professional status and hobbies were particularly interesting. Professional status increases psychological tension, especially

when a woman experiences a conflict between the role of a mother, a caregiver of a hospitalised child and a professionally active person. On the other hand, hobbies, although often understood as a protective factor, can be associated with frustration in this group if the mother lacks a real opportunity to pursue her own interests. In such a situation, a hobby may not so much reduce tension as reveal a deficit of autonomy, time and space for oneself.

To sum up, protective factors include the partner's involvement in household duties and childcare, as well as a strong partnership. Because the support of a partner reduces the care overload, strengthens the sense of community and reduces the experience of resentment. Therefore, from a practical perspective, these results indicate the need to provide psychological help not only to the mother herself, but also to the family system.

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# Higher education among generation Z students on the autism spectrum: educational challenges and self-reported health issues<sup>1</sup>

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**Abstract:** *Introduction:* Higher education represents a new and often difficult stage of life for neurotypical individuals, but it poses a particular challenge for the autism spectrum (ASD). Higher education represents a major transition for young adults and may pose particular challenges for students on the autism spectrum. Students on the autism spectrum may continue to require forms of support similar to those available during earlier stages of education; however, such support is not always systematically provided in higher education, and appropriate support models are still being developed. Autism spectrum disorder is characterized by persistent differences or difficulties in social communication and interaction, together with restricted or repetitive patterns of behavior, interests, or activities. Although the etiology of ASD is not fully understood, current evidence indicates an important contribution of genetic and other biological factors. Previous studies have reported an increased prevalence of selected physical health conditions among individuals on the autism spectrum, indicating the importance of examining somatic health in this population. *Methods:* A researcher-developed questionnaire was used to assess selected sociodemographic characteristics and self-reported health conditions among students on the autism spectrum at the Robert Schuman European University of Social Sciences and Technology in Radom, Poland. Of the 154 respondents who completed the survey, 142 provided sufficiently complete data and were included in the final analysis. *Results:* The final sample comprised 142 students aged 18–26 years, all of whom met the study's definition of Generation Z. Most participants reported receiving an ASD diagnosis between the ages of 9 and 12 years, corresponding to grades 4–6 of primary education (71.8%,  $n = 102$ ). The most frequently reported physical health conditions included food allergies, diabetes, thyroid disease, asthma, polycystic ovary syndrome, and insulin resistance. *Conclusions:* The findings highlight the need for university-based support tailored to the individual educational and health needs of students on the autism spectrum. More than half of the analyzed participants reported at least one physical health condition. A total of 100 respondents (70.4%) reported following a gluten-free diet or using dietary supplements. These findings indicate the need for further research using clinically verified health data and larger, more representative samples.

**Keywords:** autism spectrum disorder; autistic university students; generation Z; higher education; physical health; comorbidity.

## 1. Introduction

The transition to higher education represents a major developmental and educational challenge for many young adults, including students on the autism spectrum. Students entering higher education must adapt to a less structured environment that requires greater independence, flexibility, and responsibility for organizing their academic and daily activities. The university environment differs from secondary education in its organizational structure, physical and social context, academic expectations, and degree of student independence. Beginning university sub-

stantially increases academic and personal demands and may involve leaving the family home and living independently, transitions for which some students may feel insufficiently prepared.

Generation Z has reached adolescence and young adulthood during a period of substantially increased recognition and diagnosis of ASD. Some students on the autism spectrum continue to require individualized educational and psychosocial support similar to that available at earlier stages of education. However, access to such support may become less

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Podg.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Podg.pdf)

systematic after the transition to higher education, and universities continue to develop and evaluate appropriate models of accommodation and support (Van Hees et al. 2015).

### **1.1. Generation Z: Characteristics and competencies**

Several generational classifications are used in the sociological and demographic literature, although their boundaries and terminology vary across sources. Some classifications distinguish an older cohort comprising individuals born before or during the Second World War; however, terminology for this group varies across countries and sources. The next cohort is commonly referred to as the Baby Boomer generation and generally includes people born between 1946 and 1964. Baby Boomers constitute a particularly large cohort now entering older and very old age in many populations (Szweda-Lewandowska, 2014). Generation X is commonly defined as comprising individuals born approximately between 1965 and 1980. In many countries, members of Generation X grew up during periods of substantial economic, political, and technological change (Szweda-Lewandowska, 2014). Generation Y, also known as the Millennial generation, is commonly defined as including individuals born approximately between 1981 and 1996. In Poland and other Central and Eastern European countries, their childhood coincided with major political transformation, while their transition to adulthood occurred alongside rapid digitalization. Some generational studies have described Millennials as placing greater emphasis on autonomy, flexibility, and individual expectations; however, such generalizations should be interpreted cautiously (Wojtoszek, 2023). Millennials are followed by Generation Z, generally defined as individuals born from the mid-1990s to the early 2010s. Although definitions vary, Generation Z is commonly understood to include individuals born approximately between 1995 and 2012 (Wojtoszek, 2023). Generation Z is frequently described as a 'digital native' cohort because digital technologies have been present throughout much of its members' lives (Huczek, 2023). Generation Z is followed by Generation Alpha, defined in the present

article as individuals born between 2013 and 2024. Members of Generation Alpha have grown up in environments characterized by widespread access to mobile technologies, digital media, and increasingly, artificial intelligence-based tools. Some contemporary generational classifications use the term Generation Beta for cohorts born from 2025 onward. This cohort is expected to grow up in an environment increasingly shaped by advanced digital technologies and rapid technological change. The term Generation C is also sometimes used in the literature to describe highly connected digital-media users; however, unlike Generations X, Y, or Z, it is not consistently defined by year of birth. Generation C is typically described in behavioral rather than strictly chronological terms, referring to individuals characterized by intensive engagement with digital and online environments.

Members of Generation Z have reached adolescence and young adulthood during a period of substantially increased recognition and diagnosis of neurodevelopmental conditions, including autism spectrum disorder. As growing numbers of students with diagnosed neurodevelopmental conditions enter higher education, universities are increasingly required to consider accessibility, accommodation, and individualized support. Some studies describe members of Generation Z as placing considerable value on innovation, social change, and technological development (Wojtoszek, 2023). Generation Z is frequently described as a digitally immersed cohort. Extensive use of digital communication may influence patterns of social interaction, although the relationship between digital-media use and social competence is complex and should not be interpreted as uniformly negative or causal.

Some studies suggest that members of Generation Z may rely more heavily on digitally mediated communication than previous generations (Wojtoszek, 2023). At the same time, online communication enables frequent contact and ongoing exchange of information within peer networks. Greater reliance on online communication may be associated with changes in the ways social competencies are developed and expressed, although the direction and magnitude of this relationship remain subject to debate. Members of Generation Z tend to obtain

information increasingly through digital rather than traditional media, although patterns of media use vary considerably within the generation (Huczek, 2023; Wojtoszek, 2023). Frequent media multitasking has been discussed as one factor potentially associated with difficulties in sustaining attention; however, such effects vary across individuals and should not be treated as defining characteristics of Generation Z (Huczek, 2023).

Soft skills, including communication, collaboration, self-regulation, and time-management abilities, play an important role in academic and occupational functioning. Some students may demonstrate strong technical or digital competencies while experiencing difficulties in communication, collaboration, or other interpersonal aspects of academic functioning. Such differences in skill profiles may affect interactions with peers and academic staff. The intensive use of digital technologies characteristic of contemporary educational and social environments may influence how some young adults develop and use interpersonal skills; however, individual differences remain substantial. Some students may experience difficulties in communication, time management, and coping with stress, all of which can affect adaptation to higher education. Difficulties in these areas may limit students' ability to benefit fully from academic, social, and professional development opportunities. Accurate identification of students' educational and support needs is therefore important, as inappropriate or insufficient support may hinder the development and effective use of individual strengths. Higher education institutions therefore face the challenge of adapting teaching and support systems to the diverse learning needs of Generation Z while also preparing graduates for changing social and labor-market demands. Constructive feedback may play an important role in the development of academic and interpersonal competencies. At the same time, increasing recognition of neurodiversity in higher education highlights the need for effective and individualized support strategies.

## 1.2. Generation Z on the autism spectrum and higher education

Conceptualizations of autism and the terminology used to describe it have evolved substantially over time. Contemporary discussions of autism commonly draw on both clinical and neurodiversity-oriented perspectives. Two influential perspectives are the clinical model, which conceptualizes autism as a neurodevelopmental disorder, and the neurodiversity perspective, which emphasizes variation in neurological development and functioning. Within the clinical framework, autism spectrum disorder (ASD) is classified as a neurodevelopmental condition characterized by a heterogeneous range of manifestations. The core diagnostic features of ASD primarily involve:

- persistent difficulties or differences in social communication and social interaction;
- restricted or repetitive patterns of behavior, interests, or activities (Hare, 2024).

These characteristics may influence academic, social, and organizational functioning in higher education.

The DSM-5-TR uses the diagnostic term 'autism spectrum disorder,' while the ICD-11 also classifies autism within the group of neurodevelopmental disorders (World Health Organization, 2026). Many adults and university students may nevertheless retain diagnoses made under earlier classification systems, including Asperger syndrome (Głód, 2023) or childhood autism (First et al., 2022). Under earlier diagnostic classifications, Asperger syndrome was generally distinguished from other autism diagnoses by the absence of clinically significant delays in language development and intellectual functioning. Autistic individuals show substantial variability in cognitive profiles, strengths, interests, and support needs. ASD is associated with differences in neurodevelopment and patterns of brain functioning relative to more typical developmental trajectories. The etiology of ASD is complex and not fully understood, although genetic and other biological factors are known to make substantial contributions. ASD is a lifelong neurodevelopmental condition

whose manifestations and support needs may change across the life span. Autistic individuals constitute a highly heterogeneous population, and epidemiological studies have documented increasing rates of identified ASD diagnoses in many countries. A 2025 report from the U.S. Centers for Disease Control and Prevention, based on ADDM Network surveillance data, estimated ASD prevalence at approximately 1 in 31 among 8-year-old children in the monitored U.S. communities (Centers for Disease Control and Prevention, 2025). Because these estimates derive from a specific surveillance population, they should not be interpreted as estimates of global ASD prevalence. The World Health Organization (2026) has estimated that approximately 62 million people worldwide are autistic, corresponding to roughly 1 in 127 individuals. These global estimates differ from surveillance-based national estimates because they are derived using different populations and methodologies. Increased awareness, broader diagnostic criteria, and improved access to assessment may have contributed to the rise in identified cases.

Contemporary young adults have access to a wide range of educational and intellectual development opportunities. Despite their cognitive potential, some young adults on the autism spectrum do not pursue higher education. Possible barriers may include low confidence in one's abilities, concerns about increased independence, and anxiety related to major changes such as moving away from the family home (Davis et al., 2021). Research indicates that some students do not disclose their ASD diagnosis to their university, which may contribute to underestimation of their numbers in institutional statistics and reports (Cierzniewska, 2021). Previous studies have also described changes of degree program, interruptions in study, and withdrawal from higher education among some students on the autism spectrum (Perkowski et al., 2024). However, available data are insufficient to estimate the scale of this phenomenon reliably.

In Poland, available estimates of the number of university students on the autism spectrum remain limited, particularly with regard to age distribution and generational cohorts. International studies may provide additional insight into the educational experiences and support needs of autistic university

students. The increasing number of ASD diagnoses among children and adolescents may be accompanied by a gradual rise in the number of autistic students entering higher education in Poland.

Preparation for the transition from secondary education to university may facilitate adaptation among Generation Z students on the autism spectrum. The transition from secondary school to university may represent a particularly challenging period for students on the autism spectrum (Van Hees et al., 2015). Starting university involves substantial changes in academic routines, daily organization, and expectations for independent functioning. These changes may include different teaching and learning methods, greater responsibility for organizing academic work, and reduced day-to-day support from family members. Such demands may pose substantial challenges for some autistic students (Stefańska-Klar, 2010). These challenges may reflect differences in social communication, executive functioning, sensory processing, and adaptation to change, with considerable individual variation. During primary and secondary education, pupils on the autism spectrum may have access to various forms of educational and specialist support (Stefańska-Klar, 2010).

After entering higher education, students typically assume greater responsibility for identifying their support needs and applying for available accommodations. Some students on the autism spectrum may experience difficulties with daily organization, independent living, and adaptation to the demands of university life. Early identification of ASD may facilitate earlier access to specialist support tailored to the child's individual needs. Depending on individual needs, support may focus on developing skills that promote autonomy, self-management, and effective functioning in adulthood.

On 12 July 2013, the Sejm of the Republic of Poland unanimously adopted the Charter of Rights of Persons with Autism. The Charter emphasizes, among other principles, the right of autistic people to accessible education, support for independent living, and opportunities for full social and occupational participation (M.P. 2013 item 682). Adults diagnosed with ASD in childhood have reported that career guidance, volunteering, school-based social activities,

and other forms of structured participation during secondary education helped facilitate the transition to adulthood (Van Hees et al., 2015). By contrast, adults diagnosed later in life may describe negative consequences associated with the earlier absence of an explanatory framework for their longstanding difficulties. Studies of autistic students indicate that limited access to supportive peer relationships and difficulties in establishing or maintaining social connections may contribute to challenges in completing higher education. Withdrawal from higher education may in turn limit opportunities to acquire advanced qualifications and professional competencies that are consistent with an individual's cognitive potential (Perkowski et al., 2024). Some students may be reluctant to disclose their diagnosis or support needs to the university because of concerns about stigma and negative labeling associated with disability (Głód, 2023). Universities should establish transparent procedures that enable students with formal documentation to access appropriate accommodations while also providing broadly accessible forms of academic and psychosocial support. Some autistic students may experience difficulties in independently organizing their study plans, including scheduling classes, monitoring program requirements, and ensuring completion of the required number of ECTS credits.

Autistic individuals may develop intense and highly focused interests from childhood onward. Such interests may function as important strengths, although in some social contexts they may also be associated with misunderstanding or social isolation. School curricula require students to engage with a broad range of subject areas and prescribed learning outcomes. This may reduce the time and flexibility available for pursuing highly focused individual interests. A highly standardized educational environment may create difficulties for some autistic learners; nevertheless, many continue to pursue higher education. Research suggests that some autistic students regard their university years as an important and meaningful period of life (Cierzniewska, 2021). Certain characteristics observed in some autistic individuals, such as persistence and sustained engagement with preferred topics, may support academic achievement. Some autistic students demonstrate

particularly well-developed abilities and skills in selected domains. Individual characteristics such as persistence, systematicity, attention to detail, and strong subject-specific interests may support academic engagement. Potential strengths reported in some autistic individuals include:

- a detail-focused style of information processing, particularly in relation to visual information;
- originality of thought and creative approaches to selected problems (Perkowski et al., 2024).;
- well-developed information-technology skills in some individuals;
- strong memory abilities in selected domains;
- perseverance and the capacity for sustained engagement in preferred tasks;
- the ability to sustain attention for extended periods when engaged in highly preferred activities;
- intense and in-depth interests in selected topics;
- well-developed abilities in selected areas aligned with individual interests.

The presence of these strengths does not, however, guarantee successful adaptation to university demands or completion of higher education. An appropriately adapted academic environment, together with access to workshops, skills training, individual consultations, or tutoring, may support the development and use of competencies important for academic and social functioning. Some autistic students demonstrate strong motivation to address difficulties related to learning and social interaction. Experiences during the COVID-19 pandemic highlighted the potential value of remote learning and digital technologies for some autistic students, although individual responses to online education varied.

Regardless of generational cohort, higher education requires considerable independence, flexibility, intrinsic motivation, and self-directed learning skills. For some autistic students, these demands may be difficult to manage without support tailored to their individual needs. Although many autistic students have substantial intellectual potential, strong subject-specific interests, and high motivation to learn, some may experience difficulties in meeting the organizational, social, and adaptive demands of higher

education. Some autistic students may experience social interactions with peers and academic staff as demanding, particularly in situations requiring spontaneous communication or interpretation of implicit social cues. At the same time, rigid academic schedules or insufficient flexibility in course organization may create difficulties for some students. Some Generation Z students with ASD may experience difficulties with planning, prioritizing tasks, and time management. Some may also find changes in routine and unpredictable events particularly challenging. Autistic university students may be at increased risk of psychological distress, including depressive symptoms, particularly when academic demands, social difficulties, and limited support co-occur (De-la-Iglesia & Olivar, 2015).

Many autistic university students report loneliness, limited peer relationships, and insufficient social support within the university environment (Mazurek, 2014). Some students also report uncertainty about whom they can approach for practical or academic assistance. Some autistic students may participate less actively in informal student communication networks, including social-media groups, which may reduce access to practical information exchanged among peers. Difficulties in social communication, together with anxiety in unfamiliar or demanding situations, may hinder communication with peers, academic staff, and administrative personnel. Some students may find it difficult to formulate follow-up questions or seek clarification, which can make it harder to obtain necessary information.

Another area relevant to higher education involves restricted or repetitive patterns of behavior and a preference for predictability and routine, which may create additional challenges in some academic contexts. Highly focused interests may sometimes be misunderstood by others, particularly when they dominate communication or academic engagement. Such misunderstandings may be compounded by a strong preference for routine, predictability, and consistency. This perception is reinforced by their strong attachment to patterns and routines and their insistence on stability and invariability. Some autistic individuals develop intense and sustained interests in selected topics, which may influence how they allocate

attention and engage with new subject matter. Unfamiliar situations, unexpected changes, or departures from established routines may evoke discomfort or anxiety in some autistic individuals. Unfamiliar situations, unexpected changes, or departures from established routines may evoke discomfort or anxiety in some autistic individuals. Repetitive motor or vocal behaviors may also occur, particularly during stress, sensory overload, or periods of increased need for sensory regulation. Such behaviors may include repetitive vocalizations or movements used for self-regulation.

### **1.3. Mental and physical health in autistic individuals**

Because autistic individuals may have diverse educational, psychosocial, and health-related needs, support should be comprehensive and individualized. Receiving an autism diagnosis may evoke a range of emotional responses in autistic individuals and their families, particularly when the diagnosis occurs later in life (Perkowski et al., 2024). ASD may co-occur with a range of mental and physical health conditions.

The differential diagnosis of ASD may involve a range of psychiatric, developmental, neurological, sensory, and medical conditions, including intellectual disability, anxiety disorders, selective mutism, psychotic disorders, hearing impairment, and selected metabolic or neurological conditions (Pisula, 2022). Importantly, some of these conditions may also co-occur with ASD rather than constitute alternative diagnoses. ASD is associated with an increased prevalence of a range of co-occurring psychiatric and physical health conditions (Kiehl et al., 2024). The mechanisms underlying these co-occurring conditions are complex and may involve genetic, neurobiological, environmental, and psychosocial factors, as well as the cumulative effects of unmet support needs and chronic stress. Frequently reported co-occurring conditions in autistic individuals include intellectual disability, sleep disorders, attention-deficit/hyperactivity disorder (ADHD), mood and anxiety disorders, epilepsy, and tic disorders (Lupindo, Maw & Shabalala, 2023). Autistic individuals have an increased prevalence of co-occurring mental health conditions compared with the general population (First et al., 2022).

The health problems most commonly accompanying the autism spectrum are:

- intellectual disability, which according to analyses in the latest CDC report affects approximately 40% of children with ASD for whom IQ results were available (Centers for Disease Control and Prevention, 2025), while World Health Organization estimates approximately 50% (World Health Organization, 2026);
- sleep disorders, particularly difficulty falling asleep, waking during the night, or waking early, which occur in 40% to 83% of those studied;
- ADHD, which occurs in approximately 30% of children with ASD;
- affective disorders: depressive episodes in up to 38% of people with ASD and bipolar affective disorder in up to 3%;
- anxiety disorders, which occur in 30% to 50%;
- epilepsy, which affects 18% to 33%;
- tics, affecting nearly 22% (Guo et al., 2023; Kereszturi, 2023; Pisula, 2022; Winczura, 2018).

Psychiatrists also note that, in addition to the social-interaction and communication problems and restricted, stereotyped interests typical of autism, people with ASD often display undesirable and dangerous behaviors such as aggression, impulsivity, or self-injury (Pisula, 2022). Consequently, alongside systematic autism therapy, psychological and educational work, speech therapy, and physical rehabilitation, antidepressants, anticonvulsants, and antipsychotics are often used (Guo et al., 2023). Elevated rates of depressive symptoms have also been reported among autistic adolescents and young adults (De-la-Iglesia & Olivar, 2015). Depressive symptoms in autistic individuals have been associated with social isolation, loneliness, perceived lack of acceptance, and difficulties in social participation (De-la-Iglesia & Olivar, 2015; Zheng, 2021). These challenges may become particularly relevant during adolescence and early adulthood, developmental periods in which peer relationships and social belonging often assume greater importance. Some autistic individuals report experiences of social difference, exclusion, or reduced sense of belonging (Davis et al., 2021). Autistic in-

dividuals may also experience elevated rates of peer rejection, bullying, victimization, and social isolation (Fukushima, Yajima, & Moriyama, 2025). Another relevant phenomenon is autistic masking or camouflaging, which involves concealing or compensating for autistic traits in order to conform to perceived social expectations. Sustained masking may require substantial cognitive and emotional effort and has been associated with stress, exhaustion, and poorer mental health outcomes (Cierzniewska, 2021). Prolonged masking has been associated with psychological distress, depressive symptoms, and experiences described as autistic burnout (Zheng, 2021). Research has identified elevated rates of suicidal ideation and suicidal behavior among autistic individuals compared with the general population e.g., among young people (Strauss et al., 1988). Scientific sources indicate that approximately 75% of the studied sample of students on the autism spectrum had suicidal thoughts, and as many as 40% had imagined specific ways of taking their own lives (Jackson et al., 2018).

The increasing presence of autistic students in higher education highlights the need to understand not only their educational and psychosocial experiences but also their physical health needs. Although previous studies have documented elevated rates of selected co-occurring health conditions among autistic individuals, evidence concerning university students, particularly in Poland, remains limited. Moreover, little is known about self-reported health conditions and health-related behaviors among Generation Z students on the autism spectrum. Therefore, the present study aimed to characterize selected physical health conditions and health-related behaviors in this population.

## 2. Material and methods

### 2.1. Study participants

The survey was designed to assess selected sociodemographic characteristics and health-related information among university students on the autism spectrum. The data were collected as part of a broader institutional project aimed at informing future psychological

assessment and the development of support and accommodation strategies for autistic students at the university. A total of 154 students completed the questionnaire. This initial total included questionnaires with missing responses to one or more items. Questionnaires were excluded from the final analysis when missing data prevented reliable interpretation of the variables included in the present study (missing at least one answer). The final analyzed sample comprised 142 students with a formally confirmed ASD diagnosis who provided complete data for the variables included in the present analysis. The sample included 120 women (84.5%) and 22 men (15.5%). No participant selected the 'Other' response category. Participants were aged 18–26 years ( $M = 20.6$ ,  $SD = 2.1$ ). Participants aged 19 or 20 years constituted the largest age subgroup (58.5%). Based on the generational definition adopted in this study, all participants were classified as members of Generation Z (Wojtoszek, 2023). Detailed demographic characteristics of the sample are presented in Table 1.

## 2.2. Procedure

The study used an anonymous questionnaire survey. Data were collected from October 2025 to May 2026. Participation was voluntary and anonymous, and informed consent was obtained from all participants before survey completion. Participants were students enrolled in law, psychology, or public health programs at the Robert Schuman European University of Social Sciences and Technology in Radom, Poland.

All participants met the study's age-based definition of Generation Z and had a previous diagnosis of autism spectrum disorder. The questionnaire consisted primarily of closed-ended items, including single- and multiple-response questions, supplemented by several short open-ended questions. The questionnaire comprised eight sections presented in the following order:

- sociodemographic characteristics, including sex, age, degree program, year of study, whether the participant was enrolled in their first degree program, and place of residence;

Table 1. Demographic characteristics of the study sample (N = 142)

| Demographic variable            |                      | N   | %    |
|---------------------------------|----------------------|-----|------|
| Sex                             | Female               | 120 | 84.5 |
|                                 | Male                 | 22  | 15.5 |
|                                 | Other                | 0   | 0    |
| Age                             | 18                   | 5   | 3.5  |
|                                 | 19                   | 55  | 38.7 |
|                                 | 20                   | 28  | 19.7 |
|                                 | 21                   | 15  | 10.6 |
|                                 | 22                   | 12  | 8.5  |
|                                 | 23                   | 8   | 5.6  |
|                                 | 24                   | 10  | 7.0  |
|                                 | 25                   | 2   | 1.4  |
|                                 | 26                   | 7   | 4.9  |
| Place of residence              | Rural area           | 21  | 14.8 |
|                                 | Town < 50,000        | 15  | 10.6 |
|                                 | City 50,000–150,000  | 20  | 14.1 |
|                                 | City 150,000–500,000 | 78  | 54.9 |
|                                 | City > 500,000       | 8   | 5.6  |
| Degree program                  | Law                  | 22  | 15.5 |
|                                 | Psychology           | 68  | 47.9 |
|                                 | Public Health        | 52  | 36.6 |
| First degree program undertaken | Yes                  | 118 | 83.1 |
|                                 | No                   | 24  | 16.9 |
| Year of study                   | Year 1               | 26  | 18.3 |
|                                 | Year 2               | 34  | 23.9 |
|                                 | Year 3               | 62  | 43.7 |
|                                 | Year 4               | 12  | 8.5  |
|                                 | Year 5               | 8   | 5.6  |

- health-related information, including neurodevelopmental diagnoses, mental and physical health conditions, disability status, and age or period at diagnosis;
- university engagement, including participation in activities and opportunities offered by the institution and satisfaction with these forms of engagement;
- support and services, including use of specialist assistance, forms of support received, and satisfaction with available support;

- mental health, including symptoms of depression, anxiety, stress, and other aspects of psychological functioning assessed within the broader survey (e.g.: PSS-10–Perceived Stress Scale; STAI–State-Trait Anxiety Inventory; BAI -Beck Anxiety Inventory);
- functioning in higher education, including perceived accessibility and difficulties in academic, social, sensory, and environmental domains;
- autistic traits, assessed using a self-report questionnaire (CAT-Q: Camouflaging Autistic Traits Questionnaire);
- experiences of stigma and discrimination within the university environment.

2.3. Questionnaire and study measures

The broader survey included psychological measures as well as a researcher-developed questionnaire. The present study analyzed only data from the socio-demographic and health-related sections of the questionnaire; results from the psychological measures are not reported here. Eligibility was first verified on the basis of a previously established ASD diagnosis. After providing informed consent, participants completed the questionnaire voluntarily and received no financial compensation. Participants enrolled in more than one degree program were asked to report data with reference to the program they considered their primary course of study or the program in which they had progressed furthest.

A purposive convenience sampling strategy was used to recruit as many eligible autistic students as possible within the University. Study invitations were sent to students whose ASD diagnosis had been formally documented in university records or verified through appropriate diagnostic documentation. 154 individuals submitted documentation to the office for persons with disabilities; however, 8 of them did not answer all the questions while completing the survey, so their results were excluded. The ethics committee approved the study, and personal information was not compromised.

3. Results

The present analysis focuses on findings related to physical health. The most frequently reported previous diagnosis was Asperger syndrome (66.9%,  $n = 95$ ). The next most frequently reported diagnoses were atypical autism (17.6%,  $n = 25$ ) and autism spectrum disorder without further specification (11.3%,  $n = 16$ ). The distribution of reported autism-spectrum diagnoses is presented in Table 2.

Most participants reported receiving an autism-spectrum diagnosis between the ages of 9 and 12 years, corresponding to grades 4–6 of primary education (71.8%,  $n = 102$ ). An additional 35 participants (24.6%) reported receiving a diagnosis between the ages of 12 and 14 years, corresponding to grades 7–8 of primary education. Two participants (1.4%) reported receiving a diagnosis after the age of 20 years. Single participants reported diagnoses in the age ranges of 3–7 years, 7–9 years, 15–18 years, 19 years, and 20 years. No participant in the study reported receiving an ASD diagnosis between the ages of 2 and 3 years. Participants were asked to report diagnosed health conditions. Multiple responses were permitted because participants could report more than one health condition. Sixty-six participants (46.5%) reported no health problems. Food intolerances were reported by 26 participants (18.3%). Diabetes was reported by 25 participants (17.6%), while thyroid disease was reported by 15 participants (10.6%). Asthma was reported by 15

Table 2. Reported autism-spectrum diagnoses among participants ( $N = 142$ )

| Autism spectrum diagnosis*                         | N  | %    |
|----------------------------------------------------|----|------|
| Asperger syndrome                                  | 95 | 66.9 |
| Autism spectrum disorder                           | 16 | 11.3 |
| Childhood autism                                   | 1  | 0.7  |
| Pervasive developmental disorder, unspecified      | 1  | 0.7  |
| Atypical autism                                    | 25 | 17.6 |
| One or more, but the specific diagnosis is unknown | 4  | 2.8  |

\*Diagnostic labels reflect previously established diagnoses reported or documented by participants and may correspond to earlier diagnostic classification systems.

participants (10.6%), skin conditions by 10 (7.0%), visual impairment by 5 (3.5%), and epilepsy or another neurological condition by 1 participant (0.7%).

Other health problems were reported by 23 participants (16.2%). Participants selecting the 'Other' category were invited to specify the condition in an open-text field. Open-text responses included polycystic ovary syndrome (PCOS), insulin resistance, gastroesophageal reflux, migraine, irritable bowel syndrome, and Crohn's disease. The distribution of self-reported health conditions is presented in Table 3.

Participants who reported food intolerances were asked to specify the type of intolerance. Gluten-related intolerance was reported by 26 participants. This finding should be interpreted descriptively and does not establish an association between ASD and gluten-related disorders. Thirteen participants additionally reported lactose intolerance. Single participants reported allergies to menthol, hen's eggs, and peanuts. Three female participants reported that gluten- or lactose-related intolerance developed during first pregnancy and persisted thereafter. These preliminary findings warrant further investigation in larger and more representative samples.

A total of 100 participants (70.4%) reported following a gluten-free diet and using dietary supplements. In the total sample, 60 participants (42.3%)

reported vitamin D3 supplementation, 32 (22.5%) magnesium supplementation, 16 (11.3%) vitamin E supplementation, and 15 (10.6%) vitamin C supplementation.

## 4. Discussion of results

The present study examined self-reported physical health conditions and health-related behaviors among Generation Z university students on the autism spectrum. Clinical presentation and support needs may change across the life span, with substantial variability in developmental trajectories among autistic individuals. Outcomes are influenced by multiple factors, including individual cognitive profiles, support needs, co-occurring conditions, and access to appropriate interventions and accommodations (Wojtoszek, 2023).

Generation Z has reached young adulthood during a period of markedly increased recognition and diagnosis of ASD. Some autistic adults complete higher education, live independently, and participate in the workforce, although barriers within educational and social environments may limit opportunities for full academic and occupational participation. Difficulties in academic participation may be associated with limited access to appropriate support, as well as with co-occurring mental and physical health conditions.

Although research on autistic university students has expanded, important gaps remain, particularly regarding physical health and health-related behaviors in higher-education settings (Muthuka et al., 2026). Research concerning autistic individuals in Poland is available (Zakrocka, 2025), but studies specifically focusing on university students appear to remain limited.

The present study contributes to this limited evidence base by examining autistic students enrolled in three degree programs, most of whom (83.1%) were pursuing their first university degree. This is relevant because many participants were navigating higher education for the first time. Participants represented all years of study and a range of residential settings differing in level of urbanization.

Table 3. Self-reported health conditions among autistic university students (N = 142)

| Health problems                          | N  | %    |
|------------------------------------------|----|------|
| Food intolerances                        | 26 | 18.3 |
| Thyroid disease                          | 15 | 10.6 |
| Skin disease                             | 10 | 7.0  |
| Asthma                                   | 15 | 10.6 |
| Epilepsy or another neurological disease | 1  | 0.7  |
| Diabetes                                 | 25 | 17.6 |
| Visual impairment                        | 5  | 3.5  |
| Mobility impairment                      | 0  | 0    |
| Hearing impairment                       | 0  | 0    |
| Other disability                         | 1  | 0.7  |
| Other health problem                     | 23 | 16.2 |
| I have no health problems                | 66 | 46.5 |

Multiple responses were permitted; therefore, percentages do not sum to 100%.

The most frequently reported previous diagnosis was Asperger syndrome. Similar diagnostic labels have been reported in studies of autistic university populations conducted under earlier or transitional classification frameworks (Baños, 2022; Fukushima et al., 2025; Vincent, 2026). The present findings do not permit conclusions regarding cognitive ability. Earlier diagnostic descriptions of Asperger syndrome generally referred to autistic characteristics occurring without intellectual disability; however, cognitive profiles remain highly heterogeneous. Most participants reported receiving an ASD diagnosis between the ages of 9 and 12 years, corresponding to grades 4–6 of primary education. This pattern may be compared with reports of diagnostic timing in other European populations (Esqueda Villegas et al., 2026; Sacco, 2022).

More than half of participants reported at least one physical health condition. Among the conditions reported in the present sample were food intolerances, diabetes, thyroid disease, and asthma. Previous studies have also examined associations between ASD and these health conditions (Cortese, 2022; Gong, 2023; Hancock, 2026; Xu, 2018).

Open-text responses also included conditions that occur in the general population, such as polycystic ovary syndrome (PCOS) (Bravo-Muñoz, 2025) and insulin resistance (Guevara-Ramírez, 2025). Dietary factors may be relevant to the management of selected metabolic, gastrointestinal, and endocrine conditions; however, their role varies substantially across diagnoses and should not be generalized.

Some participants reported gluten-related intolerance (Bjørklund, 2024). This observation is descriptive and should not be interpreted as confirming a specific association between ASD and gluten-related disorders. These findings should be interpreted cautiously because the sample was drawn from a single university and was not designed to provide population-level prevalence estimates.

Larger, multi-center studies are needed to determine whether the patterns observed in this sample are replicated in other autistic university populations. The present study did not assess the effectiveness of magnesium, vitamin B6, or other supplements (Indika et al., 2023); therefore, no conclusions regarding

their effects on cognitive or behavioral outcomes can be drawn. Previous research has investigated associations between nutritional status and cognitive functioning, but evidence supporting routine vitamin supplementation for cognitive improvement in ASD remains insufficient (Indika et al., 2023).

Nutritional deficiencies may adversely affect general health; however, their specific relationship with ASD-related characteristics requires further investigation. The potential effects of probiotic and microbiome-targeted interventions in ASD remain an active area of research, but current evidence is not sufficient to support definitive clinical conclusions.

The present cross-sectional, self-report study does not permit conclusions regarding the effects of diet on health outcomes among autistic Generation Z students.

A substantial proportion of participants reported dietary gluten-free modification and supplement use; however, the study did not assess nutritional knowledge or the clinical appropriateness of these practices. Because existing evidence regarding dietary interventions and supplementation in ASD remains inconclusive, further well-controlled studies are needed to evaluate specific health outcomes and clinically indicated interventions.

## Limitations

Several limitations should be considered when interpreting the present findings. First, the study was conducted at a single university and used a purposive convenience sample, which limits the generalizability of the results. Second, health conditions and health-related behaviors were self-reported and were not independently verified using medical records or clinical assessments. Third, the cross-sectional design precludes conclusions regarding causality or temporal relationships. Fourth, the sample was predominantly female, which limits the extent to which the findings can be generalized to autistic male students or other gender groups. Finally, the questionnaire was researcher-developed, and its psychometric properties were not reported in the present study.

## Conclusions

The present study provides preliminary descriptive data on self-reported physical health conditions and health-related behaviors among Generation Z university students on the autism spectrum. Participants reported a range of physical health conditions, as well as frequent use of dietary modifications and nutritional supplements. However, the study design does

not permit conclusions regarding the prevalence of these conditions in the broader autistic population or the effectiveness of dietary or supplementation practices. The findings highlight the need for larger, multi-center studies using clinically verified health data and standardized measures. Universities may also benefit from integrating health-related considerations into broader systems of educational and psychosocial support for autistic students.

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# The family as a psychological value and an environment for development<sup>1</sup>

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**Abstract:** The family is one of the primary environments for human development. From the earliest stages of life, it shapes interpersonal bonds, a sense of security, identity, emotional regulation, social competences, and value systems. From a psychological perspective, the family is not merely a social structure or an institution organizing daily life. Instead, it is a dynamic system of relationships where the individual experiences closeness, acceptance, responsibility, and belonging. A child's earliest relationships with parents are of paramount importance. They lay the foundation for their attachment style, self-image, and functioning in later interpersonal relationships. Furthermore, the family performs socialization, axiological, protective, and educational functions. Through these, it transmits norms, behavioral patterns, and a hierarchy of values. In a world characterized by sensory overload, rapid change, digitized relationships, and competing cultural models, the family remains a space of grounding. It provides a framework for interpreting the world and protecting personal dignity. Its value is especially evident in its capacity to foster a safe emotional climate, support autonomy, cultivate responsibility, and build psychological resilience. The aim of this article is to present the family as an indispensable environment for integral human development. It also highlights the family as a psychological value of fundamental importance for an individual's mental health and social functioning.

**Keywords:** family, psychological value, human development, bond, attachment.

## Introduction

The family has always been the primary environment of human life. It is where a child first encounters the world of people, norms, values, and meanings. Before entering broader social spheres—such as peer groups, schools, religious communities, work environments, or media culture—the individual primarily experiences family relationships. In this respect, the family serves as the foundational space for socialization, communication, parenting, and psychological development. Its significance lies not only in providing biological and material care. Crucially, it creates an emotional climate where the child can develop a sense of security, self-worth, and belonging.

From a psychological perspective, the family is an exceptionally vital environment because it shapes the core operational patterns of the individual (Janicka

& Liberska, 2014). Through relationships with parents and other significant family members, a child learns whether the world is a safe place. They discover whether other people are trustworthy, whether they can express their own needs, and whether love and care are real. Early family experiences lay the foundation for subsequent interpersonal relations, emotional coping mechanisms, self-perception, and the interpretation of others' behavior (Moore, 2025). Therefore, the family is not just an external environment. It is a place deeply embedded within the structure of psychological development.

The value of the family is also revealed in its role as a space for integral development. Within it, humans develop not only emotionally, but also socially, morally, cognitively, and spiritually. Within

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Smol.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Smol.pdf)

the family, children learn language, communication, empathy, responsibility, conflict resolution, care for others, and respect for boundaries.

Contemporary social, cultural, and media realities require a renewed, deeper reflection on the importance of the family (Szyszka, 2016). On one hand, we observe changes in family life models, a weakening of certain bonds, rising individualism, and the impact of digital media on daily communication. On the other hand, the family performs a stabilizing and protective function in a world of uncertainty, information overload, and shifting cultural patterns. Individuals need an environment where they can experience more than just efficiency, success, and social visibility. Above all, they need unconditional acceptance, presence, and love.

The purpose of this article is to demonstrate the family as a psychological value and a primary environment for human development. The analysis focuses on key dimensions of family functioning, such as bonding, attachment, emotion regulation, communication, socialization, the transmission of values, identity development, autonomy building, and psychological resilience. Particular attention is given to the fact that the family is not merely a social institution. It is a living system of relationships. This system can either support personal maturation or, in cases of severe dysfunction, become a source of trauma. For this reason, the psychological value of the family depends not just on its formal existence. It relies primarily on the quality of bonds, communication, and responsibility present in everyday domestic life.

## **1. The family and the formation of the human psyche**

The family is among the most crucial environments shaping the human psyche. Early relational, emotional, and communicative experiences do not remain mere episodes of early childhood. Instead, they help construct the core structures of an individual's psychological functioning (Coyne & Murrell, 2020). Within the family, a child first experiences the presence of another human being as a source of security, care,

closeness, and protection. At the same time, they encounter demands, boundaries, and frustrations. The human psyche does not develop in the isolation of biological maturation. Rather, it grows within a relational space (Rečko, 2025). The quality of these relationships determines how individuals will view themselves, others, and the social world in the future.

From a psychological perspective, the family provides the initial context for developing a core sense of security. Coming into the world as a dependent and helpless being, a child requires the stable, predictable, and emotionally available presence of parents or caregivers. This involves more than just satisfying physiological needs. It is about the experience of being noticed, accepted, and protected. The repetition of such experiences leads to the formation of internal representations of the self and others. The child begins to form fundamental beliefs about whether they are important and whether their needs matter. They also learn whether others are accessible and whether the world is a relatively safe place. These primary beliefs later become part of a deeper psychological organization (Harwood, 2025).

Bowlby's attachment theory (2016) is of particular significance here. According to this theory, a child builds a bond with a parent or caregiver based on repeated experiences of closeness, protection, and emotional availability. If the caregiver responds to the child's needs affectionately, adequately, and predictably, the child develops a secure attachment style. This means they learn to trust, seek support, explore the world, and return to the significant person when afraid or overwhelmed. Secure attachment thus provides a psychological base for future independence. It does not trap the child in dependency. Instead, it enables a gradual transition from dependency to autonomy. However, if family relationships are marked by emotional unavailability, rejection, chaos, overcontrol, or unpredictability, insecure attachment patterns may form. In later life, these patterns can manifest as difficulties with intimacy, excessive fear of rejection, avoidance of dependency, mistrust, emotional impulsivity, or a tendency to submit to others (Taylor, 2020a, 2020b). Therefore, the family

influences not only the child's immediate behavior. It also shapes the matrix of their subsequent interpersonal functioning (Kozak & Wasilewski, 2022).

Another fundamental dimension of psychological formation in the family is the development of one's self-image. A child learns about themselves through the gaze, words, and reactions of significant others long before they can independently articulate their own worth. Family messages, both verbal and non-verbal, form the bedrock of this self-esteem (Gałkowska, 1999). A child who hears that they are important, loved, capable of learning, and deserving of respect builds a stable sense of self-worth more easily. Conversely, a child who is constantly shamed, compared, dismissed, or criticized may internalize a negative self-image (Kozak & Wasilewski, 2022; Sujak, 2021). In this respect, the family becomes the primary psychological mirror. Through it, an individual recognizes their own dignity (Mariański, 2022) or begins to doubt their worth (Majewska-Opielka, 2024).

Co-creating the capacity for emotion regulation is another vital function of the family (Ilg et al., 2022). A young child does not yet possess mature mechanisms for self-soothing, understanding their own emotional states, or controlling impulses. They need an adult to help them transition from tension to calm, and from chaos to naming their experience. This guidance helps move them from helplessness to the realization that emotions can be understood and processed without destruction (Rocchetta, 2020b). Initially, the parent serves as an external emotional regulator. Through their voice, touch, facial expressions, patience, and words, they help the child organize their experience. Over time, these regulation methods are internalized. They become part of the individual's psychological toolkit. In a family where emotions are noticed, named, and accepted, the child learns that fear, anger, sadness, or disappointment are parts of the human experience. They see that these feelings can be expressed safely. Conversely, in a family where emotions are mocked, punished, ignored, or dramatized, a child may learn to suppress, avoid, or impulsively discharge them. In later life, this can lead

to difficulties in self-regulation, reduced psychological resilience, relationship problems, and a vulnerability to compensatory behaviors (Kołakowski, 2024).

The family also shapes core cognitive-emotional schemas (Siegel & Bryson, 2020). Children learn not only what they feel, but also how to interpret reality. If trust, dialogue, and realistic explanations of the world dominate the family, the child develops a more coherent and secure interpretation of experiences. However, if the family home is a space of chaos, violence, unpredictability, or chronic tension, the world may appear threatening, unstable, and uncontrollable. These early cognitive schemas can influence subsequent methods of coping with stress, making decisions, and interpreting the behavior of others.

Another dimension is the formation of personal identity. The family provides the child not only with a surname, a history, and a place in the kinship structure, but also with information about who they are and where they belong. A child's identity develops within the context of family narratives, rituals, memories, expectations, and values. Through these, the individual discovers the continuity of their own life and their roots in relationships. The family strengthens identity by accepting the child's individuality. It recognizes their temperament, abilities, and sensitivity. However, it can also distort identity development if it imposes rigid roles, denies the right to distinctiveness, or makes love conditional upon meeting adult expectations (Sunderland, 2022).

The development of conscience and moral responsibility is also a major outcome of family influence. Conscience is not formed solely through commands and prohibitions. It develops through the experience of relationships where the child learns that their actions matter to others. Within the family, a child discovers the meaning of harm, guilt, making amends, apologizing, forgiveness, and responsibility (Rocchetta, 2020a). Mature moral upbringing does not consist of mechanically enforcing obedience. Rather, it guides the child toward understanding the purpose behind norms. As a result, moral norms cease to be an external constraint and gradually become part of an internal value system.

The family also plays a significant role in building psychological resilience (Southwick et al., 2024). This resilience does not imply insensitivity or an absence of suffering. Instead, it is the ability to recover from difficulties, utilize support, integrate crisis experiences, and maintain hope (Smoleń, 2025). A child who experiences the presence of close family members during failure, fear, or rejection learns that difficulties do not have to lead to loneliness. They discover that the family is a space where one learns to endure suffering without losing self-worth (Hanson & Hanson, 2022).

The family shapes the human psyche most creatively when it combines love with boundaries, closeness with respect for autonomy, demands with acceptance, and care with responsible guidance toward maturity (Stixrud & Johnson, 2019).

## **2. The family as an environment for development**

While the chapter on the formation of the psyche focuses primarily on attachment, emotion regulation, self-image, and personality structures, the analysis of the family as an environment for development covers a broader context of daily life. This includes family roles, communication, parenting styles, socialization, cognitive development, intergenerational relationships, rituals, responsibilities, and preparation for responsible functioning in society.

The family constitutes a person's primary developmental microsystem. Within it, children acquire experiences that prepare them for participation in subsequent environments, such as peer groups, schools, religious communities, workplaces, and civil society. Thus, a child's development does not occur solely through the direct influence of parents. It happens through the overall organization of family life. The daily rhythm, the division of duties, ways of spending time, communication patterns, the presence of rituals, and attitudes toward learning, work, rest, religion, media, and other people all matter. Within the family, children learn through what it is on a daily basis, not just through what it declares.

Socialization is one of the primary tasks of the family as a developmental environment. Children learn that social life requires respecting boundaries, recognizing the needs of others, undertaking duties, sharing, waiting, cooperating, and bearing the consequences of their own actions. The family is the first school of social life. There, a child experiences that they are not the sole center of the universe. They must accommodate the presence of parents, siblings, grandparents, and other close relatives. They learn that relationships require reciprocity, patience, and responsibility (Zelek, 2025). Family socialization occurs primarily through modeling. Therefore, children observe how parents relate to each other, how they resolve conflicts, and how they speak about other people. They also watch how they treat work, money, and the elderly, weak, sick, or needy. This daily lifestyle has a much stronger impact than verbal declarations. If parents talk about respect but humiliate each other in practice, the child adopts the observed pattern rather than the spoken principles. Consequently, consistency between declared and practiced values is a fundamental condition for effective upbringing.

The family also serves as an environment for cognitive development. It is here that a child first learns language, asks questions, organizes experiences, and assigns meaning to phenomena. Conversations with adults, reading together, storytelling, explaining the world, and encouraging curiosity all promote the development of thinking, memory, imagination, and language skills (Smoleń, 2016). A family can stimulate cognitive development through dialogue and openness to the child's questions (Kądziołka, 2012; Śnieżyński, 2014). However, it can also restrict it if indifference, a lack of conversation, excessive control, or a disregard for childhood curiosity prevail. Parenting styles are of particular importance in this context. Alongside the styles most frequently mentioned in the literature—such as democratic, autocratic, and liberal (Ryś, 2001)—we can distinguish further parenting styles (Shaffer & Kipp, 2013; Wielkiewicz, 2024):

1. The authoritative style, which combines emotional warmth, clear demands, and consistency, fosters the development of independence, responsibility, and social competence.
2. The authoritarian style, based mainly on submission and control, can lead to anxiety, passivity, or rebellion.
3. The permissive style, which lacks demands and boundaries, hinders the development of self-regulation and responsibility.
4. The neglectful style is particularly harmful, as the child receives neither emotional support nor an educational structure.

The family as a developmental environment therefore requires a balance between closeness and demanding standards.

A major task of the family is the gradual cultivation of autonomy. Children should be given an increasing scope of responsibility corresponding to their age, capabilities, and maturity. Autonomy does not mean leaving the child to their own devices. Rather, it means creating conditions in which they can make decisions, learn from consequences, make mistakes, and develop agency. Excessive parental control can inhibit the development of independence, while premature withdrawal of support can lead to a sense of abandonment. A mature family raises a child not to keep them close, but to enable their responsible participation in the world and the building of lasting relationships (Moore, 2025).

The family as a developmental environment also possesses a systemic character. This means that each family member influences the others, and a child's development depends not just on the individual traits of the parents, but on the entire structure of relationships (Braun-Galkowska, 2007; Ryś, 2001). The quality of the bond between parents, relationships with siblings, the presence of grandparents, the atmosphere of the home, and the ways decisions are made, stress is handled, and daily life is organized all carry significance. A child is not raised solely by individual messages, but by the entire family climate. Chronic tension, unclear roles, hidden conflicts, or a lack of stability can affect development even when not directly discussed. The marital or partner rela-

tionship of the parents is particularly critical. This is because parents serve as the child's primary model of femininity, masculinity, marriage, parenthood, and responsibility (Beck, 2020). By observing adults, a child learns patterns of intimacy, cooperation, dispute resolution, showing affection, sharing responsibilities, and decision-making (Tryjarska, 2010). The goal is not for the family to be completely free of conflict, as conflict is a natural part of life. Rather, it is about whether differences of opinion are resolved through dialogue, respect, and a willingness to repair the bond, or through violence, contempt, silence, manipulation, or humiliation (Trouchaud, 2023). Sibling relationships are also an essential component of the family environment. They represent the primary space for learning cooperation, competition, negotiating needs, sharing, jealousy, loyalty, and forgiveness. Siblings can be a source of support and belonging, but also of tension and comparison (White & Hughes, 2021; Tannen, 2011). The role of parents is not to eliminate all conflicts between children. Instead, it is to guide them so they become opportunities to learn fairness, empathy, and responsibility. The way parents treat each child matters for the development of self-worth and a sense of justice within the family.

The family also serves as an intergenerational environment. The presence of grandparents, family histories, memories of ancestors, traditions, holidays, and rituals build a sense of continuity (Smoleń, 2026a, 2026b). Children discover that their lives do not begin with themselves but are part of a broader family history. Such awareness strengthens grounding, identity, and a sense of belonging. Family stories can organize experience by showing that life encompasses both success and difficulty, joy and suffering, continuity and change. Rituals form a significant dimension of the family environment. Shared meals, celebrations, prayer, conversations, visits, walks, anniversaries, or domestic customs structure time and give meaning to daily life (Miduch & Żysko, 2020). Rituals are not merely repetitive actions. They are carriers of bonds and values through which a child experiences predictability, belonging, and stability. In a world of acceleration, sensory overload, and distracted atten-

tion, family rituals perform a protective function. This is because they create a space for returning to relationships, presence, and meaning.

The family also prepares individuals for the responsible use of freedom (Bienvenu, 2024). Today's children grow up in a reality of widespread access to information, social media, games, entertainment platforms, advertisements, influencers, and artificial intelligence tools. The family is no longer the sole source of socialization. Therefore, its task is not to completely isolate the child from the digital world. Instead, it must teach critical, responsible, and ethical media use (Bigaj, 2025). Children need adults to help them distinguish information from manipulation, popularity from value, and image from person. They also need assistance separating pleasure from goodness and digital contact from real connection (Bartoszak, 2026). In this respect, the family performs an interpretive function. It helps the child organize messages coming from culture, media, and peer environments. Contemporary culture frequently promotes instant gratification, comparison, visibility, success, and attractiveness. The family should remind the child that a human being possesses a value independent of popularity, appearance, achievements, and social approval. If a child experiences unconditional acceptance in the family, they can more easily resist the pressure of external evaluations. The family then protects the child's personal dignity from being reduced to an image, a score, or utility (Pawłowicz & Srebnicki, 2021).

The family also serves as a place for learning patience and responsibility for others. Daily household chores, caring for younger siblings, helping the elderly, looking after the sick, solving problems together, and making decisions all teach that life does not consist solely of fulfilling individual desires. Within the family, a person discovers that freedom must be linked to responsibility. They see that love is expressed not just in feelings, but also in concrete actions, fidelity, presence, and a willingness to make sacrifices.

However, one cannot overlook the fact that the family as a developmental environment can be both supportive and risky. Where violence (Jarosz & Michalak, 2018), addiction, permanent conflict, neglect, a lack of boundaries, or emotional un-

availability occur, the family hinders development. This leads to severe psychological consequences (Grabowiec, 2011; Chuchra & Jęczeń, 2012).

The family constitutes an irreplaceable environment for development not because every form of it automatically promotes maturation. Rather, it is because the quality of family relationships has an exceptional power to shape a human being (Wasilewska & Szubrycht, 2021). Thus, the family as a developmental environment is a complex system of relationships, roles, values, rituals, and daily practices. These prepare the child for social life, develop their cognitive, moral, and communicative competences, and teach responsibility, autonomy, and the interpretation of the world. Its significance lies not only in being a person's first life environment, but in serving as the primary laboratory of humanity. It is in the family that a child learns how to be themselves in relation to others and how to live with others without losing their own dignity, freedom, and responsibility (Drescher, 2021).

## Conclusion

The reflection undertaken in this article presents the family as one of the most critical environments in which individuals gradually discover their own identity. Through it, they learn about relationships and acquire the fundamental competences needed for a responsible life. Its importance is not limited solely to caregiving or organizational dimensions. Indeed, the family creates a space where the individual experiences the earliest forms of closeness. They learn to recognize emotions, experience bonds, adopt norms, and assume responsibility for themselves and others. From a psychological standpoint, the quality of daily family relationships is particularly crucial. These relations determine whether the home becomes a place that reinforces development, builds a sense of security, and fosters maturation, or whether it becomes a space of tension, neglect, and trauma. The mere presence of a family structure is insufficient to ensure the proper development of a person.

Bonds based on respect, kindness, responsibility, dialogue, and the skillful combination of love with demands are indispensable.

The family also performs an important interpretive function toward the world. It helps individuals organize experiences, understand values, and distinguish the permanent from the transient. It also allows them to maintain a sense of dignity when facing social, cultural, and media pressures. Contemporary transformations-linked, among other things, to the digitization of life, the weakening of direct bonds, and intensified individualism-make the need for a stable family environment particularly evident.

This does not mean idealizing the family or ignoring its potential dysfunctions. The family can support development, but it can also become a source

of suffering if it lacks respect, emotional safety, clear boundaries, and adult responsibility. Therefore, the value of the family must be understood not just formally, but primarily relationally and qualitatively. Its significance is determined by the way its members treat each other in daily life.

Ultimately, the family remains the primary place for learning humanity. Within it, a person can experience being important, needed, and capable of love. It is also where attitudes are formed that are later transferred to broader social life. These include trust, responsibility, empathy, patience, solidarity, and a readiness to care for others. For this reason, concern for the quality of family life is not only a private task, but also a vital social, educational, and cultural challenge.

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# Assessment of emotion regulation strategies in adults with Attention Deficit/Hyperactivity Disorder (ADHD)<sup>1</sup>

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**Abstract:** Introduction: Emotional dysregulation is estimated to affect between 30% and 70% of individuals with ADHD, regardless of the presence of comorbid psychiatric disorders. The present study aimed to compare adaptive and maladaptive emotion regulation strategies, symptoms of anxiety and depression, and borderline personality disorder traits in adults with and without ADHD. Additionally, the interrelationships among these variables were examined. *Material and Methods:* A total of 216 adults with ADHD ( $M = 33.13$ ,  $SD = 8.40$ ) and 215 individuals in the control group ( $M = 34.18$ ,  $SD = 10.10$ ), aged between 18 and 65 years, completed the following questionnaires: the Adult ADHD Self-Report Scale v1.1 (ASRS), the Cognitive Emotion Regulation Questionnaire (CERQ), the Emotion Regulation Questionnaire (ERQ), the Hospital Anxiety and Depression Scale (HADS), and The BPD Checklist. Relationships between variables were analysed using independent-samples *t*-tests, correlation analyses, and linear regression models. *Results:* Participants with ADHD reported significantly more frequent use of maladaptive emotion regulation strategies, particularly self-blame and rumination, compared with the control group. The clinical group also exhibited higher levels of anxiety, depression, and borderline personality disorder traits than the control group. Regression analyses demonstrated that both adaptive and maladaptive emotion regulation strategies significantly predicted the severity of anxiety and depressive symptoms, as well as borderline personality disorder traits. *Conclusions:* The findings highlight the importance of emotion regulation and co-occurring psychopathological symptoms in the adult ADHD population.

**Keywords:** anxiety, depression, attention-deficit/hyperactivity disorder (ADHD), borderline personality disorder (BPD), emotion regulation

## 1. Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder affecting approximately 2–4% of adults in the general population and is the most diagnosed neurodevelopmental disorder (Ben-Dor Cohen et al., 2024; Soler-Gutiérrez et al., 2023). It is estimated that approximately one million individuals in Poland may have ADHD. The most recent data from 2023 concerning psychiatric diagnoses recorded within the public healthcare system indicate that ADHD—more specifically, “hyperkinetic disorder” according to the ICD-10 classification, which remains in use in Poland—was diagnosed in only 3,579 adults receiving psychiatric consultations. This represents less than 0.4% of individuals

who may potentially meet the diagnostic criteria for ADHD (Gondek et al., 2024). Furthermore, it is possible that the prevalence of ADHD among adults is higher than currently assumed, which may result from diagnostic challenges associated with the lack of detailed diagnostic criteria for adults and the frequent co-occurrence of ADHD with other psychiatric disorders (Barkley, 2015, pp. 343–355, as cited in Soler-Gutierrez et al., 2023).

According to the DSM-5-TR (American Psychiatric Association, 2022), attention-deficit/hyperactivity disorder (ADHD) has its onset in childhood and is characterised by persistent patterns of inattention, hyperactivity, and impulsivity that

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Hors.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Hors.pdf)

must persist for at least six months and result in significant functional impairment. The DSM-5-TR distinguishes the following ADHD presentations: (1) the combined presentation, characterised by the simultaneous presence of symptoms of inattention and hyperactivity–impulsivity; (2) the predominantly inattentive presentation; and (3) the predominantly hyperactive–impulsive presentation. In addition to these presentations, the DSM-5-TR specifies levels of severity, namely mild, moderate, and severe.

ADHD frequently co-occurs with other psychiatric disorders. It has been estimated that between 70% and 80% of individuals with ADHD experience at least one additional psychiatric disorder during their lifetime (Shen & Zhou, 2024). The most common comorbid conditions include anxiety disorders and depressive disorders (D'Agati et al., 2019; Fayyad et al., 2017; Fu et al., 2025; Giacobini et al., 2023; Mayer et al., 2021; Quenneville et al., 2022; Powell et al., 2021; Reimherr et al., 2017), as well as personality disorders (MacDonald & Sadek, 2023), particularly borderline personality disorder (BPD) (Ditrich, et al., 2021; Matthies & Philipsen, 2014; Weiner, et al., 2019). Comorbid disorders complicate the clinical presentation of ADHD and are associated with greater functional impairment than either ADHD or the co-occurring disorder alone. Individuals with comorbid conditions also tend to experience greater difficulties in everyday functioning and are less likely to respond favourably to treatment (Fu et al., 2025; MacDonald & Sadek, 2023; Mayer et al., 2021; Matthies & Philipsen, 2014; Powell et al., 2021; Shen & Zhou, 2025). Expanding current knowledge regarding ADHD, depressive and anxiety disorders, and borderline personality disorder, as well as understanding how these conditions affect various, as yet underexplored, areas of functioning, is of considerable importance. Another significant phenomenon linking ADHD with its comorbid disorders is emotional dysregulation (ED). Emotional dysregulation is one of the most prominent features associated with ADHD and is defined as difficulties in flexibly modulating emotional states in a goal-directed manner. More specifically, ED refers to the inability to manage and modulate emotional states within adaptive, goal-oriented behavioural processes

(Shaw, et al., 2014). It has been estimated that ED occurs in 30–70% of individuals with ADHD, irrespective of the presence of psychiatric comorbidities (Ben-Dor Cohen et al., 2024; Shaw et al., 2014). Moreover, ED is associated with greater ADHD symptom severity (Corbisiero et al., 2017), higher rates of symptom persistence, the co-occurrence of other psychiatric disorders, and poorer social and occupational adjustment (Materna et al., 2019). Emotional dysregulation encompasses various difficulties, including the frequent use of maladaptive cognitive emotion regulation strategies (Mayer et al., 2022). Reliance on maladaptive emotion regulation strategies in ADHD has been associated with increased severity of co-occurring anxiety symptoms (Bodalski et al., 2019) and depressive symptoms (Knouse, et al., 2013). Furthermore, individuals with ADHD more frequently report using maladaptive strategies such as blaming others and rumination, similarly to individuals with borderline personality disorder (Rüfenacht et al., 2019). Comparable findings were reported by Mayer et al. (2022), who demonstrated that individuals with ADHD more frequently employed self-blame, catastrophising, and rumination. Moreover, the same study found that these maladaptive strategies, together with less frequent use of adaptive strategies such as cognitive reappraisal, may be associated with an increased risk of developing depression among adolescents and young adults with ADHD. Notably, even after excluding participants with a comorbid diagnosis of depression, individuals with ADHD continued to report greater use of maladaptive emotion regulation strategies compared with healthy controls (Mayer et al., 2022). In an experimental study on sadness regulation, Matthies and colleagues (2014b) found that adults with ADHD who employed emotional suppression experienced prolonged emotional overload and significantly increased parasympathetic nervous system activation compared with individuals who used acceptance-based strategies. Moreover, adults with ADHD report more frequent use of emotional suppression and lower emotion regulation competencies than neurotypical individuals, despite not differing from control participants in their overt use of adaptive emotion regulation strategies

(Materna et al., 2019). However, Liu et al. (2022) demonstrated that individuals with ADHD were more likely to use expressive suppression than cognitive reappraisal to regulate emotions. Interestingly, greater use of emotional suppression in this group was associated with lower levels of emotional dysregulation, an effect that was not observed among healthy individuals. The studies reviewed above highlight the substantial impact of emotion regulation difficulties and impairments in the use of cognitive emotion regulation strategies on the daily functioning of adults with ADHD (Ben-Dor Cohen et al., 2024; Bodalski et al., 2019; Liu et al., 2022; Mayer et al., 2022; Materna et al., 2019; Matthies et al., 2014b; Rüfenacht et al., 2019; Soler-Gutiérrez et al., 2023). Nevertheless, the number of studies investigating emotional dysregulation and emotion regulation strategies in ADHD remains insufficient to allow definitive conclusions to be drawn, particularly in relation to other clinical variables such as symptoms of anxiety, depression, and borderline personality disorder.

The present study aims to assess adaptive and maladaptive emotion regulation strategies among adults with and without ADHD and to examine the relationships between these variables and symptoms of anxiety, depression, and borderline personality disorder.

## **2. Material and methods**

### **2.1. Participants**

A total of 494 adults aged between 18 and 65 years participated in the study. Following the exclusion of participants who did not meet the eligibility criteria, the final sample comprised 431 individuals. The exclusion criteria included: failure to provide informed consent to participate in the study, psychotic disorders (i.e., schizophrenia, schizoaffective disorder, and delusional disorder), bipolar disorder, organic central nervous system (CNS) damage, current substance use disorder, and intellectual disability. The sample included 135 men ( $M = 34.90$ ,  $SD = 9.10$ ; 31.30%),

274 women ( $M = 33.50$ ,  $SD = 9.39$ ; 63.60%), and 22 individuals identifying as non-binary ( $M = 27.70$ ,  $SD = 6.91$ ; 5.10%). Most participants had completed higher education (58.90%) or secondary education (21.10%). Most respondents were employed (65.20%) and resided in cities with populations exceeding 500,000 inhabitants (55.20%). The clinical group consisted of adults with a clinical diagnosis of ADHD made by a psychiatrist ( $n = 216$ ;  $M = 33.13$ ,  $SD = 8.40$ ), whereas the control group comprised adults from the general population without a clinical diagnosis of ADHD ( $n = 215$ ;  $M = 34.18$ ,  $SD = 10.10$ ). Among participants in the ADHD group, a number of individuals had also been diagnosed with comorbid psychiatric disorders, including depressive disorders ( $n = 78$ ), anxiety disorders ( $n = 66$ ), personality disorders ( $n = 30$ ), autism spectrum disorder (ASD;  $n = 18$ ), behavioural addictions ( $n = 10$ ), and post-traumatic stress disorder (PTSD;  $n = 8$ ). One hundred and fifty participants in the ADHD group were receiving pharmacological treatment at the time of the study. The medications used included anxiolytics (e.g., pregabalin and buspirone), selective serotonin reuptake inhibitors (SSRIs; e.g., sertraline, escitalopram, citalopram, paroxetine, and fluoxetine), serotonin antagonist and reuptake inhibitors (SARIs; e.g., trazodone), noradrenergic and specific serotonergic antidepressants (NaSSAs; e.g., mirtazapine), serotonin–noradrenaline reuptake inhibitors (SNRIs; e.g., venlafaxine and duloxetine), noradrenaline–dopamine reuptake inhibitors (NDRIs; e.g., bupropion and methylphenidate), psychostimulants (e.g., lisdexamfetamine and methylphenidate), selective noradrenaline reuptake inhibitors (NERIs; e.g., atomoxetine), antihistamines (e.g., promethazine and hydroxyzine), anticonvulsants (e.g., lamotrigine, valproic acid, and carbamazepine), atypical antipsychotics (e.g., quetiapine, olanzapine, and aripiprazole), and benzodiazepines (e.g., diazepam and alprazolam).

The study protocol received ethical approval from the Ethics Committee of the Institute of Psychology at Cardinal Stefan Wyszyński University in Warsaw (UKSW) (approval no. 38/2025).

## 2.2. Methods

The following research hypotheses were formulated:

1. Adults with ADHD will report more frequent use of maladaptive emotion regulation strategies and less frequent use of adaptive emotion regulation strategies than individuals in the control group.
2. Levels of anxiety, depression, and BPD symptoms will be significantly higher in the clinical group than in the control group.
3. Adaptive emotion regulation strategies will be negatively correlated with levels of anxiety, depression, and borderline personality symptoms, whereas maladaptive strategies will be positively correlated with higher levels of anxiety, depression, and borderline personality symptoms.
4. Adaptive and maladaptive emotion regulation strategies will significantly predict symptoms of anxiety, depression, and borderline personality disorder.

The study employed a sociodemographic questionnaire and the following standardised psychometric instruments:

1. Adult ADHD Self-Report Scale (ASRS-v1.1) (Adler, Faraone, Sarocco, Atkins, & Khachatryan, 2019) – a self-report screening questionnaire designed to assess the severity of attention-deficit/hyperactivity disorder (ADHD) symptoms according to the diagnostic criteria proposed in the DSM-IV. The instrument comprises 18 items assessing symptoms of impulsivity, hyperactivity, and inattention. The first part (6 items), known as the ASRS-v1.1 Screener, has previously been validated as an effective tool for identifying adults at risk of ADHD, whereas the second part (12 items) assesses symptom frequency. The questionnaire measures symptoms across two domains—inattention and hyperactivity/impulsivity—in accordance with DSM-IV criteria. The instrument yields a total score. Internal consistency in the present sample was high (McDonald's  $\omega$  with a 95% confidence interval [MLR] = 0.91 [0.90–0.93]).
2. Cognitive Emotion Regulation Questionnaire (CERQ) (Garnefski & Kraaij, 2007) – the Polish adaptation developed by Marszał-Wiśniewska and Fajkowska (2010) was used. The instrument is designed to assess nine cognitive emotion regulation strategies across 36 items, comprising the following subscales: acceptance, planning, positive refocusing, positive reappraisal, putting into perspective, self-blame, other-blame, rumination, and catastrophising. Reliability coefficients for the subscales in the present sample ranged from low to high ( $\omega$  ranging from 0.69 to 0.86 [95% CI: 0.64–0.83 to 0.74–0.88]).
3. Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003) – a measure assessing two emotion regulation strategies: cognitive reappraisal and expressive suppression. The questionnaire consists of 10 items divided into two subscales: cognitive reappraisal (6 items) and expressive suppression (4 items). The Polish version of the instrument was employed in the present study (Larionow, Mudło-Głagolska, & Preece, 2025). Both subscales demonstrated satisfactory internal consistency in the study sample ( $\omega$  ranging from 0.79 to 0.87 [95% CI: 0.76–0.84 to 0.82–0.89]).
4. Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983) – the Polish adaptation by Karakuła et al. (1996) was used. The instrument is designed to assess levels of anxiety and depression and consists of 14 items divided into two subscales: anxiety and depression, each comprising seven items. Responses are provided on a four-point Likert scale ranging from 0 to 3. Both subscales demonstrated satisfactory internal consistency in the present sample ( $\omega$  ranging from 0.80 to 0.89 [95% CI: 0.77–0.87 to 0.82–0.90]).
5. The BPD Checklist (Bloo, Arntz, & Schouten, 2017) – a self-report questionnaire consisting of 47 items designed to assess the subjective burden associated with borderline personality disorder symptoms experienced during the preceding month. The items were developed based on the DSM-IV diagnostic criteria for BPD, the literature describing manifestations of borderline personality pathology, and clinical observations. The Polish adaptation developed by

Piotr Czyżewski and Agnieszka Popiel was used in the present study (Bloo et al., 2017). Internal consistency of the total score in the present sample was very high (McDonald's  $\omega = 0.96$ ).

### 3. Results

H1: It was examined whether there were statistically significant differences between the clinical and control groups in the frequency of using adaptive and maladaptive emotion regulation strategies. An independent-samples Student's t-test was conducted, with ADHD diagnosis (yes vs. no) as the independent variable and 11 emotion regulation strategies as the dependent variables. These comprised five mal-

adaptive emotion regulation strategies (expressive suppression, self-blame, other-blame, rumination, and catastrophising) and six adaptive emotion regulation strategies (cognitive reappraisal, acceptance, planning, positive refocusing, positive reappraisal, and putting into perspective). The results are presented in Table 1.

It was observed that the clinical group reported more frequent use of maladaptive emotion regulation strategies, including self-blame ( $p = 0.006$ ) and rumination ( $p = 0.001$ ). In contrast, the frequency of using adaptive emotion regulation strategies was largely comparable between the clinical and control groups. The only exception was positive refocusing, which was used less frequently by individuals with ADHD ( $p = 0.033$ ).

Table 1. Comparison of the clinical and control groups in terms of emotion regulation and emotion regulation strategies

| Variables                      | Clinical<br><i>N</i> = 216 |           | Control<br><i>N</i> = 215 |           | <i>T</i> | <i>df</i> | <i>p</i> | <i>d</i><br>Cohen's |
|--------------------------------|----------------------------|-----------|---------------------------|-----------|----------|-----------|----------|---------------------|
|                                | <i>M</i>                   | <i>SD</i> | <i>M</i>                  | <i>SD</i> |          |           |          |                     |
| ERQ: Cognitive Reappraisal     | 25.53                      | 7.82      | 26.30                     | 7.99      | -1.01    | 429       | 0.312    | -0.10               |
| ERQ: Expressive Suppression    | 15.64                      | 5.46      | 15.28                     | 6.15      | 0.64     | 423       | 0.521    | 0.06                |
| CERQ: Acceptance               | 13.77                      | 2.94      | 14.20                     | 2.88      | -1.52    | 429       | 0.129    | -0.15               |
| CERQ: Refocus on planning      | 15.33                      | 3.10      | 15.37                     | 3.49      | -0.12    | 423       | 0.903    | -0.01               |
| CERQ: Positive refocusing      | 10.58                      | 3.65      | 11.33                     | 3.63      | -2.14    | 429       | 0.033    | -0.21               |
| CERQ: Positive reappraisal     | 13.81                      | 3.77      | 14.17                     | 3.76      | -0.97    | 429       | 0.331    | -0.09               |
| CERQ: Putting into perspective | 12.33                      | 3.77      | 12.80                     | 3.52      | -1.33    | 429       | 0.185    | -0.13               |
| CERQ: Self-blame               | 13.69                      | 3.56      | 12.74                     | 3.54      | 2.78     | 429       | 0.006    | 0.27                |
| CERQ: Other-blame              | 10.62                      | 3.56      | 10.49                     | 3.43      | 0.38     | 429       | 0.705    | 0.04                |
| CERQ: Rumination               | 15.51                      | 3.27      | 14.42                     | 3.37      | 3.42     | 429       | 0.001    | 0.33                |
| CERQ: Catastrophizing          | 10.48                      | 4.12      | 10.46                     | 3.75      | 0.04     | 429       | 0.966    | 0.00                |

Note. *N* = sample size; *M* = mean; *SD* = standard deviation; *T*(*df*) = Student's t-test statistic; *p* = *p*-value; Cohen's *d* = effect size.

Table 2. Comparison of the clinical group and the control group in terms of clinical variables

| Variables                      | Clinical<br><i>N</i> = 216 |           | Control<br><i>N</i> = 215 |           | <i>T</i> | <i>df</i> | <i>p</i> | <i>d</i><br>Cohen's |
|--------------------------------|----------------------------|-----------|---------------------------|-----------|----------|-----------|----------|---------------------|
|                                | <i>M</i>                   | <i>SD</i> | <i>M</i>                  | <i>SD</i> |          |           |          |                     |
| HADS: Anxiety                  | 12.03                      | 4.54      | 10.19                     | 5.17      | 3.93     | 421       | <0.001   | 0.38                |
| HADS: Depression               | 7.47                       | 4.25      | 6.64                      | 4.25      | 2.03     | 429       | 0.043    | 0.19                |
| BPD: Borderline symptomatology | 112.67                     | 36.27     | 102.02                    | 35.21     | 3.09     | 429       | 0.002    | 0.30                |

Note. *N* = sample size; *M* = mean; *SD* = standard deviation; *T*(*df*) = Student's t-test statistic; *p* = significance level (*p*-value); Cohen's *d* = effect size.

Table 3. Correlations between emotion regulation and its strategies and clinical variables in the clinical and control groups

| Variable                       | Group   | HADS: Anxiety | HADS: Depression | BPD: Borderline |
|--------------------------------|---------|---------------|------------------|-----------------|
| ERQ: Cognitive Reappraisal     | ADHD    | -0.28***      | -0.22**          | -0.17*          |
|                                | Control | -0.22**       | -0.22**          | -0.23**         |
| ERQ: Expressive Suppression    | ADHD    | 0.22**        | 0.23**           | 0.20**          |
|                                | Control | 0.16*         | 0.22**           | 0.20**          |
| CERQ: Acceptance               | ADHD    | -0.13         | -0.08            | -0.04           |
|                                | Control | 0.03          | -0.03            | 0.10            |
| CERQ: Refocus on planning      | ADHD    | -0.31***      | -0.25***         | -0.29***        |
|                                | Control | -0.28***      | -0.41***         | -0.32***        |
| CERQ: Positive refocusing      | ADHD    | -0.21**       | -0.24***         | -0.09           |
|                                | Control | -0.17*        | -0.18**          | -0.09           |
| CERQ: Positive reappraisal     | ADHD    | -0.19**       | -0.15*           | -0.08           |
|                                | Control | -0.31***      | -0.47***         | -0.31***        |
| CERQ: Putting into perspective | ADHD    | -0.01         | -0.09            | -0.01           |
|                                | Control | -0.05         | -0.20**          | -0.02           |
| CERQ: Self-blame               | ADHD    | 0.37***       | 0.15*            | 0.34***         |
|                                | Control | 0.43***       | 0.26***          | 0.47***         |
| CERQ: Other-blame              | ADHD    | 0.19**        | 0.17*            | 0.33***         |
|                                | Control | 0.22**        | 0.24***          | 0.20**          |
| CERQ: Rumination               | ADHD    | 0.39***       | 0.23**           | 0.43***         |
|                                | Control | 0.42***       | 0.21**           | 0.34***         |
| CERQ: Catastrophizing          | ADHD    | 0.46***       | 0.38***          | 0.42***         |
|                                | Control | 0.48***       | 0.40***          | 0.45***         |

\*\*\*  $p < 0,001$ ; \*\*  $p < 0,01$ ; \*  $p < 0,05$ .

H2: It was examined whether there were statistically significant differences between the clinical and control groups in the levels of clinical variables, namely anxiety symptoms, depressive symptoms, and borderline personality symptoms. An independent-samples Student's *t*-test was conducted, with ADHD diagnosis (yes vs. no) as the independent variable and the clinical variables (anxiety, depression, and borderline personality symptoms) as the dependent variables. The results are presented in Table 2.

The clinical group exhibited significantly higher levels of anxiety ( $p < 0,001$ ), depression ( $p = 0,043$ ), and borderline personality disorder symptoms ( $p = 0,002$ ) than the control group.

H3: It was examined whether there were statistically significant associations between individual psychopathological symptoms (i.e., anxiety, depression, and borderline personality disorder symptoms) and

emotion regulation strategies (cognitive reappraisal, expressive suppression, acceptance, planning, positive refocusing, positive reappraisal, putting into perspective, self-blame, other-blame, rumination, and catastrophising). Pearson's *r* correlations were conducted for variables with a normal distribution. The results are presented in Table 3.

Depression was found to be significantly negatively correlated, with weak to moderate effect sizes, with adaptive strategies, including cognitive reappraisal, planning, positive refocusing, positive reappraisal, and putting into perspective. Conversely, depression was significantly positively correlated, with weak to moderate effect sizes, with maladaptive emotion regulation strategies, including self-blame, other-blame, rumination, and catastrophising. The significance values ranged from  $p < 0,001$  to  $p = 0,032$ .

Table 4. Predictors of anxiety in the clinical and control groups

| Group    | Predictor variables         | <i>B</i> | <i>SE</i> | <i>Beta</i> | <i>t</i> | <i>R</i> <sup>2</sup> | <i>F</i> |
|----------|-----------------------------|----------|-----------|-------------|----------|-----------------------|----------|
| Clinical | (Constant)                  | 4.47     | 2.11      |             | 2.11*    | 0.32                  | 21.56*** |
|          | CERQ: Catastrophizing       | 0.26     | 0.08      | 0.24        | 3.48***  |                       |          |
|          | CERQ: Self-blame            | 0.22     | 0.08      | 0.17        | 2.77**   |                       |          |
|          | CERQ: Refocus on planning   | -0.28    | 0.09      | -0.19       | -3.16**  |                       |          |
|          | CERQ: Rumination            | 0.28     | 0.10      | 0.20        | 2.90**   |                       |          |
|          | ERQ: Expressive Suppression | 0.11     | 0.05      | 0.13        | 2.29*    |                       |          |
| Control  | (Constant)                  | 1.29     | 1.91      |             | 0.68     | 0.40                  | 29.65*** |
|          | CERQ: Catastrophizing       | 0.27     | 0.10      | 0.20        | 2.84**   |                       |          |
|          | CERQ: Self-blame            | 0.43     | 0.09      | 0.29        | 4.85***  |                       |          |
|          | CERQ: Refocus on planning   | -0.41    | 0.08      | -0.27       | -4.96*** |                       |          |
|          | CERQ: Rumination            | 0.33     | 0.10      | 0.22        | 3.28**   |                       |          |
|          | CERQ: Other-blame           | 0.20     | 0.09      | 0.13        | 2.20*    |                       |          |

Note. *B* = unstandardised regression coefficient; *SE* = standard error;  $\beta$  = standardised regression coefficient; *t* = t-test statistic; *R*<sup>2</sup> = coefficient of determination; *F* = ANOVA statistic. \*\*\*  $p < 0,001$ ; \*\*  $p < 0,01$ ; \*  $p < 0,05$ .

Table 5. Predictors of depression in the clinical and control groups

| Group    | Predictor variables         | <i>B</i> | <i>SE</i> | <i>Beta</i> | <i>t</i> | <i>R</i> <sup>2</sup> | <i>F</i> |
|----------|-----------------------------|----------|-----------|-------------|----------|-----------------------|----------|
| Clinical | (Constant)                  | 3.78     | 1.37      |             | 2.75**   | 0.19                  | 17.91*** |
|          | CERQ: Catastrophizing       | 0.33     | 0.07      | 0.32        | 5.10***  |                       |          |
|          | ERQ: Expressive Suppression | 0.14     | 0.05      | 0.17        | 2.80**   |                       |          |
|          | CERQ: Positive refocusing   | -0.18    | 0.07      | -0.16       | -2.46*   |                       |          |
| Control  | (Stała)                     | 7.79     | 1.74      |             | 4.49***  | 0.35                  | 24.46*** |
|          | CERQ: Catastrophizing       | 0.21     | 0.08      | 0.18        | 2.72**   |                       |          |
|          | CERQ: Positive reappraisal  | -0.26    | 0.08      | -0.23       | -3.26**  |                       |          |
|          | CERQ: Refocus on planning   | -0.30    | 0.08      | -0.25       | -3.58*** |                       |          |
|          | CERQ: Self-blame            | 0.24     | 0.07      | 0.20        | 3.37***  |                       |          |
|          | CERQ: Other-blame           | 0.18     | 0.07      | 0.15        | 2.34*    |                       |          |

Note. *B* = unstandardised regression coefficient; *SE* = standard error;  $\beta$  = standardised regression coefficient; *t* = t-test statistic; *R*<sup>2</sup> = coefficient of determination; *F* = ANOVA statistic. \*\*\*  $p < 0,001$ ; \*\*  $p < 0,01$ ; \*  $p < 0,05$ .

Regarding borderline personality disorder symptoms, significant negative correlations of weak to moderate strength were observed with the following adaptive emotion regulation strategies: cognitive reappraisal, planning, and positive reappraisal. Positive correlations were observed with maladaptive strategies, including self-blame, other-blame, rumination, and catastrophising. The significance values ranged from  $p < 0,001$  to  $p = 0,035$ .

A similar pattern of associations was observed in the control group, where higher levels of clinical variables were associated with lower levels of adaptive strategies and higher levels of maladaptive strategies.

H4: To determine which emotion regulation strategies serve as predictors of anxiety symptoms, depressive symptoms, and borderline personality disorder symptoms, a stepwise multiple regression analysis was conducted. The explanatory variables were emotion regulation strategies, whereas the dependent variables were anxiety symptoms, depres-

Table 6. Predictors of borderline symptomatology in the clinical and control groups

| Group    | Predictor variables         | <i>B</i> | <i>SE</i> | <i>Beta</i> | <i>t</i> | <i>R</i> <sup>2</sup> | <i>F</i> |
|----------|-----------------------------|----------|-----------|-------------|----------|-----------------------|----------|
| Clinical | (Constant)                  | 20.73    | 13.90     |             | 1.49     | 0.40                  | 25.09*** |
|          | CERQ: Catastrophizing       | 2.75     | 0.49      | 0.37        | 5.66***  |                       |          |
|          | CERQ: Rumination            | 1.90     | 0.60      | 0.21        | 3.16**   |                       |          |
|          | CERQ: Positive refocusing   | -3.02    | 0.63      | -0.31       | -4.79*** |                       |          |
|          | CERQ: Positive reappraisal  | 2.51     | 0.53      | 0.31        | 4.71***  |                       |          |
|          | ERQ: Expressive Suppression | 0.84     | 0.30      | 0.15        | 2.78**   |                       |          |
|          | CERQ: Self-blame            | 1.08     | 0.51      | 0.13        | 2.12*    |                       |          |
| Control  | (Constant)                  | 47.05    | 10.58     |             | 4.45***  | 0.39                  | 35.61*** |
|          | CERQ: Catastrophizing       | 1.64     | 0.49      | 0.21        | 3.32**   |                       |          |
|          | CERQ: Positive refocusing   | -2.33    | 0.45      | -0.28       | -5.16*** |                       |          |
|          | CERQ: Self-blame            | 3.36     | 0.47      | 0.41        | 7.13***  |                       |          |
|          | CERQ: Other-blame           | 1.43     | 0.51      | 0.17        | 2.78**   |                       |          |

Note. *B* = unstandardised regression coefficient; *SE* = standard error;  $\beta$  = standardised regression coefficient; *t* = t-test statistic; *R*<sup>2</sup> = coefficient of determination; *F* = ANOVA statistic. \*\*\*  $p < 0,001$ ; \*\*  $p < 0,01$ ; \*  $p < 0,05$ .

sive symptoms, and borderline personality disorder symptoms. The results for anxiety symptoms are presented in Table 4, for depressive symptoms in Table 5, and for borderline personality disorder symptoms in Table 6.

In the clinical group, five emotion regulation strategies were identified as statistically significant predictors of anxiety symptoms: catastrophising, self-blame, planning, rumination, and expressive suppression. Together, these strategies explained 32% of the variance in anxiety symptoms. Higher levels of anxiety were associated with greater use of catastrophising ( $p < 0,001$ ), self-blame ( $p = 0,006$ ), rumination ( $p = 0,002$ ), and expressive suppression ( $p = 0,023$ ), as well as with lower levels of the adaptive strategy of planning ( $p < 0,002$ ). The strongest predictor was catastrophising ( $\beta = 0,24$ ). Emotion regulation strategies such as cognitive reappraisal, positive refocusing, positive reappraisal, and other-blame did not constitute significant predictors of anxiety symptoms ( $p > 0,05$ ).

In the control group, a different regression model was obtained, including five emotion regulation strategies as predictors of anxiety symptoms: catastrophising, self-blame, planning, rumination, and other-blame. Together, these strategies explained 40% of the variance in anxiety symptoms. Higher

levels of anxiety were associated with greater use of maladaptive emotion regulation strategies, including catastrophising ( $p = 0,005$ ), self-blame ( $p < 0,001$ ), rumination ( $p = 0,001$ ), and other blame ( $p = 0,029$ ), as well as with lower levels of the adaptive strategy of planning ( $p < 0,001$ ). Cognitive reappraisal, expressive suppression, positive refocusing, and positive reappraisal did not represent significant predictors of anxiety symptoms ( $p > 0,05$ ).

The best-fitting regression model in the clinical group included three emotion regulation strategies as predictors of depressive symptoms: catastrophising, expressive suppression, and positive refocusing. Together, these strategies explained 19% of the variance in depressive symptoms. Higher levels of depression were associated with greater use of catastrophising ( $p < 0,001$ ) and expressive suppression ( $p = 0,006$ ), as well as with lower levels of positive refocusing ( $p = 0,015$ ). Maladaptive strategies, including self-blame, other-blame, and rumination, as well as adaptive strategies such as cognitive reappraisal, planning, and putting into perspective, did not represent significant predictors of depressive symptoms ( $p > 0,05$ ).

In the control group, a similar regression model was obtained, including five emotion regulation strategies as predictors of depressive symptoms: catastrophising, positive reappraisal, planning, self-blame,

and other-blame. Together, these strategies explained 35% of the variance in depressive symptoms. Higher levels of depression were associated with greater use of catastrophising ( $p = 0,007$ ), self-blame ( $p < 0,001$ ), and other-blame ( $p = 0,02$ ), as well as with lower levels of positive reappraisal ( $p = 0,001$ ) and planning ( $p < 0,001$ ). Emotion regulation strategies such as cognitive reappraisal, expressive suppression, positive refocusing, putting into perspective, and rumination did not represent significant predictors of depressive symptoms ( $p > 0,05$ ).

In the clinical group, the model identified six emotion regulation strategies as statistically significant predictors of borderline symptomatology: catastrophising, rumination, planning, positive reappraisal, expressive suppression, and self-blame, which together accounted for 40% of the variance in borderline symptoms. Higher levels of borderline symptomatology were associated with higher levels of catastrophising ( $p < 0.001$ ), rumination ( $p = 0.002$ ), expressive suppression ( $p = 0.006$ ), and positive reappraisal ( $p < 0.001$ ), as well as lower levels of planning ( $p < 0.001$ ). The maladaptive strategy of blaming others and the adaptive strategy of cognitive reappraisal were not significant predictors of borderline symptomatology ( $p > 0.05$ ).

In the control group, a similar regression model was obtained, including four emotion regulation strategies as predictors: catastrophising, planning, self-blame, and blaming others, which together accounted for 39% of the variance in borderline symptoms. Higher levels of borderline symptomatology were associated with higher levels of catastrophising ( $p = 0.001$ ), self-blame ( $p < 0.001$ ), and blaming others ( $p = 0.006$ ), as well as lower levels of planning ( $p < 0.001$ ). Emotion regulation strategies such as cognitive reappraisal, expressive suppression, positive reappraisal, and rumination were not significant predictors of borderline symptomatology ( $p > 0.05$ ).

## 4. Discussion

The aim of the present study was to assess adaptive and maladaptive emotion regulation strategies among adults with and without ADHD and to examine

the relationships between emotion regulation and borderline personality disorder (BPD) traits, anxiety, and depression. The findings indicated that, compared with the control group, individuals with ADHD more frequently employed maladaptive emotion regulation strategies, such as self-blame and rumination. This finding is consistent with the limited literature available on the topic. Rüfenacht et al. (2019) demonstrated that individuals with ADHD, compared with healthy controls, more frequently used self-blame and rumination, which is in line with the findings of the present study. Similarly, Mayer et al. (2022) observed that individuals with ADHD more frequently relied on maladaptive emotion regulation strategies, including self-blame, rumination, and catastrophising. The partial replication of these findings is particularly important, as previous research suggests that more frequent use of maladaptive emotion regulation strategies adversely affects emotional and cognitive functioning among individuals with ADHD (Ben-Dor Cohen et al., 2024; Soler-Gutiérrez et al., 2023). Regarding adaptive strategies, no significant differences were observed between the clinical and control groups for most strategies, with the exception of one, namely positive refocusing (referred to in the original measure as cognitive reappraisal). One possible explanation for this finding is that the control group may have included individuals with undiagnosed ADHD. This interpretation is supported by the statistics reported by Gondek et al. (2024), which indicate that only a small proportion of adults in Poland have received a clinical diagnosis of ADHD, a figure that is inconsistent with prevalence estimates reported in other countries.

The clinical group exhibited significantly higher levels of anxiety, depression, and borderline symptomatology compared with the control group. This finding is consistent with the existing literature on psychiatric comorbidity in ADHD, which indicates that individuals with ADHD are statistically more likely to experience other mental disorders over the course of their lifetime (Shen & Zhou, 2024). The most common psychiatric conditions co-occurring with ADHD include anxiety disorders (Fayyad et al., 2017; Fu et al., 2025; Quenneville et al., 2022),

depressive disorders (D'Agati et al., 2019; Fayyad et al., 2017; Fu et al., 2025; Giacobini et al., 2023; Mayer et al., 2021; Powell et al., 2021), and borderline personality disorder (Ditrich et al., 2021; MacDonald & Sadek, 2023; Matthies & Philipsen, 2014; Weiner et al., 2019). Moreover, the symptoms associated with these disorders frequently overlap with those of ADHD (Ditrich et al., 2021; Fu et al., 2025; Matthies & Philipsen, 2014; Weiner et al., 2019), which presents an additional diagnostic challenge in terms of accurately distinguishing between these conditions. It is possible that self-report measures are not sufficiently sensitive to differentiate ADHD from other psychiatric disorders, such as anxiety disorders, depressive disorders, or personality disorders. This issue warrants further investigation in future research. The statistical analyses conducted in the present study confirmed significant correlations between emotion regulation strategies and symptoms of anxiety, depression, and borderline symptomatology in both the clinical and control groups. Adaptive emotion regulation strategies were associated with lower levels of psychopathological symptoms, whereas maladaptive strategies were associated with greater clinical symptom severity. These findings are consistent with the existing literature demonstrating that anxiety, depression, and borderline personality disorder are associated with higher levels of emotional dysregulation (Ditrich et al., 2021; Matthies & Philipsen, 2014; Young et al., 2019), as well as lower use of adaptive and greater use of maladaptive emotion regulation strategies (Bodalski et al., 2019; Rüfenacht et al., 2019; Mayer et al., 2022; Young et al., 2019). Mayer et al. (2022) demonstrated that more frequent use of maladaptive strategies and less frequent use of adaptive strategies, such as cognitive reappraisal, may increase the risk of developing depression among adolescents and young adults with ADHD, even after excluding individuals with depressive disorders. Likewise, the use of maladaptive emotion regulation strategies has been associated with greater severity of anxiety symptoms (Bodalski et al., 2019). In a study examining the relationships between neuroticism, depressive symptoms, and the moderating role of emotion regulation strategies, Liu, C. et al., (2020) reported partial correlations

among neuroticism, emotion regulation strategies, and depressive symptoms. Maladaptive strategies were positively associated with depressive symptoms, whereas adaptive strategies were negatively associated with depression. Furthermore, a meta-analysis conducted by Yao et al., (2023), focusing on the relationship between anxiety and cognitive emotion regulation strategies, demonstrated that anxiety was significantly positively associated with maladaptive strategies and negatively associated with adaptive strategies. This relationship was particularly evident for positive reappraisal and planning. Interestingly, however, acceptance was positively associated with anxiety. Research addressing these relationships remains relatively limited. Consequently, one of the major strengths of the present study is the inclusion of clinically relevant variables—namely anxiety, depression, and borderline symptomatology—in the investigation of emotion regulation among individuals with ADHD (D'Agati et al., 2019; Ditrich et al., 2021; Fu et al., 2025; Matthies & Philipsen, 2014; Powell et al., 2021; Quenneville et al., 2022; Weiner et al., 2019). It should also be noted that significant correlations between clinical symptoms (i.e., anxiety, depression, and borderline symptomatology) and emotion regulation strategies were observed within the control group. This finding may reflect the increasing prevalence of psychopathological symptoms, particularly anxiety and depressive symptoms, in the general population (Gajewski & Kucharska, 2023). Maladaptive emotion regulation strategies, including catastrophising, self-blame, rumination, and expressive suppression, as well as the adaptive strategy of planning, emerged as statistically significant predictors of anxiety in the clinical group. Maladaptive strategies predicted higher levels of anxiety, whereas planning was associated with lower anxiety severity. In turn, the emotion regulation strategies that significantly predicted depressive symptoms in the clinical group were catastrophising, expressive suppression, and positive refocusing. Maladaptive strategies were associated with higher levels of depression, while positive refocusing predicted lower levels of depressive symptom severity. With regard to borderline symptomatology, significant predictors included catastrophising, rumination, expressive sup-

pression, self-blame, planning, and positive reappraisal. Maladaptive strategies and, interestingly, positive reappraisal predicted higher levels of borderline symptom severity, whereas planning was associated with lower levels of these symptoms. Referring to the limited body of literature addressing these issues, D'Avanzato et al., (2013), in a study involving individuals with major depressive disorder, individuals in remission, individuals with social anxiety disorder, and healthy controls, demonstrated that rumination predicted greater anxiety symptom severity. Interestingly, however, expressive suppression did not emerge as a significant predictor of anxiety in that study. Similarly, Garnefski and Kraaij (2018), in a sample of adolescents aged 13 to 16 years, reported that, after controlling for depressive symptoms, anxiety symptoms were uniquely associated with two maladaptive emotion regulation strategies—catastrophising and self-blame. In the same study, after statistically controlling for anxiety symptoms, depressive symptoms were associated with rumination, self-blame, positive reappraisal, and positive refocusing, with the latter two strategies demonstrating negative associations with depressive symptoms, suggesting their potential protective role against the development of depressive disorders. Bodalski et al. (2019) found that cognitive reappraisal and expressive suppression predicted anxiety symptoms; however, experiential and cognitive-behavioural avoidance demonstrated the strongest predictive power in explaining anxiety severity. Similar findings were obtained for depressive symptoms in an earlier study conducted by Knouse et al. (2013), in which both forms of avoidance predicted greater severity of depressive symptoms. Liu et al. (2020) likewise reported that maladaptive emotion regulation strategies significantly predicted depressive symptoms and were associated with greater symptom severity, whereas adaptive strategies contributed to lower levels of depressive symptomatology. Interestingly, Zaid et al., (2025) found that rumination was associated with lower levels of anxiety, whereas expressive suppression was not significantly related to anxiety. This finding is noteworthy, as it is not only counterintuitive but also inconsistent with the results of the present study. As previously reported by

Rüfenacht et al. (2019), individuals with ADHD exhibited a maladaptive emotion regulation profile similar to that observed in individuals with borderline personality disorder. Therefore, it is unsurprising that maladaptive emotion regulation strategies predicted higher levels of borderline symptomatology in the present regression analyses. Previous studies have consistently demonstrated that individuals with borderline personality disorder or borderline personality traits are more likely to employ maladaptive emotion regulation strategies (McLachlan et al., 2021; Murgueitio et al., 2025; Salgó et al., 2021). Moreover, a systematic review conducted by Bud et al., (2023) confirmed a strong association between emotion regulation strategies and borderline symptomatology. Nevertheless, studies investigating emotion regulation strategies as predictors of borderline symptoms remain scarce. Houben et al. (2023) demonstrated that borderline personality traits were associated with maladaptive emotion regulation strategies, such as rumination and suppression, as well as adaptive strategies, including cognitive reappraisal and attentional distraction. Depressive symptoms, as might be expected, were associated with maladaptive strategies (i.e., suppression and rumination); however, somewhat surprisingly, they were not significantly associated with adaptive emotion regulation strategies. When examining depressive symptoms and borderline personality traits simultaneously, several common patterns emerged. Both constructs were associated with rumination and expressive suppression, suggesting that emotional dysregulation may represent a transdiagnostic characteristic shared across a range of psychiatric disorders. This interpretation is consistent with theoretical models of emotion dysregulation (Grazt & Roemer, 2004, as cited in Ben-Dor Cohen et al., 2021) and with empirical findings reported in previous studies (Ditrich et al., 2021; Houben et al., 2023; Matthies & Philipsen, 2014; Young et al., 2019). Unfortunately, the number of studies investigating emotion regulation strategies and symptoms of anxiety and depression in adults remains limited, particularly among individuals with ADHD. Likewise, the current literature examining emotion regulation strategies and borderline personality traits

is relatively sparse. Consequently, the present study may be considered to contribute novel evidence to this field of research. At the same time, the limited evidence base highlights the need for further investigations into the relationships between emotion regulation and psychopathological symptoms—such as anxiety, depression, and personality disorder traits—not only in adults with ADHD but also across broader clinical and non-clinical populations.

## **Summary, limitations, and future research directions**

The findings of the present study confirm that individuals with ADHD are more likely to employ maladaptive emotion regulation strategies, such as rumination and self-blame, which may contribute to greater psychological difficulties within this population. At the same time, their use of most adaptive emotion regulation strategies appears to be comparable to that of individuals without ADHD, except for less frequent use of positive refocusing. This may indicate specific deficits in emotional regulation flexibility among individuals with ADHD.

The results also demonstrated elevated levels of anxiety, depressive symptoms, and borderline symptomatology among individuals with ADHD, which is consistent with the well-established phenomenon of psychiatric comorbidity reported in the literature.

Significant associations between emotion regulation strategies and psychopathological symptoms were observed in both the clinical and control groups, highlighting the importance of emotion regulation as a factor related to psychological functioning. This was further supported by the predictor analyses, which demonstrated that emotion regulation strategies significantly predicted the severity of clinical variables, such as anxiety, depression, and borderline personality traits, in both groups. Furthermore, the findings suggest that emotional dysregulation is a phenomenon of central importance not only in ADHD but also across a range of other mental health conditions. One of the major strengths of the present study is its innovative character. To date, few studies have simultaneously examined the relation-

ships between emotion regulation strategies and clinical variables—including anxiety symptoms, depressive symptoms, and borderline personality traits—within a population of adults with ADHD. Another strength of the study is its relatively large sample size, comprising 431 adults aged between 18 and 65 years. The clinical and control groups were comparable in size, allowing basic statistical analyses to be conducted with high statistical power within each subgroup. In addition, participant recruitment was carefully controlled and based on clearly defined inclusion criteria, resulting in relatively homogeneous study groups. A further strength of the study was the use of multiple reliable and well-standardised psychometric instruments, which enabled a comprehensive examination of the relationships between emotion regulation strategies and the psychopathological variables investigated.

One of the principal limitations of the study is its cross-sectional design. This methodology does not permit causal inferences to be drawn and allows only for the identification of associations between the variables examined. Although the regression models enabled the identification of significant predictors of anxiety, depression, and borderline personality traits, longitudinal research is required to determine the directionality of these relationships and to examine the dynamics of the observed phenomena over time.

Future studies should investigate these relationships across the three diagnostic presentations of ADHD and employ ecological methods for assessing the dynamic nature of emotion regulation, such as Ecological Momentary Assessment (EMA), within large clinical ADHD samples. Mental health professionals should pay particular attention to emotion regulation deficits not only among individuals with ADHD but also within the general population. Therapeutic interventions may benefit from focusing on modifying the frequency with which adaptive and maladaptive emotion regulation strategies are employed. Such interventions could potentially reduce the severity of psychopathological symptoms, including anxiety, depression, and borderline symptomatology, among individuals with ADHD and may consequently protect them from further psychological and psychiatric complications.

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# The debate over the conscience clause exercised by the healthcare professionals in Italy between 2023 and 2026<sup>1</sup>

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**Abstract:** The main goal of this article is to analyse the ethical and legal debate being held in Italy, that concerns the use of the conscience clause by healthcare professionals. The conscience clause refers to the possibility of stating one's refusal to carry out any legally accepted acts which a particular individual considers to be morally wrongful, as well as contrary to their personal beliefs. The conscience clause is a legal structure that supports the exercise of the right to conscientious objection. Within the Italian legal system there are two forms of stating the refusal to comply with legally binding clauses on the basis of personal worldview: it is possible to decline to perform the military service (which was compulsory in that country until 2004) and to exercise the medical principle of conscience clause. With regards to the medical doctors, pharmacists, nurses and midwives, the conscience clause applies in particular to performing medical procedures, such as assisted suicide for the elderly or the terminally ill, as well as to executing a surgical and/or pharmacological abortion or any prenatal diagnosis used to terminate the life of a human being with various forms of disabilities or else making use of human embryos for laboratory research, etc. In Italy, for many years there has been taking place an intense debate regarding the application of the conscience clause in the context of abortion procedures. In 2026, the Constitutional Court gave a ruling statement on this matter that reviewed the legislation in force in the Region of Sicily. The law passed by that regional parliament could have led to discrimination against any healthcare professionals that would exercise the conscience clause. The ruling of the Court reinforced the constitutional validity of the principle of conscientious objection and protected it from attacks by politicians and pro-choice activists. Besides, the pro-life groups regarded this ruling as a victory in favour of freedom of conscience, natural law, common sense and human rights. The debate over the conscience clause in Italy touches on many important issues at the intersection of law and ethics. Multiple analyses have shown that healthcare professionals should have the right guaranteed to refuse to perform any medical procedures that conflict with their moral and religious beliefs.

**Keywords:** medical abortion, bioethics, medical ethics, conscience clause, medically assisted suicide, Constitutional Court

## Introduction

In early 2026, the Italian Constitutional Court handed down a ruling concerning the use of the conscience clause by healthcare professionals, which implicates the right to refuse to carry out any lawful acts that conflict with one's personal moral and religious convictions (Corte Costituzionale, 2026, ). Having analysed the constitutionality of a law in force in the Region of Sicily (Legge regionale 5 giugno, n. 23, 2025), the judges of the Court confirmed the indisputable status of the medical conscience clause within the Italian legal system, and simultaneously ruled out the possibility of organising competitive for medical

staff aimed solely at candidates who do not exercise their right to conscientious objection. In the Italian bioethical debate, for many years both the left-wing and liberal circles have presented Sicily as one of the regions where women faced difficulties in having convenient access to abortion procedures, mainly due to high number of healthcare professionals who did not perform such medical procedures on the basis of the conscience clause.

The law adopted by the Regional Assembly of Sicily in mid-2025 (L.R. Siciliana n. 23/2025), was challenged before the Constitutional Court by the

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Koby.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Koby.pdf)

central government in Rome, which considered that one of the provisions of this legislation – specifically related to recruitment procedures – could be interpreted as seeking the way to establish a special type of public recruitment competitions that would be exclusively addressed to those medical doctors and nurses who do perform abortion procedures. In their judgement, the judges stated that the right to conscientious objection remains inviolable as a constitutional value, as it constitutes the deepest legal reflection on the universal idea of human dignity (Dalla Torre, 2003; Bianchi, 2023; Saporiti, 2023).

The Constitutional Court's defence of the conscience clause in the context of abortion procedures carried out by medical staff is an element of a long and intense bioethical debate being held in Italy. In recent years, the dispute over the medical conscience clause in that country has intensified, particularly following the enactment of a 2017 parliamentary act on "the living will", which involves the anticipatory expression of free will by an adult or a legal guardian, made whilst in full possession of their mental faculties, that concerns a possible future provision of or withholding of various types of medical procedures (Legge 22 dicembre, n. 219, 2017). The Italian law on the living will does not contain any provisions regarding the conscience clause. This has given rise to an ethical and legal problem, directly concerning medical staff who, for moral or religious reasons, are unwilling to comply with patient's wish to discontinue, amongst other things, artificial hydration and feeding treatments, that thereby will lead to their death (Campanelli, 2023; Gandola, 2026).

In recent years, the latest chapter in this very debate over the principle of conscientious objection in Italy has been the deliberation on various draft bills that included the legalisation of medically assisted suicide (Caporale, Palazzani, 2024; Spasiano, 2026). The most recent draft bill of this kind was proposed to the Italian Parliament in July 2025 (Disegno di legge S. 1408, 2025). In recent months, the consideration of this draft legislation has been accompanied in Italy by a lively public and parliamentary debate, a key element of which being the issue of the medical conscience clause.

What key information does the latest report from the Ministry of Health contain regarding voluntary termination of pregnancy in Italy? Is it true that in Sicily the majority of gynaecologists invoke the conscience clause? What are the latest initiatives in the abortion debate being put forward by Italian pro-life and pro-choice groups? How in mid-2025 did the Sicilian Regional Assembly come to pass a law concerning, amongst other things, the principle of conscientious objection for healthcare professionals? What are the key arguments set out in the Constitutional Court's reasoning for its ruling on this law?

The main aim of this article is to provide an ethical and legal analysis of the dispute over the conscience clause for healthcare professionals in Italy and to present the most important elements of this bioethical debate between 2023 and 2026.

## 1. New developments in the ethical and legal dispute over abortion

In Italy, abortion was made legal in 1978 through the adoption of the Parliamentary Act No. 194 (Legge 22 maggio, n. 194, 1978). In this legislation, in the country commonly referred to as "the Act 194/1978", the new term called 'voluntary termination of pregnancy' (Italian: *l'interruzione volontaria di gravidanza*) was introduced to describe the abortion procedure. Consequently, in academic studies and public debate, the abbreviation IVG (the initial letters of the Italian term for 'voluntary termination of pregnancy') is very frequently used as a synonym for abortion. Every year, the Ministry of Health submits a report to the Parliament on the very implementation of the Act 194/1978. The most recent report, covering the year 2023, was submitted to the Members of Parliament on 6 March 2026. The full document runs to 84 pages, nine of which concern the application of the conscience clause in the context of voluntary termination of pregnancy procedures (Ministero della Salute, 2026, 59-67).

The report shows that in 2023 there were 65,746 abortions performed in Italy in accordance with the procedures set out in the Act 194/1978. The abortion rate – the number of abortions per 1,000 women of

childbearing age between 15 and 49 – remained unchanged from 2022 at 5.6 per thousand. Meanwhile, another abortion-related coefficient, i.e. the number of abortions per 1,000 live births rose by 3.6%, as compared to the preceding year. This means that – although the absolute number of abortions remained virtually unchanged – the number of live births continues to fall sharp: in 2023 there were 379,890 children born in Italy. The most significant change highlighted by this report concerns the methods used to perform abortions: the number of surgical procedures decreased, whilst the number of medical procedures that make use of two drugs – namely the mifepristone (the RU-486 pill) and the prostaglandins – increased. Medical abortions accounted for 59.4% of all IVG procedures in Italy (Ministero della Salute, 2026, 17-22). The increase in the number of medical abortions in recent years is directly linked to a 2020 decision by the Ministry of Health, which extended the use of mifepristone from the seventh to the ninth week of pregnancy, thus eliminating the need for hospitalisation and enabling the medical abortions to be carried out in both open public clinics as well as the family planning centres.

Moreover, the report analysed here contains exceptionally important information regarding the steady increase of the use of so-called ‘emergency contraception’ – i.e. the ‘morning-after’ pill – in recent years. A key issue here is about the dual action of these medical preparations: they have both a contraceptive effect as well as an early abortive effect and their action, when taken, depends on the phase of woman’s menstrual cycle. In Italy, there are two preparations most commonly used: the Norlevo pill, which can be taken no later than three days after a sexual intercourse, and the ellaOne pill, which can be taken no later than five days after the intercourse. Norlevo has a contraceptive effect if taken up to three days before ovulation, whilst ellaOne is effective in the same way if taken 1-2 days before ovulation. In such cases, both pharmaceuticals inhibit or delay ovulation, thereby preventing fertilisation. However, when a ‘morning-after’ pill is taken later, i.e. after fertilisation may have already occurred, they may exhibit an abortive effect, as in this case they prevent the newly formed human embryo from implanta-

tion. In 2023, there were in total 760,000 Norlevo and ellaOne pills sold in Italy. It is difficult to assess reliably what proportion of these preparations may have contributed, following possible fertilisation, to the destruction of human life at the earliest stage of its development. The Ministry of Health’s report does not contain such information (Ministero della Salute, 2026, 23-24).

Concerning the proportion of gynaecologists who “invoked the conscience clause, in 2023 this number stood at 57.1%, compared to 60.5% in 2022, although there were significant differences between regions. Among the anaesthesiologists, the proportion of those invoking the conscience clause has been lower, standing at 35.1% nationwide in 2023, compared to 37.2% in 2022. The proportion of non-medical staff who invoked the conscience clause in 2023 was again lower: at 30.9% (compared to 32.1% in 2022). For these two latter categories of professionals, significant variations were also observed depending on geographical area and region” (Ministero della Salute, 2026, 63; Gagliardi, 2018).

Various social, media and legal actions undertaken by both pro-life and pro-choice groups constitute a very important element of the Italian ethical and legal debate on abortion. One of the most recent initiatives by pro-life advocates – widely reported in the Italian media – is the Bell for the Unborn. The bell itself has been installed in the town of San Remo, in the tower of the building that houses the Diocesan Curia of Ventimiglia – San Remo. The main aim of this initiative is to raise public awareness of emerging human life, as well as to encourage reflection on the abortion law that is currently in force in Italy. The bell was consecrated on 5 February 2022 during a prayer vigil organised as part of the 44th National Day of Life that was being celebrated in Italy at that time. On 28 December 2024, on the liturgical feast day of the Holy Innocents, its ceremonial launch took place. Since then, the bell has rung once a day to commemorate all unborn children, and its intention is to serve as a lasting reminder of the often forgotten and muzzled scourge of abortion. It is worth emphasising that the Diocese of Ventimiglia – San Remo has for many years attached particular importance to the protection and respect for human life from

conception to its natural end, especially during the annual National Day of Life and through the organisation of the celebration called '40 Days for Life'.

Msgr. Antonio Suetta, the bishop of that Diocese, maintains that there is today an urgent need to raise awareness of the scourge of abortion, and this is not a religious issue but both anthropological and scientific one. In his view, "the geographical spread of legal abortion (in almost every country in the world) and the repeated commission of this grave crime against human life have led to a growing acceptance of this very act. This has grown to such extent that many people are unaware of what abortion actually is – both biologically as well as medically – and, what's more important, it is no longer regarded as a crime or a sin. In particular, progressive and feminist ideological campaigns regard abortion as a woman's 'right' and present her own decision and judgement as absolute in relation to her will and freedom, demanding that natural law, scientific evidence, positive law and even moral judgement be twisted such as to suit this subjective perspective" (Bigazzi, 2025). The Bell for the Unborn is widely recognised within the pro-life circles, and conversely it is sharply criticised by the pro-choice groups, as well as by the liberal representatives of the Catholic Church. One such figure is archbishop Vincenzo Paglia, former president of the Pontifical Academy for Life. In the public statements he defends the abortion law that is currently in force in Italy. In his view, the Parliamentary Act 194/1978 constitutes a founding pillar of the society of the Italian Republic.

The draft bill entitled *'Amendments to Legislative Decree No. 206 of 9 November 2007 on the practice of midwifery'* may be given as an example of the actions taken by the pro-choice groups. It was tabled in the Senate of the Italian Republic on 25 February 2025 (Senato della Repubblica, 2025). On 27 March 2025, this legislative initiative was referred to the Senate's 10th Standing Committee (working on social affairs, health, employment in the public and private sectors, and social security). The proceedings on this draft bill currently remain at the stage of deliberations within this Committee. The main aim of the legislative initiative is to enable midwives to perform abortions, even though they do not hold

a proper medical doctor licence. In accordance with the current Italian law, the abortion procedures may be performed exclusively by doctors. Midwives, on the other hand, belonging to the nursing and midwifery professions are not considered doctors. Hence the proposal by senators from two centre-left parties, the Democratic Party and the Five Star Movement, so as to make an exception for midwives in the specific case of abortion (Scandroglio, 2025).

Under the legal framework currently in force in Italy, the professional remit of midwives is defined, amongst other, as follows: monitoring the normal course of pregnancy; preparation of parents for their future responsibilities; ensuring full preparation for childbirth; assistance to mother during labour and monitoring the condition of the foetus; and finally to deliver the baby (Decreto legislativo 9 novembre 2007, n. 206, 2007). The abortion procedures are not included in this list of professional remits. The authors of the draft bill therefore wish to amend this list, so that midwives would be authorised to perform abortions in the same way as gynaecologists are. The senators proposing the bill believe that in this way women's access to abortion procedures carried out in accordance with the Act 194/1978 would be rightfully expanded.

A legislative initiative put forward by senators from the Democratic Party and the Five Star Movement has met with strong opposition from the National Federation of Midwifery Associations (Federazione Nazionale degli Ordini della Professione di Ostetrica [FNOPO], 2025). The position of the Italian midwifery community on this matter was expressed by Silvia Vaccari, the president of the organisation. Ms Vaccari stated that the midwives' professional body rejects the draft bill tabled in the Senate in its entirety. In her view, the claim that the overwhelming majority of Italian midwives do not raise conscientious objections should be contested. Furthermore, Ms Vaccari highlighted the inherent incompatibility of abortion procedures with the role of the midwifery profession, as such practices are primarily of a medical and surgical nature. In her view, assigning the performance of medical and surgical services to midwives is utterly inconsistent: medical doctors and midwives are professionals of distinct characteristics and with different areas of

practice and responsibility, and they do not perform 'similar tasks'. Therefore, legitimising "such a 'transfer of duties' from medical doctors to midwives neither facilitates the implementation of the Act 194/1978, nor does it enhance the autonomy or dignity of our profession, nor else does it meet women's healthcare needs at any stage of their life" (FNOPO, 2025).

## **2. Legal regulations introduced in the Region of Sicily**

On 27 May 2025, the Regional Assembly of Sicily (Italian: *L'Assemblea regionale siciliana*) – the local parliament of one of the 20 regions of the Italian Republic – passed a law concerning, amongst other things, the conscience clause for healthcare professionals (L.R. Siciliana n. 23/2025). The new law came into force on 13 June 2025, the day of its promulgation by the President of the Region of Sicily. According to some interpretations of its provisions, the law has ambiguously allowed healthcare institutions to hold competitive exclusively for candidates who do not exercise the right to conscientious objection. The main aim of adopting the new law was to guarantee the availability of medical doctors and medical staff to perform abortion procedures, in accordance with the abortion law in force in Italy since 1978.

The chief author of this legislative initiative, which was preceded by a long and lively public debate over the past few years, was a member of the opposition left-wing Democratic Party. It is worth noting here that Sicily is traditionally a region dominated politically by centre-right parties. The Sicilian Regional Assembly consists of 70 members. Following the most recent regional elections, held on 25 September 2022, the centre-right holds 44 seats in the Sicilian Regional Assembly, whilst centre-left groups hold 26. There were forty-eight members of the Assembly who participated in the ballot held on 27 May 2025 and there were 27 who voted 'for' with 21 'against'. This at least ten deputies from the centre-right majority voted in favour of adopting the new bill (Dovico, 2025a).

When it comes to the issue of the conscience clause, the Article 2 of this Act, entitled *'Functional areas designated for the performance of voluntary ter-*

*minations of pregnancy'*, is of key importance here. It reads as follows: '1. For the purposes of implementing the Act 194 of 22 May 1978, as amended, any healthcare facilities and hospitals within the Regional Health Service shall establish, wherever they do not already exist, there functional areas designated for the performance of voluntary termination of pregnancy (IVG) procedures within the Gynaecology and Obstetrics Operational Units. 2. The Regional Councillor for Health (Italian: *L'Assessore regionale per la salute*) shall, by means of an order to be issued within 90 days of the date of entry into force of this very Act, lay down specific guidelines concerning the functioning and organisation of the functional areas dedicated to IVG. 3. Healthcare units and hospitals shall, as part of the standard recruitment procedures provided for in the three-year staffing plans, ensure that the functional areas referred to in Para 1 above are suitably provided with the staff who do not invoke the conscience clause (Italian: *personale non obiettore di coscienza*). If, as a result of the termination of employment or a subsequent objection lodged by the staff employed in accordance with this paragraph, healthcare authorities and hospitals find themselves having no staff who do not exercise the conscience clause, then within 120 days of the date on which a declaration invoking the right to conscientious objection has been submitted or the employment contract has been terminated, they shall take appropriate steps to reinstate the staff who do not invoke the conscientious objection clause, all within the limits of available staffing resources" (L.R. Siciliana n. 23/2025).

In the view of the bill's proponents, the new legal regulations would need to be adopted, since in Sicily – in accordance with the 2022 data from the Ministry of Health – 81.5% of gynaecologists, 62% of anaesthesiologists and 64.9% of non-medical staff were making use of the conscience clause, which in all three cases was significantly above the national average (60.7%, 37.2% and 32.1% respectively). Out of 55 healthcare facilities with obstetrics and gynaecology departments that were included in the analyses conducted by the Italian Ministry of Health, there abortions were performed in 2002 in 26 (47.3%) of them. It is worth pointing out that the

average caseload per gynaecologist not invoking the conscience clause was 1.5 abortions per week, which is slightly above the overall national average of 0.9. Around 5% of women living in Sicily who decided to have an abortion travelled to another region of Italy for this procedure to be performed (Ministero della Salute, 2024).

In the debate leading up to the adoption of the new bill, both the left-wing as well as liberal groups cited various figures given by the Ministry of Health and used them as arguments justifying the need to organise competitive for staff who do not invoke the principle of conscientious objection. On the other hand, the majority of right-wing and conservative groups highlighted the lack of sound ground justifying the need for such a change. In the view of the latter, in Sicily – even though medical staff in the region invoke the principle of conscientious objection at a rate significantly above the national average – the abortion procedures, carried out in accordance with the Act 194/1978, are widely available. Consequently, there is no need to increase the number of facilities or staff members who do not invoke the conscientious objection clause.

The central authorities in Rome have also become involved in the bioethical and political dispute unfolding in Sicily. They received support from some sections of public opinion, including the Association of Pro Vita & Famiglia, which promotes the family model based on marriage between a man and a woman and defends the human right to life from conception to natural death. On 24 July 2025, members of this Association delivered to Palazzo Chigi in Rome – the seat of the Council of Ministers and the Italian Prime Minister's office – over 20,000 signatures collected during a public petition, calling on the government to challenge the Sicilian law at the Constitutional Court. On 4 August 2025, at a meeting of the centre-right Council of Ministers – chaired since 2022 by Giorgia Meloni – the 32 various legal acts passed by the regions and autonomous provinces were subjected to legal review. Seven of these were deemed to be inconsistent with the Constitution of the Italian Republic and, as a result, were referred to the Constitutional Court, being the legal body responsible for resolving juris-

ditional disputes between central government and the regions. The legal provisions introduced in Sicily, concerning the possibility of organising competitive reserved for healthcare professionals who do not exercise the right to conscientious objection, were included in the list of the challenged laws (Corte Costituzionale, 2026, 40).

The central government in Rome has stated that the legal provisions adopted by the Regional Assembly of Sicily exceed the legislative scope of remits of regional authorities, as defined in the Italian legal system. Furthermore, they are in contradiction to the national legislation, as they infringe upon the constitutionally protected principles of equality, against the right to exercise conscientious objection as well as the principle of equal access to public offices and public competitive (Dovico, 2025b). In the view of the Government of the Italian Republic, the Sicilian law, by requiring healthcare facilities to ensure – through organised competitive – the presence of staff who do not invoke the conscience clause in functional areas dedicated to voluntary termination of pregnancy and, where necessary, to initiate appropriate procedures to reinstate them to work, would ultimately introduce, even if only implicitly, forms of recruitment and employment reserved exclusively for such a specific category of employees.

Thus – as stated by the authorities in Rome – an additional requirement of subjective category was introduced in Sicily, and it goes beyond the criteria laid down in national legislation in such a way that might have discriminatory effects on candidates who do invoke the conscience clause. Moreover, it might cause serious repercussions for the constitutional principles governing equal access to employment in the public sector. The Prime Minister, represented by the State Attorney General's Office (Italian: *Avvocatura generale dello Stato*) – in Italy performing the role of the supreme state body responsible for supporting the state, the government and Italian ministries before the courts as well as providing legal assistance and issuing legal opinions on behalf of the public administration – has challenged the aforementioned Sicilian law before the Constitutional Court.

### **3. The position of the Italian Constitutional Court**

The Constitutional Court's judgment on the law adopted by the Regional Assembly of Sicily was delivered on 11 February 2026 and was subsequently promulgated on 1 April 2026 in the official Italian State journal *Gazzetta Ufficiale della Repubblica Italiana*. The Court ruled that the Sicilian law was adopted with the intent to organise voluntary termination of pregnancy services within healthcare facilities, in accordance with the abortion law in force in Italy, but that it must also obligatorily respect the right to a conscience clause, which is clearly and in detail (*expressis verbis*) protected by the Act 194/1978 and cherished in the Italian Constitution (Kobyliński, 2015). Thus, on the one hand, the judges of the Court found that Sicilian Regional Law No. 23 of 5 June 2025 is consistent with the Constitution of the Italian Republic, whilst on the other hand they indicated that the only applicable interpretation of this legal provision is the one which unequivocally confirms the indisputable status of the medical conscience clause within the Italian legal system, and also precludes the organisation of competitive aimed solely at candidates who do not invoke the principle of conscientious objection (Corte Costituzionale, 2026; Kućko, 2020).

Hence, the proposition of the Council of Ministers – formally drafted by the State Attorney General's Office – which argued that the Sicilian law was 'unconstitutional', was rejected. However, at the same time, the Court upheld the arguments of the central government in Rome regarding the arrangement of competitive held for healthcare professionals. The Court's ruling also set out the limits of regional legislation and confirmed the right of healthcare professionals to the conscience clause. In the view of the Court's judges, the fact that a person exercises their right to conscientious objection on the grounds of moral and religious principles cannot constitute grounds for excluding medical doctors, nurses, midwives and other healthcare professionals from participating in public competitive for employment.

In the justification of its judgment, the Court did not rule out the possibility of a broad interpretation (Latin: *interpretatio extensiva*) of the Sicilian law, as presented by the Council of Ministers. A broad interpretation is understood as such an interpretation of the law whose outcome goes beyond the literal meaning of the legal text being interpreted. The judges held that, had this been the only possible interpretation, the provision adopted by the Regional Assembly of Sicily would have to be deemed incompatible with the Constitution of the Italian Republic. In that case, it would have introduced an unauthorised derogation from the rules governing public competitive and it would also infringe upon the jurisdiction of the central authorities in Rome around establishing the fundamental principles of the national healthcare system. Moreover, it would be contrary to the very Act 194/1978, which does not provide for the possibility of holding competitive reserved exclusively for persons not exercising the right to conscientious objection. Thus, the Court characterised this method of recruiting healthcare staff as a wholly exceptional scenario within the state's legal system, emphasising that it is permissible only where there is an explicit statutory provision for that approach (Corte Costituzionale, 2026, 43).

The judges of the Court held that "in the Act 194/1978, the conscientious objection was recognised in a very broad sense, to the extent that it was defined as a simple unilateral declaration of consent, which could, in principle, be made at any time. Article 9 of the Act 194/1978 thus reflects the legislature's intention, which decisively reinforces the constitutional significance of freedom of conscience, traditionally recognised since time immemorial as an essential feature of the inalienable identity of the human person. In accordance with the established case-law of this Court, the intimate sphere of individual conscience must be regarded as the deepest legal reflection of the universal idea of human dignity and constitutes a constitutional value so high that it justifies the establishment of privileged exemptions from the fulfilment of public duties classified by the Constitution as mandatory" (Corte Costituzionale, 2026, 45; Moń, 2009).

If the broad interpretation of the Sicilian law, as assumed by the Council of Ministers, were the only possible interpretation, then the principle of freedom of conscience—which is a constitutional value in the Italian legal system—would be called into question. Undoubtedly, elimination of those who oppose the abortion from participation in competitive recruitment exams infringes upon the freedom of conscience guaranteed by the Constitution (Dalla Torre, 1992). Furthermore, barring from these examinations the candidates who have exercised the conscience clause would violate one of the fundamental constitutional principles, namely the principle of equality. Such a measure would constitute a form of discrimination on the grounds of personal beliefs. Moreover, this solution could lead to the exclusion of the most competent candidates. Such a restriction on access to employment in the public sector would also be ultimately ineffective, as those candidates, who during the competitive examination would declare that they were not invoking the conscience clause, could change their mind at any time after signing their employment contract.

In order to avoid such negative practical consequences arising from the broad interpretation of the law regulation voted for and adopted by the Regional Assembly of Sicily, the judges of the Constitutional Court ruled that the correct interpretation of this legal provision is a restrictive one (Latin: *interpretatio restrictiva*). The main reason for implementing this approach was to ensure the compliance of the Sicilian Law with the Constitution. Along this interpretation, the regional law imposes on healthcare facilities solely the obligation to guarantee the operational capacity of units that provide the abortion services, whilst competitive recruitment examinations must be kept open for also the individuals who refuse to carry out such medical procedures on the grounds of their beliefs. Such a restrictive interpretation leads to the conclusion that the Sicilian Law in no way alters the rules governing access to employment in the public sector, but it merely establishes internal technical restrictions related to the organisation of healthcare services and the operation of healthcare facilities. The main purpose of this restriction is

to ensure the operational effectiveness of healthcare units designated for voluntary termination of pregnancy.

On the basis of this interpretation, the expression ‘a person not exercising the conscience clause’ is relevant solely during the phase of internal staff allocation, but in no way it may translate onto a selective requirement that could restrict an employee’s freedom of conscience or require that the waiver of the right to invoke the principle of conscientious objection may be taken into account at the time of recruitment. Consequently, the law adopted by the Regional Assembly of Sicily must be interpreted in such a way that competitive recruitment exams are open to all, and wherever the doctors who perform abortion procedures are necessary to be employed, the staff invoking the conscience clause should be assigned to other duties. Consequently, the Sicilian law is not unconstitutional, provided that it is interpreted in such a way so as to allow candidates invoking the principle of conscientious objection to participate in the competitive recruitment examinations.

In the view of the Court’s judges, the effectiveness of healthcare services cannot be achieved through the preliminary selection of staff on the basis of their individual beliefs, but it must be ensured by means of organisational tools, including, but not limited to: internal mobility, the use of conventional forms of cooperation, working shifts planning and, more generally, dynamic human resource management models that ensure keeping an appropriate balance between healthcare professionals who do exercise the conscience clause and those who do not (Corte Costituzionale, 2026, 42). It is worth noting here that the pro-life groups have acclaimed the Court’s ruling as a victory of freedom of conscience, natural law application, common sense and human rights. In their view, a regional law cannot treat a moral conviction – understood as a human person exercising the conscience clause – as a condition that prevents any person from participation in a public recruitment competition for any posts in healthcare service facilities. The Court’s ruling precludes – both for the region of Sicily and for any other region that may in future wish to regulate medical staff’s access to gynaecology and obstetrics – the possibility of

introducing competitive recruitment examinations that would be available exclusively for candidates who perform abortions. Undoubtedly, the ruling has reinforced the constitutional validity of the right to conscientious objection, protecting it from attacks by certain politicians and pro-choice activists (Quaglia, Ghigi, 2023; Kobyliński, 2024, 286-287).

## Summary

The main scholarly contribution of this article is a synthetic presentation of the key elements of the debate on the medical conscience clause in Italy between 2023 and 2026, along with an analysis of selected ethical and legal aspects of this issue. The findings of this study allow to draw the following four research conclusions:

Firstly, the judgement of the Italian Constitutional Court of 11 February 2026 significantly strengthens the right of healthcare professionals to exercise conscientious objection. The judges of the Court confirmed the indisputable status of the medical

conscience clause in the Italian legal system and ruled out the possibility of organising for medical staff the competitive recruitment examinations which are aimed solely at candidates who do not invoke their right to conscientious objection.

Secondly, the controversy that surrounds the medical conscience clause in Italy confirms the currently growing role of the law in bioethical discussions; the arguments put forward on this topic in public debate become increasingly of a legal rather than an ethical nature.

Thirdly, the intense bioethical debate that takes place in Italy confirms the significant impact of pro-life groups in that country. These groups undertake many important initiatives aimed at defending the dignity of human life from the moment of conception to natural death.

Fourthly, one of the key aspects in the dispute over the conscience clause for healthcare professionals in Italy is the legal uncertainties surrounding the respective competences of the central authorities in Rome versus the legislative power of the individual country regions.

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# Urinary incontinence in women: A medical problem that remains relevant today – a review of the literature<sup>1</sup>

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**Abstract:** Urinary incontinence is a common condition in women and is not a physiological consequence of ageing, pregnancy or childbirth. Although it is not usually life-threatening, it can significantly limit daily activities, occupational and social functioning, intimate relationships and mental well-being. The aim of this non-systematic review of the literature is to critically analyse and synthesise current scientific reports on the prevention, diagnosis and treatment of urinary incontinence in women. The paper presents the most important issues concerning urinary incontinence in women, with particular emphasis on its aetiology, clinical presentation, diagnosis, treatment and prevention. Stress, urge and mixed urinary incontinence are discussed, as well as other, less common forms of this condition in women. The main risk factors are presented, including age, pregnancy and childbirth, excess body weight, the menopause, pelvic floor muscle weakness, chronic cough, constipation, smoking, lack of physical activity, neurological disorders and previous surgical procedures in the lower pelvis. The importance of the medical history, physical and gynaecological examinations, a voiding diary, urinalysis, ultrasound, uroflowmetry, provocation tests and, where indicated, urodynamic studies is highlighted. Conservative management was discussed, encompassing education, lifestyle modification, pelvic floor muscle training and bladder training, as well as pharmacotherapy, minimally invasive methods and surgical treatment. It was emphasised that early recognition of symptoms and individualised management can reduce the severity of symptoms and improve quality of life. Preventive measures should focus on strengthening the pelvic floor muscles, maintaining a healthy body weight, preventing constipation and chronic cough, and overcoming the barriers that prevent women from reporting their symptoms to healthcare professionals. Symptoms can vary in severity – from occasional leakage of small amounts of urine to frequent episodes requiring the use of absorbent products, which limit activity and contribute to social withdrawal. The choice of treatment should take into account the type and severity of symptoms, co-morbidities, previous management, the patient's expectations and her ability to actively participate in treatment, which is crucial for minimising long-term health, social and emotional consequences.

**Keywords:** diagnosis, women, treatment, urinary incontinence, prevention

## Introduction

Urinary incontinence is a common health problem among women (Aoki et al., 2017). Although it does not pose a direct threat to life, it can significantly impair functioning in daily life, mental well-being, social and occupational activity, and family and partner relationships. The condition is often accompanied by

feelings of shame, embarrassment and a sense of loss of control over one's own body. For this reason, many women do not report their symptoms to healthcare professionals, viewing them as a natural consequence of ageing, previous childbirth or hormonal changes (Pizzol et al., 2021). The condition can occur at

<sup>1</sup> Article in Polish language: [https://stowarzyszeniefidesetratio.pl/fer/67p\\_Kutk.pdf](https://stowarzyszeniefidesetratio.pl/fer/67p_Kutk.pdf)

any age, and the risk increases with, amongst other factors, advancing age, the number of births, excess body weight and weakness of the pelvic floor muscles (Aoki et al., 2017; Pizzol et al., 2021).

The clinical presentation of urinary incontinence varies: from occasional leakage of small amounts of urine to frequent episodes that significantly hinder the performance of daily activities (Lee et al., 2021). The condition may limit physical activity, encourage avoidance of social contact, hinder work and lower self-esteem (Pizzol et al., 2021). Its significance for women extends beyond the physical dimension (Połocka-Molińska et al., 2017). Women's fear of unpleasant odours, soiling their underwear or clothing, and a lack of access to a toilet may lead to them leaving the house less often, giving up social activities and experiencing reduced life satisfaction (Stroppa et al., 2025). Urinary incontinence in women should therefore be regarded as a medical, social and emotional problem (Lee et al., 2021; Pizzol et al., 2021; Połocka-Molińska et al., 2017; Stroppa et al., 2025).

The aim of this literature review is to critically analyse and synthesise current scientific reports on the prevention, diagnosis and treatment of urinary incontinence in women. To provide an overview of urinary incontinence as an ongoing medical issue in the form of a concise, analytical summary of the most relevant information.

A traditional, i.e. non-systematic, review of the available literature was employed as a flexible method of source selection. No strictly defined, reproducible protocol or algorithm was used, and not all available databases were searched. Publications were searched only in the following databases: PubMed, Scopus and the Cochrane Library. The search was based on the following set of keywords: woman, urinary incontinence, diagnosis, prevention, treatment. The analysis focused on sources published in English and Polish over the last ten years (2016–2026).

An initial selection of articles was made on the basis of their titles and abstracts, after which the full text of the publications was assessed in terms of direct thematic relevance and clinical significance for the group of women with urinary incontinence. The aim of this process was to focus on the most up-to-date

and reliable evidence concerning the prevention, diagnosis and treatment of urinary incontinence in women.

## **1. Definition and classification of urinary incontinence**

Urinary incontinence is defined as any involuntary leakage of urine. This symptom may occur in women in various situations and vary in severity: from isolated, minor episodes to a condition requiring the regular use of pads or other absorbent products (Hu & Pierre, 2019).

Urinary incontinence is not a physiological consequence of ageing in women, nor is it an inevitable consequence of childbirth. It is a condition requiring the selection of optimal diagnostic and therapeutic management (Hu & Pierre, 2019). Maintaining continence requires the proper, coordinated functioning of structures within the genitourinary system, such as the bladder, urethra, pelvic floor muscles, urethral sphincters and the nervous system. Dysfunction of any of these components can disrupt the mechanism of urine retention in women and lead to uncontrolled leakage (Aoki et al., 2017; Hu & Pierre, 2019).

The most commonly diagnosed types of urinary incontinence in women are stress, urge and mixed incontinence. Each of these forms has a different mechanism and course, and requires an individualised diagnostic and therapeutic approach (Hu & Pierre, 2019).

## **2. Epidemiology of urinary incontinence in women**

Urinary incontinence in women is a common condition; however, the scale of the problem may be underestimated, as many women do not report their symptoms to a doctor, midwife or nurse. This is often due to embarrassment or the belief that the symptoms are a normal consequence of ageing, pregnancy or childbirth. It is estimated that around 10 per cent of adult women experience at least one episode of urine leakage per week, whilst sporadic incidents

may affect between 25 per cent and 45 per cent of them (Cardozo et al., 2023). The risk increases with age, but the problem can also occur in younger women, particularly those who have given birth, are overweight, have weakened pelvic floor muscles, or engage in strenuous physical activity. In later life, hormonal changes, chronic diseases, medication use and weakening of the structures supporting the pelvic organs also play a role (Cardozo et al., 2023).

The higher prevalence of urinary incontinence in women compared with men is associated with differences in the anatomy of the genitourinary system, a shorter urethra, weakening of the pelvic floor muscles following previous pregnancies and childbirth, and hormonal changes during the perimenopausal period (Aoki et al., 2017; Cardozo et al., 2023; Corrado et al., 2020).

### **3. Risk factors for urinary incontinence**

The risk of developing urinary incontinence in women is multifactorial (Aoki et al., 2017). It is influenced by anatomical, hormonal, neurological, metabolic and environmental factors, as well as age, general health, the course of pregnancies and childbirth, lifestyle and comorbidities (Aoki et al., 2017). A key mechanism contributing to urinary incontinence is the weakening of the pelvic floor structures (Aoki et al., 2017). The pelvic floor muscles support the bladder, urethra, uterus and rectum, and play a role in urinary continence. Their dysfunction can disrupt urethral stabilisation and impair urinary control. Disorders of the supporting tissues, peripheral nerves, bladder and urethra, as well as hormonal changes, may also play a role in the pathogenesis (Aoki et al., 2017; Cardozo et al., 2023).

Multiple pregnancies and births are significant risk factors for urinary incontinence in women. During pregnancy, the enlarging uterus, together with the developing foetus, placenta and amniotic fluid, increases the load on the pelvic floor, which contributes to the stretching of muscles and ligaments (Dai et al., 2023). The risk of damage to the structures responsible for urinary continence may also increase

as a result of subsequent births, the birth of a large baby, or significant stretching of the tissues during labour (Dai et al., 2023; Wang et al., 2020).

Age is another significant risk factor (Batmani et al., 2021). As the body ages, there is, amongst other things, a weakening of the muscles, a reduction in tissue elasticity, a higher incidence of chronic diseases and a decline in the functioning of the nervous system, all of which may contribute to the onset of symptoms (Batmani et al., 2021; Troko et al., 2016). The perimenopausal period, which is accompanied by a reduction in oestrogen levels, is also significant. A deficiency of these hormones may adversely affect the tone of the musculotendinous structures of the urogenital diaphragm, weakening support for the urethra and contributing to urinary incontinence (Sussman et al., 2020).

Excess body weight in women increases the load on the bladder and pelvic floor structures, particularly when adipose tissue accumulates in the abdominal region (Nygaard & Shaw, 2016). An increase in intra-abdominal pressure intensifies the pressure on the bladder and the vesicourethral junction, which may increase the frequency of episodes of stress urinary incontinence, e.g. when coughing, sneezing, laughing, standing up, walking upstairs or during physical activity (Nygaard & Shaw, 2016; Steenstrup et al., 2018).

The risk of urinary incontinence in women may also be associated with inadequate or excessive physical exertion (Pierce et al., 2016). Of particular significance are activities that cause a sudden increase in intra-abdominal pressure, such as lifting heavy loads, jumping on a trampoline or intense exercises that place strain on the pelvic floor (Syeda & Pandit, 2024). A lack of physical activity in women is also detrimental; therefore, both a sedentary lifestyle and excessive physical strain can disrupt the normal functioning of the pelvic floor muscles (Pierce et al., 2016; Syeda & Pandit, 2024; Teixeira et al., 2018).

Modifiable risk factors for this condition in women also include chronic cough, respiratory diseases, constipation and smoking. A persistent cough increases intra-abdominal pressure, thereby placing strain on the bladder and the pelvic floor muscles. Smoking may further exacerbate this mechanism, as it promotes

chronic coughing. Constipation and straining during bowel movements also increase pressure on the structures of the lesser pelvis (Aoki et al., 2017).

Symptoms of urinary incontinence in women may also occur in the context of neurological diseases and cognitive impairments. This includes, amongst others, multiple sclerosis, Parkinson's disease, dementia syndromes, as well as conditions following a stroke, brain injury or spinal cord injury. Disorders of the nervous system can disrupt the transmission of signals between the brain, the bladder and the pelvic floor muscles, making it difficult to consciously control urination (Sussman et al., 2020).

Risk factors for this condition also include previous surgery in the lower pelvic region and cancer treatment. Gynaecological operations and other medical procedures performed in this area can damage or weaken the pelvic floor muscles and the urethral sphincter. Chemotherapy and radiotherapy, in turn, can affect kidney and bladder function, increasing the risk of urinary dysfunction (Kobashi et al., 2023).

#### **4. Types and symptoms of urinary incontinence**

The clinical presentation of urinary incontinence in women depends primarily on the type of disorder, its cause and its severity. In clinical practice, three main forms are most commonly distinguished (Mostafaei et al., 2020; Rostami et al., 2025; Sussman et al., 2020):

- stress urinary incontinence,
- urge urinary incontinence,
- mixed urinary incontinence.

Stress urinary incontinence is the most common form of this condition in women (Petca et al., 2025). It involves involuntary leakage of urine in situations that increase intra-abdominal pressure, such as coughing, sneezing, laughing, brisk walking, running, lifting heavy objects, climbing stairs or physical exercise (Rada et al., 2022). A characteristic feature is the absence of a sudden, strong urge to urinate preceding the leakage (Petca et al., 2025;

Rada et al., 2022; Sussman et al., 2020). The severity of stress urinary incontinence can be described in three grades:

- Grade I – leakage occurs only with a sudden and significant increase in intra-abdominal pressure, e.g., during coughing, sneezing, laughing or intense physical exertion. Symptoms are usually mild and sporadic.
- Grade II – urine leakage occurs during moderate physical activity or whilst carrying out typical everyday activities, such as walking briskly, running, climbing stairs, bending over or lifting heavier objects.
- Grade III – urine leakage occurs even with minimal exertion, a change in body position, walking calmly or standing; in severe cases, it may also occur at rest, e.g. whilst sitting or lying down (Sussman et al., 2020).

Urge incontinence is characterised by a sudden, uncontrollable urge to urinate (Monteiro et al., 2018). The urge may be so strong that the patient is unable to reach the toilet in time. This form is associated with overactive bladder syndrome, in which urgent urges, with or without urinary incontinence, may be accompanied by daytime frequency and nocturia (Trapani et al., 2024). The need to constantly factor in access to a toilet when planning one's day may limit women's social, professional and leisure activities (Monteiro et al., 2018; Trapani et al., 2024).

Mixed urinary incontinence in women combines features of both stress and urge incontinence (Mostafaei et al., 2020). Urine leakage may occur both during activities that increase intra-abdominal pressure and as a result of a sudden, strong urge to urinate (Rostami et al., 2025). The co-occurrence of these two mechanisms means that this form can be particularly distressing for women (Mostafaei et al., 2020; Rostami et al., 2025; Sussman et al., 2020).

In addition to the three main forms of this condition, other types of urinary incontinence are also recognised, including:

- overflow incontinence,
- non-sphincteric urinary incontinence,

- bedwetting,
- continuous urinary incontinence,
- urinary incontinence associated with a change in body position,
- urinary incontinence associated with sexual activity,
- hidden (masked) urinary incontinence.

This means that the clinical presentation need not be limited to urine leakage associated solely with exertion or a sudden urge (Sussman et al., 2020). The severity of symptoms can vary greatly (Abebe et al., 2024). Some women experience only occasional leakage when coughing, sneezing or exerting themselves, whilst for others the episodes are frequent and involve greater urine loss (Frigerio et al., 2022). In such cases, it may be necessary to use absorbent products, change underwear frequently and restrict daily activities (Abebe et al., 2024; Frigerio et al., 2022; Rada et al., 2022).

## **5. Diagnosis of urinary incontinence**

The aim of diagnosing urinary incontinence in women is to determine the type of disorder, the severity of symptoms and the likely causes (Kobashi et al., 2023). This is crucial for the optimal selection of treatment, as similar symptoms may result from various medical conditions (Sussman et al., 2020). A properly conducted diagnostic assessment enables the differentiation between stress, urge and mixed urinary incontinence, as well as other voiding disorders (Kobashi et al., 2023; Sussman et al., 2020). The diagnostic process usually begins with a detailed medical history taken from the woman (Kobashi et al., 2023). Firstly, it is necessary to establish when the first symptoms appeared, the frequency of leakage episodes and the circumstances in which they occur (Sussman et al., 2020). It is important to distinguish whether urine leakage occurs whilst coughing, sneezing, laughing, exerting oneself or changing body position, and whether it is preceded by a sudden, difficult-to-control urge (Sussman et al., 2020). This information allows for a preliminary

determination of the mechanism underlying the condition (Kobashi et al., 2023; Sussman et al., 2020). The medical history should cover the following points in particular (Kobashi et al., 2023; Sussman et al., 2020):

- the duration of symptoms,
- the frequency of episodes of involuntary urine leakage,
- circumstances in which leakage occurs, e.g. coughing, sneezing, laughing, physical exertion or a change in body position,
- the occurrence of a sudden, difficult-to-control urge preceding leakage,
- the number of micturitions during the day,
- the occurrence of night-time urination,
- the presence of a sudden urge to urinate,
- a feeling of incomplete bladder emptying,
- pain, a burning sensation during urination or haematuria,
- recurrent urinary tract infections,
- use of panty liners, sanitary towels or other absorbent products,
- the estimated amount of urine lost,
- comorbidities,
- medicines taken regularly,
- any allergies,
- smoking and alcohol consumption,
- level of physical activity,
- participation in sport and the type of sport,
- constipation,
- number of previous pregnancies and births,
- mode of delivery,
- history of obstetric complications,
- previous gynaecological or urological operations,
- previous procedures involving the lesser pelvis.

The medical history is supplemented by a physical examination, including a gynaecological examination (Kobashi et al., 2023). This allows for an assessment of the condition of the reproductive organs, the identification of any prolapse of the vaginal walls or the uterus, an assessment of pelvic floor muscle tone, and the detection of changes within the genitourinary system (Sussman et al., 2020). This is particularly important because urinary incontinence

in women may co-occur with pelvic floor weakness, hormonal changes, previous childbirths and prior surgery involving the reproductive organs (Kobashi et al., 2023; Sussman et al., 2020).

A voiding diary is a valuable diagnostic tool. In it, the patient records fluid intake, the volume of urine passed, the number of daytime and night-time voids, episodes of urinary incontinence, and the occurrence of urinary urgency. The record may also include the circumstances of leakage, body position, activity being performed, and absorbent products used. To obtain reliable data, the diary should be kept for at least three days. It facilitates the assessment of bladder function in everyday conditions, the diagnosis of frequent urination, nocturia and urinary urgency, and the identification of links between a woman's lifestyle and the severity of her symptoms (Sussman et al., 2020).

Additional tests are also used in the diagnostic process. A general urine analysis and urine culture are of fundamental importance, as they help to rule out a urinary tract infection that may cause frequent urination, a burning sensation during urination, pain or a sudden urge to urinate. A general urine analysis may also reveal other abnormalities, including those associated with kidney disease (Sussman et al., 2020).

Ultrasound of the urinary tract enables assessment of the structure of the organs and the detection of anatomical abnormalities. It is also very important to measure the residual urine volume after voiding, which allows an assessment of whether the bladder is emptying properly or whether there is residual urine suggesting other lower urinary tract disorders (Sussman et al., 2020).

Uroflowmetry is a simple, non-invasive test used to assess the manner of urination. The patient urinates into a device that records the flow rate, enabling an assessment of the course of micturition, its rate, and any possible dysfunction of the bladder and urethra. The test is particularly useful when abnormal bladder emptying is suspected (Kobashi et al., 2023; Sussman et al., 2020).

The cough test and the pad test are also used in the assessment of urinary incontinence in women. The cough test involves provoking urine leakage whilst coughing and is particularly useful in diag-

nosing stress urinary incontinence. The pad test, on the other hand, allows the volume of urine lost to be estimated based on the difference in the weight of the pad before and after the test or after performing activities that trigger leakage (Kobashi et al., 2023; Sussman et al., 2020).

Urodynamic testing is a more specialised method for assessing bladder and urethral sphincter function during the filling and emptying phases of the bladder (Kobashi et al., 2023). During the test, a catheter is inserted into the bladder via the urethra, and a second one into the rectum. The bladder is then gradually filled whilst voiding parameters are recorded (Sussman et al., 2020). This enables the assessment of, amongst other things, the volume of urine voided, the flow rate, and the pressure within the bladder and the abdominal cavity. The test is not routinely performed at the start of the diagnostic process; it is considered particularly in cases of ambiguous symptoms, when previous treatment has been ineffective, or prior to planned surgical treatment (Kobashi et al., 2023; Sussman et al., 2020).

## **6. Treatment of urinary incontinence in women**

Treatment in this area should be tailored to the individual, taking into account the type of urinary incontinence, the severity of symptoms, age, general health, comorbidities, previous procedures and the patient's willingness to cooperate (Burton et al., 2022). Initially, the least invasive methods are usually implemented, such as education, lifestyle modification, physiotherapy and behavioural therapy (Dumoulin et al., 2016). Pharmacotherapy, minimally invasive procedures or surgical treatment are considered in cases of insufficient improvement or significantly severe symptoms (Burton et al., 2022; Dumoulin et al., 2016; Liu et al., 2024; Stewart et al., 2017; Todhunter-Brown et al., 2022).

The basis of conservative management is patient education and modification of daily habits that may exacerbate symptoms (Chen et al., 2024). It is recommended to maintain a healthy weight, engage in regular physical activity of appropriate

intensity, prevent constipation, treat urinary tract infections and limit foods and drinks that irritate the bladder (Mantilla Toloza et al., 2024). In the case of overactive bladder symptoms, it may be helpful to reduce the intake of fizzy drinks, citrus fruits, hot spices, chocolate and other foods that exacerbate the urge to urinate (Chen et al., 2024; Mantilla Toloza et al., 2024; Sousa et al., 2024; Todhunter-Brown et al., 2022).

The following measures are of particular importance in conservative management (Chen et al., 2024; Mantilla Toloza et al., 2024; Sousa et al., 2024; Todhunter-Brown et al., 2022):

- maintaining a healthy weight,
- limiting the intake of caffeine and fizzy drinks,
- maintaining proper hydration,
- preventing constipation,
- treating urinary tract infections,
- giving up nicotine and limiting alcohol consumption,
- avoiding excessive heavy lifting,
- regular physical activity tailored to the patient's abilities,
- good bladder and bowel habits.

Pelvic floor muscle training is one of the most important conservative management methods for urinary incontinence in women (Dumoulin et al., 2018). It involves consciously contracting and relaxing the muscles responsible for supporting the pelvic organs and contributing to the mechanism of urinary continence (Hay-Smith et al., 2024). Its aim is to improve resting tone, contraction strength and endurance, and neuromuscular control (Kharaji et al., 2023). When performed systematically and correctly, this training can reduce the symptoms of stress urinary incontinence, particularly those of mild or moderate severity (Paiva et al., 2017). Effectiveness may be greater when exercises are carried out under the supervision of a urogynaecological or urological physiotherapist (Rocha et al., 2018). Physiotherapy also includes education on diet, fluid intake, urinary and bowel habits, physical activity and the impact of stress (Rocha et al., 2018). Depending on individual needs, biofeedback, electrostimulation,

pessary therapy, magnetic stimulation and vibration therapy are also used (Dumoulin et al., 2018; Hay-Smith et al., 2024; Kharaji et al., 2023; Paiva et al., 2017; Rocha et al., 2018).

Bladder training plays an important role in urge incontinence in women and overactive bladder syndrome (Liu et al., 2024). It involves gradually increasing the intervals between successive voids and learning to control sudden urges (Monteiro et al., 2018). The aim is to reduce the frequency of urination, limit episodes of urgency and improve bladder control (Trapani et al., 2024). A voiding diary can facilitate treatment planning (Liu et al., 2024; Monteiro et al., 2018; Trapani et al., 2024).

Pharmacotherapy is primarily used in patients with urge incontinence or overactive bladder syndrome (Liu et al., 2024). Anticholinergic drugs reduce excessive bladder activity; in practice, solifenacin and tolterodine, amongst others, are used (Sussman et al., 2020). They may reduce frequent urination and urinary urgency and improve urinary control, but they are also associated with a risk of adverse effects, such as dry mouth, visual disturbances, gastrointestinal symptoms, headaches, cardiac arrhythmias or urinary retention (Todhunter-Brown et al., 2022). Therefore, the choice of medication and dosage should be tailored to the patient's needs (Liu et al., 2024; Sussman et al., 2020; Todhunter-Brown et al., 2022).

In stress urinary incontinence, pharmacotherapy plays a less significant role than physiotherapy and surgical treatment (Sussman et al., 2020). In perimenopausal women, local vaginal oestrogen therapy may alleviate some of the symptoms associated with atrophic changes in the mucous membranes (Todhunter-Brown et al., 2022). Duloxetine is also sometimes used; whilst it increases the tone of the external urethral sphincter, it usually only reduces the severity of symptoms during treatment and may cause adverse effects (Sussman et al., 2020; Todhunter-Brown et al., 2022).

Minimally invasive methods for the treatment of urinary incontinence are mainly considered when conservative and pharmacological management fail to produce the expected improvement (Burton et al., 2022). In suitably selected patients with neurogenic detrusor overactivity or urge incontinence, botulinum

toxin type A may be used; this reduces excessive detrusor muscle activity and may reduce the number of incontinence episodes (Burton et al., 2022; Sussman et al., 2020; Todhunter-Brown et al., 2022).

Surgical treatment is most commonly considered for women with stress urinary incontinence, particularly when conservative methods do not provide sufficient improvement or when symptoms are significantly severe (Grigoryan et al., 2023). The aim of the procedure is to improve support for the urethra and bladder neck in order to reduce urine leakage in situations that increase intra-abdominal pressure (Imamura et al., 2019). Techniques used include urethral slings, as well as procedures to suspend and stabilise the pelvic floor structures (Javanbakht et al., 2020). The decision to proceed with surgery should be preceded by detailed diagnostic investigations, an assessment of the patient's health, a discussion of the benefits and possible complications, and consideration of alternative treatment options (Grigoryan et al., 2023; Imamura et al., 2019; Javanbakht et al., 2020; Sheng et al., 2022; Wang et al., 2022).

## **7. Prevention of urinary incontinence in women**

Prevention of urinary incontinence in women involves minimising factors that contribute to pelvic floor muscle weakness, bladder overload and impaired urinary control (Janse van Vuuren et al., 2021). It is important to educate women about healthy habits, recognising early symptoms and risk factors such as pregnancy, childbirth, the menopause, being overweight, obesity, constipation, chronic cough and excessive physical exertion (Lawson & Sacks, 2018). An early response to emerging symptoms can reduce their severity and facilitate the implementation of appropriate management (Lawson & Sacks, 2018; Vasconcelos et al., 2019; Wieland et al., 2019; Janse van Vuuren et al., 2021).

Pelvic floor muscle exercises play a particularly important role in prevention (Koomson et al., 2025). They can be used both as part of treatment and as a preventative measure (Moroni et al., 2016).

They should be performed regularly, particularly by women who have given birth, those going through the menopause, and people reporting the first symptoms of pelvic floor muscle weakness or occasional episodes of urinary incontinence (Radzimińska et al., 2018). Regular muscle training improves muscle tone, strength and control, thereby supporting the mechanism of urinary continence (Koomson et al., 2025; Moroni et al., 2016; Radzimińska et al., 2018).

It is also important to maintain a healthy body weight and avoid excessive strain (Alhamoud et al., 2024). Being overweight or obese increases pressure on the bladder and pelvic floor, whilst frequently lifting heavy objects can raise intra-abdominal pressure (Fusco et al., 2017). A similar mechanism is associated with chronic cough and constipation; therefore, treating these conditions and giving up smoking are important preventive measures (Alhamoud et al., 2024; Fusco et al., 2017; Nygaard & Shaw, 2016; Steenstrup et al., 2018; Teixeira et al., 2018).

Daily habits are also important (Janse van Vuuren et al., 2021). One should avoid holding in urine 'just in case', spending long periods on the toilet, and straining excessively during urination and bowel movements (Lawson & Sacks, 2018). A balanced diet, adequate fluid intake, prevention of constipation and limiting foods that may irritate the bladder are recommended (Sussman et al., 2020). Physical activity should be regular, moderate and tailored to the woman's capabilities (Janse van Vuuren et al., 2021; Lawson & Sacks, 2018; Sussman et al., 2020; Todhunter-Brown et al., 2022).

Another aspect of prevention is overcoming feelings of shame and encouraging women to report the first symptoms (Janse van Vuuren et al., 2021). Urinary incontinence is common, but it should not be regarded as an inevitable consequence of a woman's ageing or the number of pregnancies and births she has experienced (Lawson & Sacks, 2018). Early consultation facilitates the diagnosis of the cause of the condition, reduces the severity of symptoms and improves women's quality of life (Janse van Vuuren et al., 2021; Lawson & Sacks, 2018; Rada et al., 2022; Vasconcelos et al., 2019).

## Conclusions

Early diagnosis of the type of urinary incontinence in women and the modifiable risk factors for this condition enables the planning of a personalised, interprofessional diagnostic and therapeutic approach. Well-delivered education, lifestyle modifications, pelvic floor muscle training and bladder training should form the basis of conservative treatment. However, the decision to proceed with pharmacotherapy or invasive treatment requires a thorough diagnostic

process and must take into account the severity of symptoms, co-morbidities and the preferences of the patient herself, and often those of her partner as well. Prevention is of key importance, including strengthening the pelvic floor muscles, maintaining a healthy weight, preventing constipation and chronic cough, and encouraging women to report symptoms early to their midwife and gynaecologist. Urinary incontinence in women is not only a medical problem, but also a personal and social one, which will be the subject of future publications.

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