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Family system and sleep and circadian rhythm disorders in children and adolescents[1]

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Abstract: *Introduction:* The aim of the article was to refer to the current psychological knowledge on the functioning of the family system, considered in the context of difficulties resulting from sleep and circadian rhythm disorders in children and adolescents. The considerations were based on the assumptions of the systemic theory of families and the theory of psychosocial development. Due to the increasingly common problems with maintaining the natural rhythm of life and a division into day and night, special attention was paid to the importance of preventive measures, covering both the entire family system as well as the school and work environments of its members. *Method:* The method of content analysis of publications presenting the results of quantitative psychological studies on the functioning of family systems in a situation of psychological crisis, sleep and circadian rhythm disorders in children and adolescents and their correlation with the health behaviours of parents as well as the effects that these disorders cause in children and adolescents was used in the review. Scientific databases such as PubMed, EBSCO, APA PsycArticles were used for the research. *Results:* The presented results of the literature review allow for a greater understanding of the connections between family values, parents' health behaviours, parenting patterns, conditions stemming from the school environment and sleep and circadian rhythm disorders in children and adolescents. *Conclusions:* It was found that the family environment can both prevent the occurrence of numerous difficulties in the functioning of children and adolescents, as well as be their source or even contribute to their intensification. The awareness that sleep and circadian rhythm disorders occurring in children and adolescents disrupt their social and cognitive development, contribute to the deterioration of their health and significantly limit the implementation of compulsory schooling and learning, it seems necessary to take decisive preventive and therapeutic actions. Further exploration of the undertaken issue through conducting scientific research is becoming a significant challenge, the results of which can contribute to the creation of effective psychological intervention programs supporting families in coping with crisis situations related to sleep and circadian rhythm disorders occurring in children and adolescents.
Keywords: adolescence, child, family, sleep disorder, circadian rhythm, psychological help

Introduction

The modern conditions of life connected with the continuously progressing technological development in some areas, the possibility of using artificial lighting as well as being online have made it difficult for many people to maintain the natural rhythm of life and the division into day and night. Exposure to light in the evening hours and sometimes even at night combined with irregularity of awake and sleep time results in sleep and circadian rhythm disorders in many people and can be the source of a lot of other diseases. Some of the external circumstances that have been mentioned have an influence on the family environment, affecting its qualities, depending on the stage of the family development. In the present article, the psychological situation of families at a development cycle stage referred to as the family with children (with a little child, a school-age child, an adolescent) was subject to scientific considerations. It has been assumed that a family at this stage remains under a strong influence of situations connected with the children's

1 Article in Polish language: https://www.stowarzyszeniefidesetratio.pl/fer/61P_WalB.pdf

developmental processes, crises experienced by the parents, related to their individual development, health and marital conflicts (Liberska, 2014).

Family specialists agree that events and assignments involving all the members of the family system are of a great importance for the family development cycle structure. They make the families look for new ways of coping with critical situations, which are conditioned by numerous factors (De Barbaro, 1999). Among the most frequently mentioned ones are: the quality of emotional bonds, communication skills, openness and readiness to accept changes, the level of self-esteem, personal qualities of individual family members, the kind of a critical event, its intensity, its significance for the family, the obtained social support and some demographic factors (Świętochowski, 2014).

Being the parent of a child with functional difficulties, which include sleep and circadian rhythm disorders, is a source of psychological crisis, as it affects the whole family system making it unstable. The family in the systemic meaning is a system of mutual interactions. Family specialists consider not only the role of influences of individual family members but also the functioning of the whole system, where each person depends on the others and all the remaining relationships. Taking this point of view allows us to define a family as a complex structure consisting of interdependent persons, who share the same history, experience a certain degree of emotional bond, and introduce interaction strategies for the sake of individual members and the group as a whole. It is assumed that the family system consists of many subsystems, which have some goals and tasks to be done together (Plopa, 2005).

1. Parental system and building health-promoting behaviours related to sleep in children and adolescents

The family system has been subject to modifications due to undergoing changes, sometimes negative, the assigned value or the way of functioning (see Smykowski, 2023). However, what have not changed in it refers to primacy and having a strong impact on its members. This is because the family of origin is a role model and a place where not only people learn to be in close relationships (Plopa, 2005), but also they may acquire health-related behaviour patterns. Psychologists agree that people's behaviours are determined by their previous experiences. They are the effect of acquiring knowledge based on their own experiences or experiences of other people. According to the theory of social learning, it is also assumed that the majority of family contexts give numerous opportunities for the processes of social learning to work and family members are perfect role models (Wojciszke, 2017).

In childhood and adolescence the family environment still plays a significant role in the social space of a young person. It is still a figure whereas in the background there are other social environments with peers, romantic partners as well as other adults performing specific functions for young people, such as caring and educational ones. Throughout life the system and the range of interpersonal relationships of young people change, thus the parents who feel responsible for building the adaptive potential and the health-promoting behaviour profile of their child will provide them with a kind of protective policy for the future. The adaptive potential of a child is understood as a configuration of interacting variables, such as temperament, health, self-esteem, feeling of coherence, beliefs, social competencies and the quality of functioning of family environment (Kowalik, 2011) and is to a great extent related to the level of mental resilience. In turn, health-related behaviours mean all the behaviours of an individual that directly or indirectly affect health in three areas, i.e. the physical, mental and social ones. Among behaviours of this type we can include the ones that promote health, meaning care for healthy lifestyle, and the ones which are harmful for our health, for example risky behaviours, abuse of harmful substances or poor eating habits (Marmola, Wańczyk-Welc, 2017).

It is considered that the efforts made by parents into the impacts shaping individual aspects of the adaptive potential and the health-promoting behaviours of children and adolescents play an especially important role during the time when the young person's psyche is most malleable. It is assumed that in childhood and adolescence these impacts are able

to leave a relatively lasting effect and translate into a higher level of satisfaction in various areas of young people's lives. The family environment has a significant influence on the modelling of health-related behaviours, which arise as a result of interactions with the closest environment of a person. It is emphasized that parental impacts run on two levels, i.e. the direct and the indirect one. In respect of the considered issue of the circadian rhythm disorder in the delayed sleep phase variety, the parental impact on the direct level refers to regulating activities taken up for the sake of a child's health, including the regularity and the quality of their sleep, care for digital hygiene, regular meal times, oral hygiene and a general regularity of performing everyday duties. The parent who tries to responsibly build the child's proper sleep-related habits tends to shape them in an active way. On the other hand, the indirect parental impact on the child's health-related behaviours, including the one referring to the behaviours connected with sleep, is associated with behaviour modelling, parental role model transfer, e.g. in the context of daily evening rituals related to sleep and digital hygiene. It is important to be aware that it is the parents that profile the health-related behaviour pattern connected with sleep, and learning through observation is not the only process which is at its core.

Bearing in mind the fact that family environments are characterized by great variety, as far as the quality and the number of educational influences are concerned, this differentiation was shown on a continuum, where the most desirable position is occupied by so called *families of success*, which to a great extent affect the proper course of the child development process, and the least desirable one by so called *families of risk* (Brzezińska, 2013). In case of families of success, also referred to as *open families*, a key role is played by the strong and positive interpersonal relationships of a child with the adults. The significant psychological properties of these bonds are durability, stability and emotional closeness. As a result of that, the family members often spend time together, both involving the child in household jobs and engaging the adults in the child's activities. The open family also initiates and takes care of contacts with other people outside the closest family circle. Families of this type tend to often take up interactions of a didactic nature, which facilitates the creation of specific cognitive maps in the mind of a young person. These maps can both refer to the children themselves and the surroundings, affecting the perception of the world and making the child able to predict other people's reactions in a more natural way. In the family of success, a young person, mainly through the contact with the adults who are sensitive to their needs, can not only get their cognitive curiosity aroused but can also have a better chance to build their identity, stabilizing the diversity of the social environment (Brzezińska, 2013).

Parental influences and shaping behaviours run differently in the family of risk. It is assumed that families of this type are less likely to provide a foundation for a widely understood educational success of a child. There is rather a tendency to exclude them from interactions with the family members, activities performed together and new activity areas, also those external ones. The inclination to lock oneself in one's own world, to isolate oneself from the world and the people is connected with a relatively narrow range of parental behaviours, usually schematic ones. Another feature of the discussed type of family is poor communication patterns of its members, which neither help to learn the rules existing in the social world nor facilitate the maintenance of proper interpersonal relationships (Brzezińska, 2013).

There are also a lot of other factors significant for the creation of developmental space for young people, such as the family structure (e.g. generationality, divorces, siblings), its socioeconomic status, race/ethnicity, nationality, inclusive vs exclusive family orientation towards the local community and traditions (Smykowski, 2023).

2. Sleep and circadian rhythm – mechanisms, developmental changes and meaning

The stages of sleep and awake pattern are regulated by two independent although reinforcing each other, processes: the homeostatic process and the circadian rhythm. The homeostatic process leads to the need for sleep increasing with the time of staying awake and

decreases with the time of sleep. Increasing sleepiness is connected with a higher and higher concentration of adenosine in the brain – a nucleotide, which is a "by-product" of daily activity of a person.

The circadian process is responsible for the organization of human behaviour and physiology depending on the time of day and night. Among other things, it influences the time of sleep and wake, the work of individual organs, body temperature, hormone secretion, digestion rate, emotions, building immune processes and both physical and intellectual capacity (Borbély, Daan, Wirz-Justice, Deboer, 2016).

The most important regulator of the circadian rhythm, so called *Zeitgeber,* is light. Morning light reaching the suprachiasmatic nucleus (SCN) in the hypothalamus (called the central clock) through the melanopsin photosensitive cells is a signal which stops the production of melatonin. It promotes activity during the daytime. On the other hand, the lack of light in the evening promotes the secretion of melatonin, which is a hormone preparing our bodies for sleep. Therefore, the task of the signals from SCN modulated by light is to synchronize the daily human activity to the day-night rhythm (Hattar, Liao, Takao, Berson, Yau, 2002), and the stable light-dark and sleep-wake rhythm is one of the more important factors responsible for the healthy circadian rhythm (Bjorvatn, 2022).

Light, however, is not the only regulator of the circadian rhythm. It is supposed that practically each body cell has a kind of a clock reacting to different stimuli (Hastings, Maywood, Brancaccio, 2022). Other important environmental factors affecting the circadian rhythm are meal times and fasting time, physical activity hours as well as social functioning (Monk, 2010). The researchers noticed that the need for sleep, its structure and chronotype change with age. The recommended number of sleep hours for children and adolescents is as follows: 14-17 hours for newborns, 12-15 hours for babies, 11-14 hours for children aged 1-2 years, 10-13 hours for preschoolers, 9-11 hours for school children and 8-10 hours for teenagers (14-17 years) (Gavriloff, Bacaro, Schlarb, Baglioni, 2022). Also the circadian rhythm, changes. At first it is hardly organized. Newborns practically sleep all day, their bodies are less capable of producing and synthesizing melatonin, which starts working more effectively around 2nd till 6th month of life. At that time, the sleep-wake pattern adjusted to the times of day begins to appear (Paditz, 2024). Children with the developed circadian rhythm usually present the early chronotype, turning into the late chronotype in adolescence and reaching the peak around the age of 20 years. Then – in young adults and at later stages of development the chronotype gradually accelerates (Roenneberg, Kuehnle, Pramstaller, Ricken, Havel et al. 2004). The length of sleep is in common understanding perceived as an indicator of good sleep. In the related literature other sleep components are mentioned, which are equally significant. They are the quality of sleep (proportions of individual sleep phases, wake-up time), subjective satisfaction with sleep, time of sleep and its regularity (Sletten, Weaver, Foster, Gozal, Klerman et al., 2023). Regularity is an element of good sleep which is strictly related to the circadian rhythm, translating into the quality of sleep. Regular sleep is connected with the longer phase of deep stage of NREM sleep (N3 sleep) and REM sleep. The researchers also indicate the occurrence of correlations between fixed times of going to bed and getting up and academic achievements (Phillips, Clerx, O'Brien, Sano, Barger et al., 2017), body mass, metabolic disorders (Roane, 2015) and some other health aspects.

3. Sleep and circadian rhythm disorders in children and adolescents

Sleep deficit is presently a significant problem, noticed both in adults and children. It is observed on school days already in over half of the schoolchildren at the age of 6-11 years and in teenagers (Buxton, Chang., Spilsbury, Bos, Emsellem i in., 2015; Owens, Adolescent Sleep Working Group, Committee on Adolescence 2014; Wheaton, Jones, Cooper, Croft, 2018).

The researchers indicate that in the group of older adolescents, the homeostatic pressure for sleep builds up more slowly and the circadian rhythm is delayed, which can easily translate into later sleeping

hours. There are also some external factors – such as after school activities, homework, peer relationships and early hours of starting lessons, and they can be additional elements shortening sleep time, making morning wake-ups more difficult (Bartel, Gradisar, Williamson, 2015; Crowley, 2018; Logan, Hasler, Forbes, Franzen, Torregrossa et al., 2018). It has been observed that in the group of adolescents the sleep deficit has increased over the last few years. That might be related to the spread of smartphones (Twenge, Krizan, Hisler, 2017).

Sleep deficit is strongly correlated with not only the amount of sleep but also the disruption of its regularity. This deficit, which is usually bigger on school/workdays, is compensated for at weekends in the form of increasingly longer sleeping time. When there is a discrepancy between sleep and wake-up hours (resulting in discrepancies in the exposition to sunlight, mealtimes, sport and social activities) on weekdays and at weekends, such a phenomenon is referred to as "social jet lag". It is considered to be the measure of misalignment of the biological and social rhythms of an individual (Wittmann, Dinich, Merrow, Roenneberg, 2006).

At the same time, despite the physiological delay of the circadian rhythm, a disorder called the delayed sleep phase syndrome (classified in the International Classification of Sleep Disorders (ICSD-3) (Sateia, 2014) is found in only 1-4% of adolescents (Danielsson, Markström, Broman, von Knorring, Jansson-Fröjmark, 2016; Lovato, Gradisar, Short, Dohnt, Micic, 2014; Sivertsen, Pallesen, Stormark, Bøe, Lundervold, Hysing, 2013). That indicates the significance of the problem, which is irregularity or falling asleep time delay connected with the social jet lag fitting in the diagnostic criteria. This results in the fact that it is not included in "the diagnostic statistics" and because of that more difficult to notice. It is emphasized that insomnia and physiological delayed falling asleep time or the delayed sleep phase disorder can coexist, but at the same time they are sometimes confused. Moreover, one of these disorders can become the cause of another one (Siversten et al., 2013)

It has been found that going to bed later can cause sleepiness, mood swings, cognitive process disorders (resulting from sleep deficit). On the other hand, teenagers and their parents, wanting to prevent the occurrence of sleep debt, may "force themselves" to fall asleep earlier than it is allowed by the natural circadian rhythm. That might lead to a disruption of the association of a bed with sleeping, cause emotional tension, the association of falling asleep with excessive effort, the sense of powerlessness and helplessness. ("Everyone at home is asleep, but I am not"). This situation can be a factor facilitating the occurrence of insomnia (Spielman, 1987).

Another sleep disorder is insomnia. It is the most common sleep disorder occurring in people, including children and adolescents. In ICSD-3 (Sateia, 2014) insomnia is described as difficulties falling asleep or maintaining sleep continuity in spite of appropriate conditions for sleeping. It is connected with worse functioning during the daytime, for example sleepiness, mood lability and cognitive functioning problems. If such a situation occurs more often than three times a week and lasts longer than three months, it can be referred to as chronic insomnia. The researchers point to its prevalence in the paediatric population. The problems with falling asleep and maintaining sleep continuity affect approximately 20-30% of preschoolers and from 4% to 39% of adolescents (de Zambotti, Goldstone, Colrain, Baker, 2018; Gavriloff et al., 2022). Insomnia – regardless of its name – is a disorder which is demonstrated not only at night, but also during the daytime. It is characterized by excessive arousal both on the cognitive level (ruminations, excessive worrying, racing thoughts) and on the physiological one (excessive activity of the sympathetic axis of the nervous system, non-physiological level of cortisol, elevated levels of inflammation, metabolic disorders and increased systolic blood pressure) (de Zambotti et al., 2018).

According to the researchers, the factors facilitating the development of insomnia include: female gender, high emotional reactivity, severe school stress, substance use, especially caffeine, and evening use of electronic devices. It is emphasized that caffeine in the form of coffee or energy drinks is regularly consumed by approximately 30% of adolescents as a remedy against sleepiness and can be a factor both causing insomnia and maintaining it (de Zambotti et al., 2018). The significance of using electronic devices

and the influence of blue light on sleep are still an area for scientific exploration, where the researchers have not reached agreement yet. Some sources support the hypothesis that the use of electronic devices can contribute to an increased level of arousal, causing problems with falling asleep (e.g. Lange, Cohrs, Skarupke, Görke, Szagun et al. 2017; Munezawa, Kaneita, Osaki, Kanda, Minowa et al., 2011). It still has not been decided whether using electronic devices is something that causes insomnia or is just its effect (de Zambotti et al., 2018). In turn, the findings of some other studies indicate that the differences in the falling asleep time of people using electronic devices before going to bed and not using them are minor and the possible delay in falling asleep is not related to the arousal connected with using a device and not being able to fall asleep but rather with delaying the very decision about going to bed (Bauducco, Pillion, Bartel, Reynolds, Kahn et al., 2024).

It is considered that insomnia and a sleep-wake pattern irregularity can be correlated. One of the important factors contributing to insomnia is the improper sleep hygiene. Mainly in respect of following the rules of regularity of going to bed and waking up. At the same time, insomnia, leading to increased sleepiness, may cause the will to catch up on sleep – to go to bed earlier, sleep longer at weekends, which in turn might result in deregulation of the circadian rhythm.

The parents who are at the child rearing stage of family development face the challenge to understand what makes up an event of a normative nature and what already does not. According to J. Goldsmith (2018) we can point out four significant aspects of this judgment. The first of them refers to accepting the fact that children and adolescents are characterized by developmental instability. For example, becoming aware that the need for sleep will change with age. The second aspect is connected with the first one and describes a desirable way of performing the parent's role as flexible. The third aspect concerns ensuring children and adolescents balance adequate to their age between dependence and the provided autonomy. And the last aspect describes the range of parental power, when and how to take interventions with the child's well-being in mind.

4. Effects of insufficient sleep/ circadian rhythm disorder

In the situation when a child/adolescent in a family shows a significant maladjustment of their inner rhythm to the social and school expectations, we can talk about the occurrence of circadian rhythm disruptions in them. As the circadian rhythm affects nearly most of body cells, its disorders go beyond the sleep-wake pattern problems. They can also be connected with mood disorders, metabolic disorders and immunological problems. Moreover, they affect school attendance and achievements, motivation for taking up different educational, social and health-related challenges. In such a situation the functioning of the family system changes dramatically as circadian rhythm disorders in a form of delayed sleep phase syndrome that are not taken care of make it difficult for the child and the whole family system to function properly.

Analysing difficulties occurring on the child's side, what is emphasized is the risk of failure to fulfil school obligations, limitation of peer interactions and widely understood social development.

The researchers stress that sleep and circadian rhythm disorders or deficits may have impact on the emotional life and increase the risk of other mental disorders (Reynolds, Spaeth, Hale, Williamson, LeBourgeois, et al., 2023). Sleep deprivation is connected with a higher level of anxiety, irritation, tension, hostility, confusion, catastrophizing, decrease of positive affect – less happiness, less energy, poorer emotional control (Baum, Desai, Field, Miller, Rausch et al. 2014; Talbot, McGlinchey, Kaplan, Dahl, Harvey, 2010; Tomaso, Johnson, Nelson, 2021). It can also intensify the feeling of loneliness, increase the number of conflicts (Simon, Vallat, Barnes, Walker, 2020). In the period of neuronal changes and increased emotional lability so characteristic for adolescence, sleep deprivation may make this tendency even stronger, decreasing self-control, enhancing impulsiveness, vulnerability, facilitating the way to risky behaviours and increasing the risk of using substances and addictions (Logan et al., 2018). It is worth noticing that sleep deprivation can be a self-perpetuating situation.

Decreasing self-control, increasing impulsiveness and striving for quick gratification, it can lead to a greater number of behaviours giving short-term pleasure (overeating, drinking alcohol, inability to stop using a smartphone) which can delay a decision to go to bed or worsen the quality of sleep thereby increasing sleep deprivation (Geng, Gu, Wang, Zhang, 2021; Kroese, de Ridder, Evers, Adriaanse, 2014).

Parents are also concerned about somatic symptoms experienced by their children. The most common ones are: headaches, gastrointestinal disorders and general weakness. It has been proved that in the longer perspective they can cause mood disorders, orthostatic deregulation, fibromyalgia, lowering of school results and contribute to social isolation. It is emphasized that circadian rhythm disorders often coexist with other mental disorders, such as ADHD, depression, anxiety disorders intensifying their symptoms (Kaczor, Skalski, 2015).

Sleep and circadian rhythm disorders are also correlated with metabolic health. Sleep deficits are connected with the risk of obesity, insulin resistance, elevated blood pressure (Zhang, Huang, Chen, 2017; Quist, Sjödin, Chaput, Hjorth, 2016). There are fewer studies referring to the role of circadian rhythm disorders in children and adolescents, therefore this problem matter is regarded as worth developing (Reynolds et al., 2023). However, it was noticed that less regular sleep-wake patterns translated into a greater risk of obesity (probably due to varying mealtimes and changes in hunger and satiety hormones regulation as well as dietary choices) (Miller, Lumeng, LeBourgeois, 2015).

One of the important factor disturbing the circadian rhythm in adults is shift work, which was considered as carcinogen by the International Agency for Research on Cancer at WHO (Straif, Baan, Grosse, Secretan, El Ghissassi et al., 2007). However, shift work affects not only the health of the person who does it but also its social environment. The results of the related literature review (Li, Johnson, Han, Andrews, Kendall et al., 2014) point out that the children of the shift working people showed more metabolic and social problems and coped with difficulties worse than the ones of the people working in fixed hours. It could be an interesting issue of psychological research to consider "a children's equivalent" of shift work – i.e. to find out the effect of different hours of starting school.

The researchers have found that social jet lag in teenagers translates into a higher Body Mass Index (Malone, Zemel, Compher, Souders, Chittams et al., 2016), coexists with clinical or seasonal depression (Henderson, Brady, Robertson, 2019), a higher level of irritation, sleepiness and poorer school achievements (Tamura, Komada, Inoue, Tanaka, 2022). In turn, the delayed sleep phase syndrome in adolescents is correlated with higher risk of using substances (especially caffeine and alcohol), a more sedentary lifestyle, absenteesm form school and a higher level of anxiety (Danielsson et al., 2016; Lovato et al, 2014; Siversten, 2013). Insomnia is also a disorder strongly affecting the quality of life. It has been found that it is connected with a higher level of stress, often coexists with depression, being its significant predictor. It is – together with depression as well as without it – a factor connected with suicidal ideation, suicide attempts and suicide. It is also related to using substances, engaging in risky behaviours (using drugs, driving under the influence of alcohol), which can be connected with not only emotional dysregulation but also the weakened control centre (de Zambotti et al., 2018; Simon et al., 2020).

The number of hours and the quality of sleep of children/adolescents are important for the quality of functioning of the whole family system. The parents of a child/adolescent suffering from sleep and circadian rhythm disorders witness numerous difficulties experienced by their child. That causes their anxiety and concern about their future, especially problems at school, health and peer relationships. Moreover, the parents are aware of numerous changes destabilizing the family lifestyle, e.g. interparental conflicts concerning the way of acting with a child suffering from the delayed sleep phase syndrome. They can result from a situation in which parents observe increased activity of the child when the other members of the family expect peace and quiet and want the child to go to bed. The child, however, refuses to do that. Other conflict areas may concern daytime functioning restrictions for the healthy siblings, inviting guests,

restrictions of going out together with the child, due to the fact that it will be difficult for them to wake up in the morning and do sports actively or participate in family meetings.

Parental abuse, conflicts, poor communication and atmosphere in the family can result in developing ineffective patterns of coping with emotions, cause stress, thereby making it difficult for a child to sleep well at night. On the other hand, parental warmth is considered to be a protective factor (Khor, McClure, Aldridge, Bei, Yap, 2021). Moreover, it is worth reminding that the effects of sleep deficit described in the context of children and adolescents also concern adults. Therefore, it can be supposed that a well-rested parent will be able to better manage their own emotions and these of other members of the family, understand difficult behaviours of their child and other adults in the system, which will facilitate building a good atmosphere.

A source of parents' concern can also be their helplessness, as they are not able to help their child or they see their own limitations, for example, resulting from their work, concerning their capability of helping their child to return to socially expected functioning. This kind of a family situation makes the parents, who feel responsible for the child, at the same time become aware of insufficiency of psychological tools that might be used to provide them with adequate assistance. Parents may also be frustrated by the fact that the psychosocial development of their child, who suffers from circadian rhythm disorders, is not going well and their behaviours are becoming less and less adaptive. This thesis's reflection can be found in the concept of psychosocial development of E. Erikson (2002). Referring to the human psychosocial development considered in the context of Erikson's theory, it is emphasized that it is based on motivation having its source in the need for achieving competence in fulfilling the expectations and requirements of the social environment in different areas of life. The author indicates that a human goes through eight stages of development in their life. By facing in each of them various conflict and crisis situations, they have an opportunity to solve them successfully and in this way develop adaptability on a higher level. On the other hand, inability to solve a crisis leads to experiencing the feeling of inadequacy and makes it difficult to cope with crises occurring on the next stages of the human life (Erikson, 2002). Due to the issues raised in the study, emphasis was placed on discussing the stages of development with the effects of a successfully resolved crisis, referring to childhood and adolescence.

In early childhood, which ranges from the age of 1 to 3 years, the first crisis which is revealed is referred to as "autonomy *versus* shame and doubt". At this stage a child is trying to gain a sense of autonomy, self-determination. To let them solve this crisis positively, the parents need to act adequately to the age of the child, providing them with opportunities of influencing the environment, which will help them build high self-esteem and a sense of effectiveness and independence.

The pre-school period, which ranges from the age of 3 to 6 years, is connected with the necessity to cope with the crisis called „initiative *versus* sense of guilt". At this stage the child's goal is to realize their plans through interaction with other people. The parents supporting the child's initiative, adopting an attitude of reasonable freedom in the upbringing process, help the child develop self-confidence and conviction about the purposefulness of their own actions.

Children at the age between 6 and 12 years need to solve the conflict of „productivity *versus* feeling of inferiority". The school age is full of comparisons with peers, most frequently in respect of educational and sports achievements, social interactions and family life. A positive result of these comparisons translates into high self-esteem and self-acceptance.

Adolescence (age 12-18 years) is the time period for resolving the conflict between „identity *versus* role diffusion". The positive transfer to the next stage of development in this period is connected with development of the sense of identity. A strong conviction about who you are, faithfulness to one's beliefs and values, ability to face confrontations with people presenting different perspectives prove that this conflict has been solved successfully (Erikson, 2002).

In the presented concept, human development takes place in the social context, which is understood as any kind of voluntary participation of a person in

any social reference system that may concern them. In a situation of the occurrence of sleep and circadian rhythm deregulation or disorders, participation of a child in any social reference system that may concern them is highly difficult, which is likely to translate into failure to solve crises indicated in Erikson's theory of psychosocial development.

5. Preventive actions and directions of psychological assistance vs social systems

The improvement of the quality of sleep and the circadian rhythm in children and adolescents is, as in case of other areas of work with these groups, the result of numerous impacts. The related literature review allowed us to isolate a few significant levels, on which they take place.

The first of them is the level of the problem diagnosis, where it is necessary to have comprehensive medical knowledge about physiological sleep and sleep disorders and the therapy methods. That is because sleep disorders in paediatric population are frequently insufficiently detected and understood (Spruyt, Chan, Jayarathna, Bruni, International Paediatric Sleep Association et al., 2024). This is also the level of the social environment where children and adolescents are functioning, mainly the family, but also the school.

V. Satir (2000) emphasized that parents play the part of family architects. She regarded them as the most important subsystem in the family. It is the spouses that start the family, which is connected with revealing the level of satisfaction with it. It is them who decide about the quality of family atmosphere, satisfying the needs, the sense of security of all its members. The spouses also determine the quality and intensity of communication in the family and the style of their relationships and interactions is passed on to the children. The spouses' role is to arrange the family life and divide the duties (ibidem). A significant part in the prevention of sleep and circadian rhythm disorders can be assigned to the parents' knowledge about the sleep-wake pattern regulating mechanisms, the occurring developmental changes in respect of the need for sleep and the circadian rhythm changes as well as the rules concerning healthy sleep and a pre-sleep routine (Gavriloff et al., 2022).

In the related literature we are able to find some clues in respect of family functioning and its impact on sleep. In case of the occurrence of sleep and circadian rhythm disorders in children and adolescents, it is worth thinking about modifying the family life arrangement. A minor cannot be required to make a rational decision to stop using a smartphone or playing computer games after 10 pm. They are often encouraged to be active late in the evening by the change of the social life pattern, the specific construction of computer games strongly immersing a person in virtual reality as well as by weaker parental control and the improper parental model. The occurrence of similar behaviours in the family will not motivate the child to change their harmful habits. A young person might not understand what negative health-related and social consequences they will experience. Not only in the future but also here and now. In the psychological studies an element of modelling can be seen. It was found that children more often tended to keep their electronic devices in their bedrooms if their parent did that too (Buxton et al., 2015). Moreover, it is assumed that the sleep time of teenagers is modified also by the sleep time of their parents (Khor et al., 2021).

We must agree with Satir (2000) and other top representatives of psychology, that it is the parents who are responsible for the health of the child and the shaping of behaviours which will promote it. An essential issue in trying to help a child experiencing circadian disorders with the delayed sleep phase is to ensure that they consistently comply with the sleep hygiene principles. That includes such behaviours as the parents' mindfulness focused on the effort to teach the child to go to bed when they feel sleepy, to associate the bed only with sleeping and to get out of bed whenever they have any problems with falling asleep, to do something else not to force themselves to fall asleep and to go back to bed when they feel sleepy again. The parent can help the child to have regular sleeping and getting up hours, not to sleep during the daytime, and if it is necessary, not longer than twenty minutes. It is recommended that fixed

sleeping hours are set. However, in case of adolescents, their chronotype must be taken under consideration – if their parents force them to go to bed too early, they might have a problem with falling asleep (Khor et al., 2021). In case of younger children, it is important that the parents maintain a fixed rhythm in their pre-sleeping routine both on school days and on holidays and at weekends (Prokasky, Fritz, Molfese, Bates, 2019).

An essential issue connected with the regularity of the sleep-wake pattern in children and adolescents is their contact with electronic devices. As the researchers indicate on the basis of the study review (Bauducco et al., 2024), electronics can have an ambiguous influence on sleep. The impact of electronic devices emitting blue light on the latency of sleep (the time from switching off the light with the intention to fall asleep to the very moment of falling asleep) is slight. However, it has been noticed that they have an influence on the delay of melatonin secretion and a decision when to go to sleep and the night sleep (Bauducco et al., 2024). It is a common phenomenon to keep the phone by the bed, to write text messages at night, to keep sound notifications/vibrations on, which disrupts the sleep architecture, leads to wake-ups and encourages us to use the telephone/messengers at night, lowering the quality and amount of sleep and disturbing the circadian rhythm. At the same time, the authors draw our attention to a potentially inverse correlation – the fact that it can be the problems with sleeping, emotional balance or longer wake-up time connected with the circadian rhythm disorder that are the cause of using the phone or social media at night.

The results of the analyses show that the risk factors in the described situation may include: individual susceptibility to the impact of technology, tendency to take up risks and fear of missing out (FOMO). On the other hand, the protective factors are, for example, individual character traits, such as self-control, and family rules. Although, on the one hand, a growing sense of independence and a desire for self-determination are a natural element in the group of teenagers, on the other hand, it is the parents' support, expressed as involvement in the relationship as well as setting the rules for using technologies that is not only effective (Khor et al., 2021) but also expected by the adolescents. It has been found that teenagers notice the advantageous influence of parental regulations on the quality of their sleep (Jakobsson, Josefsson, Högberg, 2024). Similar conclusions concern the relationships of parents with children at the pre-adolescent age (Buxton et al., 2015). Thus, it is essential to set clear rules of using devices emitting blue light – not using them at least two hours before going to bed and in the bedroom (Buxton et al., 2015).

One must remember that besides this kind of light, they provide the contents that evoke strong emotions, making it difficult to fall asleep. Therefore, it is considered advisable to teach the child to control the intensity of stimuli they receive, depending on the time of day as well as develop the skills to calm oneself down before sleeping and minimize behaviours that might disturb sleep (Reynolds et al.., 2023).

Regular physical activity of a child/adolescent, avoiding products containing sugar and caffeine are other good habits that facilitate falling asleep (Kaczor, Skalski, 2016). It is assumed that physical activity strengthens the homeostatic pressure for sleeping and, therefore, it is connected with going to bed earlier. It is disadvantageous only when done intensively less than an hour before sleep (Bartel et al., 2015). Regular mealtimes, maintaining a proper interval between the last meal and going to bed are another element enhancing regularity of the circadian rhythm (Monk, 2010).

The researchers indicate that it is light that is the most important *Zeitgeber*, that is why we cannot omit it in considerations while discussing healthy circadian rhythms. Modern people spend most of their time indoor, where it is significantly darker than outside even on a cloudy day. Additionally, due to artificial light sources and light pollution – nights are brighter. Both the elements weaken the circadian rhythm (Brown et al., 2022). Therefore, among other things, it is recommended that light should be dimmed in a child/adolescent's bedroom in the evening as part of the so called sleep hygiene (Akacem, Wright, LeBourgeois, 2018).

It is believed that bright light in the morning, experienced even during a few minute walk stops the secretion of melatonin, reducing morning sleepiness, increasing the secretion of serotonin and melatonin in the evening (Kaczor, Szczęsna, 2023). Thus, it is advisable that a teenager go for a morning walk with the dog or shopping to the bakery as their everyday duty. Although exposure to morning light is important for all age groups, it is especially significant for adolescents. That is because it is connected with advancing the circadian rhythm. It has also been observed that sufficient exposure to light during a whole day makes people less sensitive to the effect of light after the sunset, which can be arousing and delay your circadian rhythm (Chang, Scheer, Czeisler, 2011; Rångtell, Ekstrand, Rapp, Lagermalm, Liethof et al., 2016). Some beneficial actions in the school environment can include classes outdoors if possible, using suitable window blinds and good lighting in classrooms and corridors (Kim, Casement, 2024).

It is assumed that parents supporting children and adolescents want to strengthen their belief that testing different behaviours, solutions, also those connected with failures is a natural component of the development process. It is considered that the involvement and support of the family for activities taken also outside the family environment, at school increase the effectiveness of the activities, better translating the transfer of knowledge into behavioural changes (Reynolds et al., 2023). In the COM-B model describing the mechanism of behavioural change its significant determinants are emphasized (West, Michie, 2020). The first condition necessary for a behavioural change to occur in a human is the capability of making it. That includes skills, knowledge, attention and memory processes (Capability) and external opportunities, such as physical and social factors making the change come true (Opportunity). For example, they can be beliefs about what the persons close to a child/teenager like parents, friends or teachers think about the problem with going to bed at a proper time, what experiences they have, how supporting they are for the child/teenager. The thing that might be of importance here is the time needed for taking up a given topic or the related resources. The last condition of the behavioural change mechanism is Motivation, understood as different internal processes leading to the occurrence of change in behaviour. That can be a conviction that a given problem is important and we are able to make a change, some emotions related to a given issue – how beneficial or threatening it is not to get enough sleep at night.

An important issue in the context of the circadian rhythm in children is the time when they start their lessons or how the lessons are organized. That becomes especially significant at the stage of adolescence and chronotype delay. It appears that delaying the start of school lessons by one hour affected many areas of functioning. The ones connected with sleep – lengthening sleeping time, greater regularity and, as a result, a decreased social jet lag. The psychological effects included: better mood, higher satisfaction with life, less irritability. These connected with life and school achievements – fewer late-comings, less sleeping in classes, fewer problems with discipline, better attendance rate, higher grades as well as a decreased number of car accidents in case of adolescents who are allowed to drive (Barlaan, Pangelinan, Johns, Schweikhard, Cromer, 2022; Borisenkov, Popov, Smirnov, Dorogina, Pecherkina et al., 2022; Bowers, Moyer 2017; Chan, Tang, Leung, Poon, Lau i in., 2024; Meltzer, Wahlstrom, Plog, McNally, 2022).

Such a change is undoubtedly organizationally demanding on many levels, which is emphasized by Start School Later, Inc., which promotes such a solution. It cooperates with scientists, health specialists, teachers, headmasters as well as parents in order to raise awareness concerning the correlation between sleep and the school starting time and provide support for changing that[2]. The level of awareness, openness and the pro-active attitude of parents can be a factor stimulating system changes and with this supporting children's chronobiological health.

Supportive parents, apart from being empathic, demonstrate tendency to give advice encouraging children to change their behaviour when they

2 https://www.startschoollater.net/about-us.html

realize that the development process causes disproportionate difficulties and consequences for their health and social functioning. Parents do not hesitate to take actions in a situation when their children experience strong anxiety. Their influences may contribute to ensuring their children/adolescents greater support, including the option of using psychological (Goldsmith, 2018) or medical assistance.

Conclusion

Technological changes, which result in lifestyle modifications and an increase in the knowledge on the importance of the chronobiological functioning of a human being, shall make us reflect on building awareness and correct habits connected with the sleep-wake patterns.

In the context of children and adolescents, it is the family system and the social environment that are of a particular importance for shaping health-promoting behaviours. The parents can regulate the child's behaviours both directly and indirectly – through modelling health-promoting behaviours.

In this article some parental behaviours of a supportive nature both for children and adolescents were indicated. At the same time, the issue that was not addressed but seems worth further exploration is the matter of providing support to parents in respect of both the knowledge about sleep and circadian rhythms in children and of building reflection on their own behaviours related to the adequate sleep hygiene. Another area of the scientific considerations could be building of personal resources in respect of communication, empathy and relationships, which can help to create a good atmosphere of trust in the family and to introduce new habits and attitudes.

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