EÖTVÖS LORÁND UNIVERSITY
FACULTY OF EDUCATION AND PSYCHOLOGY
INSTITUTE OF PSYCHOLOGY

THESIS RESEARCH PART

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2024

EÖTVÖS LORÁND UNIVERSITY
FACULTY OF EDUCATION AND PSYCHOLOGY
INSTITUTE OF PSYCHOLOGY

Interplay Between Body Image, Somatic Symptoms, Social Support, BMI, and Vigorous Physical Activity Among Turkish Adolescents

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Budapest, 2024

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The thesis's topic: Body Image and Psychosomatization

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Time of consultation	Topic of the consultation, notes, suggestions	Supervisor's signature
16.11.2024 Teams	Discussing the research topic, HBSC data access	
30.01.24 Teams	Discussing the litereature review, potential research questions	
14.02.2024 Kazy	Finding the research focus, finalising research questions/hypotheses	
14.03.2024 Teams	Review data, variables to use for the research questions	
22.03.2024 Kazy	Discussing statistical methods to test hypothesis	
08.04.2024 Teams	Discussing the results of the statistical analysis, results	
15.04.2024 Kazy	Discussing the discussion parts, findings, implications, limitations, overrall review of the thesis	

I allow the sumbission of the thesis.

Budapest, 2024. 04.19.

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ABSTRACT

This study has two focuses, firstly focusing on the relationship between body image and psychosomatic symptoms among Turkish adolescents. The ANOVA analysis is conducted to compare the psychosomatic symptoms of adolescents depending on their body image. Secondly, the predictive value of vigorous physical activity (VPA) and social support (from family and peers) on body mass index (BMI) and somatic symptoms examined. After distracting the variable failing to provide statistically meaningful relationship with other variables, such as body weight perception, Structural Equation Modelling (SEM) is used for the second research interest. Turkish sample consist of 5848 adolescents (11-13-15 year old's), participated the 2018 HBSC survey.

Results proved that adolescent who deviated from normal weight perception has higher somatic symptoms compared to those who normal weight perception. Secondly, higher VPA and social support estimated lower BMI and lower somatic symptoms.

1. INTRODUCTION

Adolescence is a transition phase, from childhood to adulthood. The adolescent has gone through number of changes on their body, social network and psychologically. Due to these rapid changes, adolescents are more vulnerable in terms of body dissatisfaction (Clay et al., 2005). Overweight perception among adolescents has a strong effect on dieting and weight control; it can lead to life-threatening conditions like eating disorder (Mann et al., 1983) and depression (Ganesan et al., 2018). The body of individuals serves as a primary locus for the unfolding human life, manifesting experiences, senses, and perceptions. The way individuals perceive their body is crucial. There are several influences on how individuals feel and think about their bodies such as physical attributes, social environments, societal messages. This study is going to dive into the complex interplay between subjective somatic complaints, body image, BMI and various psychosocial factors, including family support, peer support, and engaging in vigorous physical activity among adolescents.

This study is based on the data set of The Health Behavior of School Aged Children (HBSC) which is a cross-national study of World Health Organization (WHO) that entails school-based surveys on health behaviors of 11-13-15 year old age groups. It is conducted every four years since 1983/1984 across 45 countries. Just like WHO, HBSC study also advocates that health encompasses physical, social, and emotional well-being (World Health Organization, 1986). The HBSC study's objective is to produce new information and increase the understanding of adolescent health and well-being. Researchers from different disciplines are engaging HBSC studies therefore variety of conceptual and theoretical models are being used to describe, analyze, and illustrate the health behavior and health state of young people. Further objectives of the HBSC project are to provide insight and impact health promotion and education policies, programs, and practice for youth at national and international aspects.

Adolescents constitute the largest generation of youth for the first time in the history, comprising a quarter of the world's total population (Sawyer et al., 2012). As William Wordsworth (1807) said in his poem, "*The child is father of the man*.". Children and adolescents of today, are going to be our future. This aspect draws a big importance on the HBSC study. Understanding the health-related behaviors, lifestyles, wellbeing of adolescents is a powerful tool for supporting the development of healthy generations. HBSC studies both risk and protective factors for health and well-being of adolescents, and this provides wide range of behavioral indicators for health.

1.1 Body Image

"I dive into the well of my body
And end up in another world
Everything I need
Already exists in me
There's no need
To look anywhere else"

Home Body - Rupi Kaur (2020)

Body image is a multidimensional phenomenon that has a growing body of studies. Body image term emerged as mental representations (self-perception and self-attitudes) of one about their body including thoughts, beliefs, behaviors, and feelings (Ramos et al., 2019) and its functions (Aslan, 2004). There are two elements of body image: perceptual and attitudinal. The perceptual aspect relates to accuracy of one's perception of their body size and shape; while the attitudinal aspect refers to the feelings and emotions connected with these perceptions. Ultimately, perceptual, and attitudinal elements evolve over time and form the cohesive body image (Gardner, 2002).

Body is a crucial part of human experience for all human beings. Throughout body image studies, body experience has been seen as a main component for human functioning (Cash, 2011). Throughout lifespan, body has a big role in one's psychological growth. There are variety of behaviors linked with body-experience, this shows the widespread effect of body image (Fisher, 1990). Cash (2011), claims body image affects our thoughts, emotions, and behaviors daily. Most dramatically, it has an influence on our intimate and public relationships. Knafo (2016) proposed that body image has a comprehensive effect on one's self esteem, identity, mental health, and social life. These points and outcomes of body image is point out the importance of the issue.

Body image perception classified as positive, negative, or somewhere in between. It is a continuum. Recent report showed that body dissatisfaction is highly prevalent and increasing among adolescents (Currie et al., 2012). Satisfaction level of body size is measured by self-report questionnaires which allows subjects to determine the intensity of agreement or disagreement with statements related to body. Weight perception on the other hand, is the interpretation of one's own weight status (Quick et al., 2014). In the HBSC study, there is a data regarding weight perception. It allows researchers study in body weight perception which has a significant importance on body image. It is important to study this subject because body

weight satisfaction may change quickly during adolescence because of the somatic changes in their body, as a result it may negatively affect adolescent's mental well-being and behavior.

Any disturbance or negativity towards domains of body image including thoughts, beliefs, behaviors, and feelings called body image concerns or negative body image (Ramos et al., 2019). Children with higher BMI (Body Mass Index) has a risk of experiencing discrimination against their appearance, that risks of developing internalizing symptoms in long-term (Puhl & Latner, 2007). Children are experiencing judgment on their body weight (Rees et al., 2011). Consequently, this discrimination might increase children's awareness and internalization of social attitudes about their weight which might lead adolescents have even more negative body image (Puhl & Latner, 2007).

Body image has been under effect on so many variables as body weight perception is one of them particularly among adolescent girls (Voelker et al., 2015). Adolescents have been through variety of physiological changes, including weight gain, emotional and cognitive changes. Changes that come with the puberty requires adolescents to reconstruct their body perception, because extreme preoccupation about body might lead to decrease in self-esteem (Mills et al., 2011). Additionally, social changes lead adolescents to have greater concern for their physical appearance. In. other words they tend to compare themselves with their peers and media figures (Jones, 2001). Contemporary media, promote thin body for females (Speck et al., 2004) and slim but muscular body for males (Jung, 2011).

A cross-cultural study (Whitehead et al., 2017) propose that there is an increase of the prevalence of perceived overweight among boys. Despite the increase among boys, girls remain to have higher possibility than boys to perceive themselves as overweight.

Çam and Top (2019) proved that obesity has a negative effect on children's life. Their study proves engaging more physical activity, decreasing the screen time, and having a fruitful parental relationship could contribute to reducing the prevalence of obesity for obese students.

Obesity on children is on rate for several decades, as one of the results children are experiencing judgment on their body weight (Health and Social Care Information Centre, 2009). WHO (2024) stated that there is a significant raise in the number of obesity and overweight around the world; over 390 million overweight and 160 million obese children and adolescent (5-19 age group) found in 2022. Overweight ratio increased from 11.2% to 17.9% and obese rates increased up to 13.5% from 2.9%, between 2000-2004 and 2015-2019 in

Türkiye. Additionally, it is stated that being overweight and obesity cause some health problems and this trend is more common among boys than girls (Yavuz, 2023).

1.2 Somatic Symptoms

Variety of self-reported somatic symptoms such as backache, irritability, stomachache, difficulty in sleeping, feeling low called as somatic symptoms, subjective health symptoms or psychosomatic complaints (Huang et al., 2023). Natvig et al., (1999) defined psychosomatic symptoms as a combination of physical complaints (headache, stomachache, backache, and dizziness) and psychological complaints (feeling low, irritability, nervousness, and difficulty in getting to sleep). This study focuses on subjective somatic state of the adolescents. The perspective of study suspected that these symptoms to be of psychological origin, the term "somatic symptoms" has been chosen as the data does not provide a certain answer regarding their origin; avoiding any possible confusion is aimed by this choice.

Psychosomatic term is the combination of two Greek words: "psyche" refers "mind" and "soma" means "body". From psychology perspective, psychosomatic term refers to development, exacerbation or maintenance physical conditions or symptoms caused by psychological factors (Greene & Walker, 1997); in other words, physical symptoms that has no biological and medical reasons. To elaborate, feeling sadness and irritability as well as physical complaints such as headaches and stomach aches (Hagquist et al., 2019). Lipowski (1988) defined somatization as having bodily medical complaints roots from unknown causes.

Looking at the diseases from body and mind perspective roots from the oriental medicine and antiquity, back in those days mind and body are considered as a single entity. (Dumitrascu et al., 2019). In the contrary, Rene Descartes proposed the dualistic approach, an alternative interpretation of this concept refers to the separation of body and mind suggesting that they are completely two different compounds. After a while, he is criticized by some physician experts (Damasio, 2005). Nowadays, common conclusion is that medical conditions should be dealt by giving importance to both body and mind additionally connection between body and mind should not be ignored. When there are no organic or medical reasons behind

somatic symptoms this mindset allows researchers to focus on other possible psychological causes (Dumitrascu et al., 2019).

Kaçmaz et al., (2023) found in their study, if individual is prone to have somatization, their body image is negatively affected. Additionally, these participants have more signs of anxiety and depression. Adolescent experience decreases in their subjective well-being, particularly girls (Bor et al., 2014). Ottova et al., (2012) indicated self-reported psychosomatic complaints contains somatic and psychological symptoms. As a result, both are found related with stress, it is proved that when individuals have higher stress their complaints are increasing too. This research is aiming to look deeply concepts such as the body image, somatic complaints, social support and being involved in vigorous physical activities.

1.3. Social Support

HBSC is taking a comprehensive view on health. Such as health behaviors integrated within the broader lifestyle of adolescents also health considered within its social context (Aarø et. Al, 1986). Extended society and social world have significant influence on adolescents' behavior; health related behaviors and outcomes are the result of the social life. Perceived social support defined as the individual's perception of received support from their social network (Tardy, 1985). Mellin et al. (2002) introduce social support as a protective factor due to its significant influence on increased health behaviors (e.g. more fruit and vegetables intake, physical activity). Second research aim of this research thesis is investigating the effect of social support on body image and psychosomatization. Considering the major and crucial roles on the adolescents' life; parent support and peer support are employed to operationalize the social support concept. While social support is crucial part of human life, absence or presence of social support can play an important role on one's life.

1.3.1. Family Support

Body image is a constructed during the early years of life, Knafo (2016) refers that amount and quality of care, attention, touch, gaze and holding received from parents affects thoughts and feelings of infant about their body. Additionally, caregiver's attitude in terms of infant's body (interaction quality, willingness to give attention) has key role on the development

of body self/body image (Lemma, 2010). These specific interactions with parents influence individual's sense of body worth, attractiveness, and desirability in the future (Knafo, 2016).

Recent study proves that increased parental communication could potentially decrease the body dissatisfaction among girls while having quality interactions with family might help them to avoid body dissatisfaction among boys (Al Sabbah et al., 2009). Another study, ease of communication with parents is associated with decreased weight concerns among male adolescents (Kelly et al., 2016).

The development of body image in adolescents is influenced by variety of factors, relationship with primary attachment figure is notably significant. Acknowledging the significant role of primary attachment objects is an advantage when exploring body image of adolescents.

Family relations that consist clear communication, support and safety has a positive effect on mental health of adolescents, also decreased the risk of anti-health behaviors (Fridh et al., 2015). Another study proposed receiving family support is a protective factor in terms of increasing intensity of somatic symptoms (Tabak & Mazur, 2016).

1.3.2 Peer Support

Peer support consists of the level of acceptance and received help by peers to adolescents. Peer support has linked with mental health (Freeman et al., 2012). Students who received lover level of peer and teacher support showed higher rate of weekly somatic symptoms. In another study, researchers controlled the stress level at the end students with higher level of peer support showed less somatic symptoms compared to their peers who receives lower level of peer support (Torsheim & Wold, 2001b).

According to Caccavale et al. (2012), social interactions with peers has a significance effect on the relationship between weight status and body image among girls. Overweight/obese girls with higher social network tended to exhibit lower levels of body dissatisfaction compared to those with smaller social network. Also, Kenny (2018) indicates that having stronger friendship dynamics results in decreased level of body dissatisfaction.

Student with lower level of peer support is indicated high level of depression also more rapid increase (Way et al., 2007). However, there are different studies that found stronger

predictor of psychosomatic symptoms than peer support such as school distress and school alienation (Natvig et al., 1999).

1.4 Vigorous Physical Activity

Currently, majority of adolescents are not as active as suggested even though there is an active effort on promoting physical activity level among adolescents (Karchynskaya et al., 2022). Empirical evidence proves physical activity has positive effect on children's and adolescents' mental and physical health (Rodriguez-Ayllon et al., 2019). Furthermore, higher physical activity levels are associated with higher life satisfaction for children and adolescents (Shi et al., 2022). Current trend in terms of physical activity is decreasing specifically moderate and vigorous physical activities, among 11-14-year-old Turkish adolescents (Mirzayi et al., 2021).

Low levels of Vigorous Physical Activity (VPA) found to be associated with depression symptoms (Bélair et al., 2018) and higher life satisfaction (Feng, 2022). These results are interpreted as higher level of VPA should contribute lower levels of depression symptoms and higher level of life satisfaction consequently lower level of psychosomatic symptoms. A comprehensive study explains physical activity prevents mental health problems such as depression, anxiety, low levels of self-esteem (Eime et al., 2013). Therefore, it is indicated higher levels of VPA should contribute lower level of psychosomatic symptoms. This interpretation aligns with the study of Giannotta et al (2022); psychosomatic symptoms such as headache, stomachache during adolescence increased the risk of developing depression and anxiety.

Body image is another factor linked to physical activity. It is found that body image may have a strong effect on physical activity level of adolescents (Karchynskaya et al., 2022). Adolescent's view on their body weight influences their physical activity level. Karchynskaya et al (2022) found that adolescents who perceives their body having an unhealthy weight tend have less physical activity level and vice versa. Possible reasons behind that relationship; potential weight stigmatization (Puhl & King, 2013), body shaming and negative body perception (Sabiston et al., 2014). In the contrary, another study suggested adolescents who dissatisfied with their body showed higher level of physical activity (Zaker & Radzi, 2015), it has a possibility of being associated with the tendency of some adolescents engages physical activity with the intention of weight loss or control (Humbert et al., 2008).

1.5 Rationale

WHO (2001) proposed the fact of mental health disorders can have individual and collective prices. Furthermore, adolescents' current symptoms or problems have the risk of being precursors to disabling disorders during later life such as depression, behavioral and interpersonal problems. Studying the relationship between somatic symptoms and body image; also, complex interaction between vigorous physical activity, social support, BMI, and somatic symptoms is important for adolescent health. This research aims to highlight these factors influence health outcomes among Turkish adolescents.

Therefore, the present study has two aims. First aim is to examine the nature of relationship between body image and somatic symptoms. After analyzing the relationship between body image and somatic symptoms; second intention is to look at these terms in from deeper perspective; the effects of social support and physical activity on body image and somatic symptoms. Consequently, following research questions are built:

1. Is there a significant difference in levels of psychosomatic symptoms among adolescents with varying degrees of body image?
2. To what extent do social support predict the BMI and psychosomatic symptoms?
3. Does engaging vigorous sport activities play a role on positive body image and less psychosomatic symptoms?

This study will test the following hypotheses:

1. Adolescents with negative body image will have higher scores on somatic symptoms.
2. Higher level of social support is associated with lower BMI score and lower levels of psychosomatic symptoms among adolescents.
3. Engaging in vigorous sport activities is associated with lower BMI score and lower levels of psychosomatic symptoms.

2. METHODS

2.1 Accessing the 2017/2018 HBSC Data

HBSC stands with open science mindset which is a movement aims to make science accessible to everyone for the good of society (UNESCO, 2022). HBSC study provides its data for researchers through its data management center, it is aligned with the principles of the open science. Accessing the international data archive of HBSC required few steps such as visiting the website of HBSC, submitting a data access request, providing the ethical approval. After this step, recipient approved the request. Subsequently, agreement between parties signed that involves terms and conditions for data security.

2.2 Study Design and Participants

HBSC study takes place in school setting where self-report questionnaire is administered to a representative sample of 11-13-15 years old age group. First HBSC survey conducted between 5 countries as an informal collaboration at 1983/1984. Since then, surveys have been conducted in every four years with growing number of member countries. Nowadays, there are 48 countries are member of this wide and international network.

International survey of the HBSC study encompasses three types of questions: mandatory, country specific questions, optional packages. Mandatory questions include demographic information, social context, health outcomes, health behaviors, and risk behaviors, well-being, and electronic media communication (EMC). HBSC international Mandatory Questionnaire provides common data from participating countries. Analyzing this data from HBSC countries provides the measurement of important health related behaviors, health indicators, and external surrounding factors. Additionally, it allows researchers to make cross-national comparisons.

In 2017/2018, over 240000 participants recruited from 46 countries. This study is going to be on Turkish data which recruited 5848 samples. Cluster sampling is used when recruiting participants, and primary sampling unit is school class, however the analysis is made at the individual level not class level. The reason of choosing schools as a sampling unit was to make the data more manageable. The structure of the sample was made to mirror the distribution of students across the determined grade levels. Total Turkish sample consisted of 5848 students of which 2397 were 11-year-olds, 1950 were 13-year-olds, 1501 were 15-year-olds.

The rights of the subjects are protected by the 12th article in the United Nations Convention on the Rights of the Child which addresses children's right to express their stance on all subjects that affect them. Researchers are aware their protecting anonymity, dignity, safety, and rights of the participants are researcher's responsibility.

2.3 Variables

2.3.1 Body Image

The body image item measured body image from body weight perception perspective. The question follows; *"Do you think your body is...?".* Response categories as follows: *much too thin, a bit too thin, about the right size, a bit too fat or much too fat*. In the present study, responses are categorized to obtain three categories of body image: Low weight status (much too thin, a bit too thin) medium weight status (about the right size) and High weight status (bit too fat and much too fat). The inclusion of body image item in HBSC happened since the 1993/94 survey.

2.3.2 BMI

Weight and height is self-reported data and questions presented as it follows; *"How much do you weigh without clothes?" , "How tall are you without shoes?"*. BMI is calculated with this formula; (kg/m^2) by weight in kg divided by height in m^2.

2.3.3 Somatic symptoms

Somatic symptoms variables have been measured since 1986. It is also called psychosomatic complaints or subjective health complaints. This is an eight-item scale on subjective health complaints (headache, stomachache, backache, feeling low, irritability or bad temper, feeling nervous, difficulties in getting to sleep, feeling dizzy). The question follows; "In the last 6 months, how often have you had the following?" Symptoms are rated on a 5-point frequency scale: *about every day (1), more than once a week (2), about every week (3), about every month (4),* and *rarely or never (5)*. Due to order of the answers, this is a reverse coded variable. Scoring high values in this variable means having less psychosomatic symptoms. In the present study, aim is to investigating overall somatic complaints of adolescents therefore the mean of somatic complaints included in the analysis.

2.3.4 Vigorous Physical activity (Independent Variable)

Vigorous Physical Activity (VPA) is measured by an item asking; "Outside school hours: how often do you usually exercise in your free time so much that you get out of breath or sweat?". The answers follow; *"Everyday (1), 4 to 6 times a week (2), 2 to 3 times a week (3), Once a week (4), Once a month (5), Less than once a month (6), Never (7)"*. The VPA variable is reverse coded, higher values mean lower level of VPA.

2.3.5 Social Support: Family support and Peer support (Independent Variable)

Social support is measured as a latent variable based on parent support and peer support. Family support and peer support are the subscales of the Multidimensional Scale of Perceived

Social Support (MSPSS) (Zimet et al., 1988). Family support items assist to measure perceived support, emotional help, confidence, and encouragement (Borraccino et al., 2022). Family Support items as follows; *"My family really try to help me", I get the emotional help and support I need from my family", I can talk about my problems to my family", "My family is willing to help me make decisions".* Peer support items are about receiving help, affinity, confidence and help (Borraccino et al., 2022). Peer support items as follows; *"My friends really try to help me", "I can count on my friends when things go wrong", "I have friends with whom I can share my joys and sorrows", "I can talk about my problems with my friends"*. Responses in both scales were given on a 7-point Likert scale (from 0 "very strongly disagree" to 7 "very strongly agree").

2.4 Statistical Analysis

With the aim of evaluate first research question (Is there a significant difference in levels of psychosomatic symptoms among adolescents with varying degrees of body image?) ANOVA has conducted. Firstly, assumption of normality is tested by using skewness and kurtosis values. They revealed that both variables are within the acceptable range for normality (-+2). Specifically, body image variable showed skewness of -0.096 and kurtosis of -0.698, while somatic symptoms variable displayed a skewness of -0.910 and kurtosis of 0.418. These findings suggest that the normality assumption for both variables is met. Secondly, the assumption of homogeneity of variances was tested using Levene's test. The results confirmed that variances were homogeneous for somatic symptoms (all $p>.05$) meeting the assumption for ANOVA.

In order to evaluate 2nd and 3rd research questions (2. To what extent do social support predict the BMI and psychosomatic symptoms? - 3. Does engaging vigorous sport activities play a role on positive body image and less psychosomatic symptoms?) one structural model equation is formulated. In the measurement model, Social Support variable has two sub-dimensions (family support and peer support) since it is the only latent variable in the analysis it could not examined on its own. Measurement models need to be examined separately from the main SEM model. However, since it is not possible to define measurement models with 2 indicators on their own due to the underestimation problem. Researchers suggest that it is possible to examine them with the structural model (Kline, 2011; Hoyle, 2012).

3. RESULTS

3.1 ANOVA

Descriptive statistics table displays low weight perception(n=1042), medium weight perception(n=3594), high weight perception(n=1076).

Table 1: Descriptive Statistical Values of Groups

	n	M	SD
Low	1042	3.44	.89
Medium	3594	3.62	.89
High	1076	3.44	.88

There was a significant effect of body image on somatic symptoms for the three groups, $F(2, 5709) = 28.54$, $p < .001$. The effect size was 0.01, indicating a small effect. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the medium weight perception ($M = 3.62$, $SD = .89$) was significantly different than the low weight perception condition ($M = 3.44$, $SD = .89$) and the high weight perception ($M = 3.44$, $SD = .88$). However, the low weight perception condition ($M = 3.44$, $SD = .89$) and the high weight perception ($M = 3.44$, $SD = .88$) did not significantly differ from each other. Taken together, these results suggest that body image influences somatic symptoms level. Specifically, our results suggest that when adolescents have low or high weight perception, they show more higher levels of somatic symptoms compared to medium weight perception.

3.2 Structural Equation Modelling

3.2.1 Correlational Table

Before conducting structural equation modeling (SEM), a correlational analysis was performed to evaluate the strength and direction of relationship between the variables. Results are presented in Table 2.

Table 2:

Variables	*M*	*SD*	1	2	3	4	5	6
1.Peer Support	19.863	7.079	-					
2.Family Support	22.544	6.948	0.305*	-				
3.VPA	3.581	1.858	-0.091*	−0.095*	-			
4.BMI	19.720	3.640	−0.061*	−0.070*	0.079*	-		
5.Somatic Symptoms	3.557	0.901	0.147*	0.282*	−0.063	−0.081*	-	
6.Body weight perception	2.989	0.738	0.005	−0.006	0.011	0.525*	0.013	-

*p value is significant.

The results indicated a positive moderate correlation between Family Support and Body Mass Index (BMI), r= .305, p < .001, suggesting that higher levels of family support are associated with higher BMI scores. Interestingly, the VPA variable, which is reverse coded, demonstrated a small but significant negative correlation with both Peer Support, r= -.091, p < .001, and Body Mass Index (BMI), r = -.061, p < .001. This indicates that higher scores on the VPA variable, which reflect lower levels of physical activity in practice, are associated with a decrease in both the support received from friends and BMI levels. A positive correlation was found between Somatic Symptoms, which is reverse coded, and BMI, r = .147, p < .001. These results suggest that having less somatic symptoms is associated with higher BMI scores.

On the other hand, Body Weight Perception did not exhibit significant correlations with many of the study variables (only significantly correlated with BMI), presenting r values between .005 and .525. The corresponding p-values were above the conventional threshold for statistical significance (p > .05), with the sole exception of its relationship with BMI. The absence of linear relationships implies that “Body Weight Perception” may not have a central influence in the network of variables in this study. Since the Body Weight Perception does not have significant relationship with other variables in the research, except BMI, it is found suitable to exclude it from subsequent SEM analysis to streamline the model and focus on predictors with demonstrated significant relationships.

It is suggested to identify variables with statistically significant relationship during preliminary stages and exclude the non-significant analysis (Jackson, 2003; Tabachnick & Fidell, 2013). The main reason of excluding non-significant relationships is absence of linear association which may lead to insufficient contribute substantial explanatory power to the SEM model (Kline, 2011) and potential multicollinearity and overfitting, thus reducing the model's parsimony (Hair et al., 2010). Furthermore, utilizing the degrees of freedom without providing additional explanatory value is another risk of non-significant variables; it might lead to detracting from the model's fit (Hoyle, 2012).

Therefore, "Body Weight Perception" is excluded further SEM analysis due it doesn't provide significant correlation with majority of the variables. In the case of including "Body Weight Perception"; the model might get complicated without adding value to it predictive utility (Kline, 2011). With the principle of parsimony, aiming for the most basic model adequately explains the data and consistent with SEM analysis (Hoyle, 2012; Hair et al., 2010).

3.2.2. Measurement Model

The significance of factor loadings for the measurement model has been addressed within the structural equational model. In this context, factor loadings for both family (L=1.00, λ= .748) and friends (L=0.533, λ=.395) were found to be significant, p<.001.

Before moving on to structural regressions, model fit indices were examined and found to be at acceptable levels, it follows; χ^2 =57.166, df=3, , χ^2/df = 19,05 *RSMEA* = 0.065 [90% *Confidence Interval* = (0.051/0.079)], *SRMR*= 0.035, *CFI* = 0.941, *TLI* = 0.804.

Table 3:

Predictors of Social Support Variables in the Original Model Regression Coefficients

	L	*λ*	*SE*	*Z*	*p*
Family Support	1.00	0.748	0.00		
Peer Support	0.538	0.395	0.050	10.797	<0.01

3.2.3 Structural Regressions

Finally, structural regressions were examined in the structural equation model, all the relationships were found to be significant.

Table 4:

Regression Coefficients for Predicting Body Mass Index (BMI) and Somatic Symptoms

Variables		*B*	*SE*	*t*	*p*	*95% CI*
Predictor	Outcome					
VPA	BMI	0.140	0.028	4.946	<.001	[0.084, 0.195]
Somatic	BMI	-0.202	0.067	-3.008	0.003	[-0.334, -0.070]
Support	BMI	-0.049	0.015	-3.194	0.001	[-0.079, -0.019]
VPA	Somatic	-0.023	0.007	-3.451	<.001	[-0.036, -0.010]
Support	Somatic	0.067	0.006	10.757	<.001	[0.054, 0.079]

Vigorous Physical Activity (VPA) was found to be a positive predictor of Body Mass Index (BMI), with an estimated effect of $B = 0.140$, $SE = 0.028$, $z = 4.946$, $p < .001$, and a 95% confidence interval ranging from 0.084 to 0.195. This predictor also showed a small, standardized effect ($\beta = 0.140$). VPA is reverse coded, providing higher scores for the VPA variable means engaging less vigorous physical activity. As a result, this indicates engaging less vigorous physical activity predicts higher score of BMI.

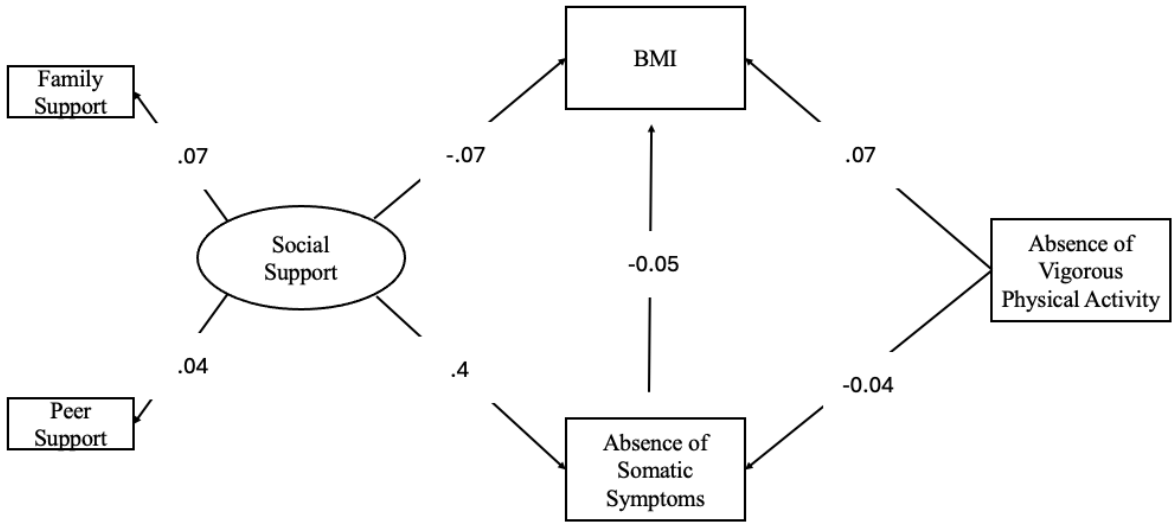
Somatic Symptoms negatively predicted BMI, with an estimated effect of $B = -0.202$, $SE = 0.067$, $z = -3.008$, $p = .003$, and a 95% CI between -0.334 and -0.070, indicating a standardized effect ($\beta = -0.202$). Considering the fact that somatic symptoms are reverse coded, this result indicates the individual with less somatic symptom predicts lower BMI score.

Social support was negatively associated with BMI ($B = -0.049$, $SE = 0.015$, $z = -3.194$, $p = .001$, 95% CI [-0.079, -0.019], with a standardized effect ($\beta = -0.252$). This indicates that receiving more social support predicts lower scores of BMI.

Additionally, Vigorous Physical Activity was found to be a negative predictor of the Somatic Symptoms, with an estimated effect of $B = -0.023$, $SE = 0.007$, $z = -3.451$, $p < .001$, and a 95% CI from -0.036 to -0.010. This effect size was ($\beta = -0.023$). As it is mentioned before VPA is reversely coded, it demonstrates that higher level of VPA estimates smaller level of somatic symptoms.

Social support had a positive effect on the Somatic Symptoms (B = 0.067, SE = 0.006, z = 10.757, p < .001), with a standardized effect size (β = 0.344), and the 95% CI ranged from 0.054 to 0.079. It means that receiving higher levels of social support estimates lower level of somatic symptoms, as it is mentioned before somatic symptoms variable is reverse coded.

3.2.3 Path Analysis Diagram



4. DISCUSSION

This study aimed to explore the relationship between body image (body weight perception), somatic symptoms, vigorous physical activity, social support, and body mass index among Turkish adolescents. Findings on current study contribute to understanding of Turkish adolescents' body weight perception and their daily practices impact their subjective physical health.

4.1 Body Weight Perception and Somatic Symptoms

The first goal of the study is to investigate somatic symptom levels of adolescents depending on their body image. It is found that adolescents with low and high body weight perception reported higher somatic symptom scores compared to adolescents with medium body weight perception. The results proved that when adolescents deviated from norm in terms of body image (low or high body weight perception), they score higher somatic symptoms. First hypothesis of the study is confirmed based on this finding.

Results found statistically significant as determined by ANOVA testing; however, the difference of mean found relatively small. This indicates that while there is a relationship between body weight perception and somatic symptoms, the effect size is modest in clinical sense. This result aligns with previous research findings which has proved that positive body image is associated with reduced somatic symptoms (Kaçmaz et al., 2023). The small effect size between variables indicates the presence of meaningful relationship between body image and somatic symptoms, however there are possible other factors plays role on somatic symptoms such as having a medical condition. It is important to consider this when formulating interventions that aims improve adolescent's health.

4.2 Vigorous Physical Activity, Social Support, and Health Outcomes (Somatic Symptoms and BMI)

The second aim of the study is to investigate two predictors (physical activity and social support) of BMI and psychosomatic symptoms. Since physical and psychological health are in a cycle, they mutually influence each other, reaching to a holistic approach has intended by adding these factors into equation.

Current study revealed that higher levels of vigorous physical activity and social support predicted lower levels of BMI and somatic symptoms, as analyzed through structural equation modeling. Second and third hypothesis about higher levels of social support and vigorous physical activities are being associated with lower BMI score and lower levels of somatic symptoms among adolescents confirmed based on these findings. These results align with body of literature which demonstrates higher perceived social support is linked with lower levels of

somatic symptoms (Grigaitytė & Söderberg, 2021). Also, peer support is found influential on reduced BMI among obese individuals (Chen et al., 2021). Similarly, inactive lifestyle found to be linked to functional somatic symptoms among Dutch adolescents (Janssens et al., 2014). As expected, literature shows correlation between physical fitness and low body fat (Rowland, 1991) also being physically active decrease the risk of overweight and high body fat percent however physical activity is not the only indicator (Kesavachandran et al., 2009) having a fitter body consequently leads adolescent to having a lower BMI.

Notably, initial aim of the study was to include body image variable in the SEM analysis to examine it as a dependent variable. However, in the preliminary model, body image did not perform significant relationship with other variables (except BMI), consequently it is removed from the final analysis. There are two possible explanations for this outcome. First possibility is that body image may not be influenced by other variables in the HBSC 2017/2018 Turkish sample. Second possibility is the measurement of the body image in this study failed to reflect multifactorial nature of body image. Body image represented with body weight perception of adolescents; this simplistic approach might lead to insignificant findings between variables.

These findings prove the importance of close relationships in physical health. The study overall underlines the unity of physical and psychological health in other words the holistic approaches in adolescent health. All in all, enhancing physical activity and social support may play an effective role in reducing BMI and somatic symptoms among adolescents.

4.3 Limitations and Strengths

The present study consists of several limitations. Firstly, cross-sectional design restricts our chance to infer causality. Longitudinal studies had a significant value to confirm the directionality of the relationships found. Also, the assessment method is self-reported; this may cause response bias because of possible inaccuracy, misreporting, misunderstanding. Measuring body image with a single question creates the risk of not being able to reflect multifaceted nature of body image and underestimate its impact. Future research can benefit from a more comprehensive assessment of body image. Significance levels of correlations among key variables found low, there is possibility of being influenced by the large sample size (n=5848), which can detect small effects. As these findings aligns with other studies as mentioned earlier, the significance level of weak correlations is limited. Other absent factors might play a role in these relationships. Future research could take an advantage of employing other variables and methodologies to access stronger associations.

The strength of the study is exploring the impact of both physical (vigorous physical activity and psychological (social support) factors on body image and somatic symptoms. This

dual perspective allows us to interpret both physical and psychological elements have influence. Moreover, study addresses importance of being physically active for health. Given that Turkish adolescents' physical activity decrease around 11-14 years due to academic load, study stress the importance of having physical activities into adolescent's daily life (Mirzayi et al., 2021).

4.4 Future Research

Future research should explore the association between body image and somatic symptoms by employing more comprehensive measures that have a higher possibility of assessing body image to advance the understanding. Additionally, distinguishing psychosomatic symptoms from those who had biological causes. This differentiation is crucial to improve interventions regarding the psychosomatic symptoms and body image.

4.5 Conclusion

All in all, current study illuminates complex associations between body image, physical activity, social support, BMI, and somatic symptoms. These insights underscore the necessity of holistic approaches that consider both social and physical dimensions of adolescent health and well-being. Considering these factors in terms of policymaking and interventions can advance the chance of well-being of the adolescent population in Turkey.

REFERENCES

Aarø, L. E., Wold, B., Kannas, L., & Rimpelä, M. (1986). Health behaviour in schoolchildren A WHO cross-national survey: A presentation of philosophy, methods and selected results of the first survey. *Health Promotion International*, *1*(1), 17-33.

Al Sabbah, H., Vereecken, C. A., Elgar, F. J., Nansel, T., Aasvee, K., Abdeen, Z., Ojala, K., Ahluwalia, N., & Maes, L. (2009). Body weight dissatisfaction and communication with parents among adolescents in 24 countries: international cross-sectional survey. *BMC public health*, *9*, 52. https://doi.org/10.1186/1471-2458-9-52

Aslan, D. (2004). Beden algısı ile ilgili sorunların yaratabileceği beslenme sorunları. STED, 13(9), 326-329.

Bélair, M. A., Kohen, D. E., Kingsbury, M., & Colman, I. (2018). Relationship between leisure time physical activity, sedentary behaviour and symptoms of depression and anxiety: Evidence from a population-based sample of Canadian adolescents. *BMJ Open*, *8*, e021119. https://doi.org/10.1136/bmjopen-2017-021119

Bor, W., Dean, A. J., Najman, J., & Hayatbakhsh, R. (2014). Are child and adolescent mental health problems increasing in the 21st century? A systematic review. *The Australian and New Zealand journal of psychiatry*, *48*(7), 606–616. https://doi.org/10.1177/0004867414533834

Borraccino, A., Marengo, N., Dalmasso, P., Marino, C., Ciardullo, S., Nardone, P., Lemma, P., & The 2018 HBSC-Italia Group. (2022). Problematic social media use and cyber aggression in Italian adolescents: The remarkable role of social support. *International Journal of Environmental Research and Public Health*, *19*(15), 9763. https://doi.org/10.3390/ijerph19159763

Caccavale, L. J., Farhat, T., & Iannotti, R. J. (2012). Social engagement in adolescence moderates the association between weight status and body image. *Body image*, *9*(2), 221–226. https://doi.org/10.1016/j.bodyim.2012.01.001

Çam, H. H., & Üstüner Top, F. (2020). Overweight, obesity, weight-related behaviors, and health-related quality of life among high-school students in Turkey. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *25*, 1295-1302.

Cash, T. F., & Smolak, L. (Eds.). (2011). *Body image: A handbook of science, practice, and prevention* (2nd ed.). The Guilford Press.

Chen, Y., Li, Z., Yang, Q., Yang, S., Dou, C., Zhang, T., & Guan, B. (2021). The Effect of Peer Support on Individuals with Overweight and Obesity: A Meta-Analysis. *Iranian journal of public health*, *50*(12), 2439–2450. https://doi.org/10.18502/ijph.v50i12.7926

Clay, D., Vignoles, V. L., & Dittmar, H. (2005). Body image and self-esteem among adolescent girls: Testing the influence of sociocultural factors. *Journal of research on adolescence*, *15*(4), 451-477.

Currie, Candace, Zanotti, Cara, Morgan, Antony, Currie, Dorothy, de Looze, Margaretha. et al. (2012). Social determinants of health and well-being among young people: Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey. World Health Organization. Regional Office for Europe. https://iris.who.int/handle/10665/326406

Damasio, A. R. (2005). *Descartes' error*. Random House.

Dumitrascu, D. L., David, L., & Baban, A. (2019). Is *psychosomatic* really a bicentennial word? The proof of an older use. *Medicine and pharmacy reports*, *92*(2), 205–207. https://doi.org/10.15386/cjmed-1245

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*, *10*, 98. https://doi.org/10.1186/1479-5868-10-98

Feng, B., Xu, K., & Zhou, P. (2022). Association between vigorous physical activity and life satisfaction in adolescents. *Frontiers in public health*, *10*, 944620. https://doi.org/10.3389/fpubh.2022.944620

Fisher, S. (1990). The evolution of psychological concepts about the body. In T. F. Cash & T. Pruzinsky (Eds.), *Body images: Development, deviance, and change* (pp. 3–20). New York: Guilford Press.

Freeman, J. G., Samdal, O., Băban, A., & Bancila, D. (2012). The relationship between school perceptions and psychosomatic complaints: cross-country differences across Canada, Norway, and Romania. *School Mental Health*, *4*, 95-104.

Fridh, M., Lindström, M., & Rosvall, M. (2015). Subjective health complaints in adolescent victims of cyber harassment: moderation through support from parents/friends - a Swedish population-based study. *BMC public health*, *15*, 949. https://doi.org/10.1186/s12889-015-2239-7

Ganesan, S., Ravishankar, S. L., & Ramalingam, S. (2018). Are Body Image Issues Affecting Our Adolescents? A Cross-sectional Study among College Going Adolescent Girls. *Indian journal of community medicine : official publication of Indian Association of Preventive & Social Medicine*, *43*(Suppl 1), S42–S46. https://doi.org/10.4103/ijcm.IJCM_62_18

Gardner, R. M. (2002). *Body image assessment of children.* In T. F. Cash & T. Pruzinsky (Eds.), *Body image: A handbook of theory, research, and clinical practice (pp. 127-134). New York, NY: Guilford Press.*

Giannotta, F., Nilsson, K. W., Åslund, C., et al. (2022). Among the Swedish generation of adolescents who experience an increased trend of psychosomatic symptoms: Do they develop depression and/or anxiety disorders as they grow older? *BMC Psychiatry*, *22*(779). https://doi.org/10.1186/s12888-022-04432-x

Greene, J. W., & Walker, L. S. (1997). Psychosomatic problems and stress in adolescence. *Pediatric Clinics of North America*, *44*(6), 1557-1572.

Grigaitytė, I., & Söderberg, P. (2021). Why does perceived social support protect against somatic symptoms: Investigating the roles of emotional self-efficacy and depressive symptoms? *Nordic Psychology, 73*(3), 226-241. https://doi.org/10.1080/19012276.2021.1902845

Hagquist, C., Due, P., Torsheim, T., & Välimaa, R. (2019). Cross-country comparisons of trends in adolescent psychosomatic symptoms - a Rasch analysis of HBSC data from four Nordic countries. *Health and quality of life outcomes*, *17*(1), 27. https://doi.org/10.1186/s12955-019-1097-x

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate data analysis (7th ed.). Prentice Hall.

Health and Social Care Information Centre. (2009). *Annual report and accounts 2008/09*. The Stationery Office. HC 727. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228583/0727.pdf

Hoyle, R. H. (Ed.). (2012). Handbook of structural equation modeling. The Guilford Press.

Huang, Y., Lu, J., & Širůček, J. (2023). The associations between social environment and adolescents' psychosomatic health: An ecological perspective. *Frontiers in psychology*, *14*, 1141206.

Humbert, M. L., Chad, K. E., Bruner, M. W., et al. (2008). Using a naturalistic ecological approach to examine the factors influencing youth physical activity across grades 7 to 12. *Health Education & Behavior, 35*(2), 158–173. https://doi.org/10.1177/1090198107308374

Jackson, S. L. (2003). Research methods and statistics: A critical thinking approach (3rd ed.). Wadsworth.

Janssens, K. A., Oldehinkel, A. J., Bonvanie, I. J., & Rosmalen, J. G. (2014). An inactive lifestyle and low physical fitness are associated with functional somatic symptoms in

adolescents. The TRAILS study. *Journal of psychosomatic research*, *76*(6), 454–457. https://doi.org/10.1016/j.jpsychores.2014.03.008

Jones, D. C. (2001). Social comparison and body image: Attractiveness comparisons to models and peers among adolescent girls and boys. *Sex Roles*, *45*(7-8), 645-664. https://doi.org/10.1023/A:1014815725852

Jung J. (2011) Advertising Images of Men: Body Size and Muscularity of Men Depicted in *Men's Health* Magazine, Journal of Global Fashion Marketing, 2:4, 181-187, DOI: 10.1080/20932685.2011.10593096

Kaçmaz, D. A., Küçükelçi, D. T., & Sahranç, U. (2023). Study on the Mediation Effect of Body Image Between Somatization and Subject Well-being Levels in Individuals. *The Journal of Social Science, 7*(14), 132-142.

Karchynskaya, V., Kopcakova, J., Madarasova Geckova, A., Klein, D., de Winter, A. F., & Reijneveld, S. A. (2022). Body image, body composition and environment: do they affect adolescents' physical activity?. *European journal of public health*, *32*(3), 341–346. https://doi.org/10.1093/eurpub/ckac022

Kaur, R. (2020). *Home Body*. Simon & Schuster.

Kelly, C., Fitzgerald, A., Sentenac, M., Gakewski, J., Molcho, M., & Gabhainn, S. N. (2016). Weight concerns among adolescent boys. *Public health nutrition*, *19*(3), 456–462. https://doi.org/10.1017/S1368980015001615

Kenny, U., Sullivan, L., Callaghan, M., Molcho, M., & Kelly, C. (2018). The relationship between cyberbullying and friendship dynamics on adolescent body dissatisfaction: A cross-sectional study. *Journal of health psychology*, *23*(4), 629–639. https://doi.org/10.1177/1359105316684939

Kesavachandran, C., Bihari, V., & Mathur, N. (2009). Can physical activity maintain normal grades of body mass index and body fat percentage?. *International journal of yoga*, *2*(1), 26–29. https://doi.org/10.4103/0973-6131.53839

Kline, R. B. (2011). Principles and practice of structural equation modeling (3rd ed.). Guilford Press.

Knafo, H. (2016). The development of body image in school-aged girls: A review of the literature from sociocultural, social learning theory, psychoanalytic, and attachment theory perspectives. *The New School Psychology Bulletin*, *13*(2), 1-16.

Lemma, A. (2010). *Under the skin: A psychoanalytic study of body modification.* New York, NY: Routledge.

Lipowski, Z. J. (1988). Somatization: The concept and its clinical application. The American Journal of Psychiatry, 145(11), 1358–1368. https://doi.org/10.1176/ajp.145.11.1358

Mann, A. H., Wakeling, A., Wood, K., Monck, E., Dobbs, R., & Szmukler, G. (1983). Screening for abnormal eating attitudes and psychiatric morbidity in an unselected population of 15-year-old schoolgirls. *Psychological Medicine*, *13*(3), 573-580.

Mellin, A. E., Neumark-Sztainer, D., Story, M., Ireland, M., & Resnick, M. D. (2002). Unhealthy behaviors and psychosocial difficulties among overweight adolescents: the potential impact of familial factors. *The Journal of adolescent health : official publication of the Society for Adolescent Medicine*, *31*(2), 145–153. https://doi.org/10.1016/s1054-139x(01)00396-2

Mills, J. S., Roosen, K., and Vella-Zarb, R. (2011). "The psychology of body image: Understanding body image instability and distortion," in *Body Image: Perceptions, Interpretations, and Attitudes*, ed. S. B. Greene, (New York, NY: Nova Science Publishers), 59–80.

Mirzayi, C., Ferris, E., Ozcebe, H., et al. (2021). Structural equation model of physical activity in Turkish schoolchildren: An application of the integrated behavioural model. *BMJ Open, 11*(e046317). https://doi.org/10.1136/bmjopen-2020-046317

Natvig, G. K., Albrektsen, A., Anderssen, N., & Qvarnstrøm, U. (1999). School-related stress and psychosomatic symptoms among school adolescents. *Journal of School Health, 69*, 362–368.

Ottova, V., Erhart, M., Vollebergh, W., Kökönyei, G., Morgan, A., Gobina, I., Jericek, H., Cavallo, F., Välimaa, R., de Matos, M. G., Gaspar, T., Schnohr, C. W., & Ravens-Sieberer, U. (2012). The Role of Individual- and Macro-Level Social Determinants on Young Adolescents' Psychosomatic Complaints. The Journal of Early Adolescence, 32(1), 126-158. https://doi.org/10.1177/0272431611419510

Puhl, R. M., & King, K. M. (2013). Weight discrimination and bullying. *Best Practice & Research Clinical Endocrinology & Metabolism, 27*(2), 117–127. https://doi.org/10.1016/j.beem.2012.12.002

Puhl, R. M., and Latner, J. D. (2007). Stigma, obesity, and the health of the nation's children. *Psychol. Bull.* 133, 557–580. doi: 10.1037/0033-2909.133.4.557

Quick, V., Nansel, T. R., Liu, D., Lipsky, L. M., Due, P., & Iannotti, R. J. (2014). Body size perception and weight control in youth: 9-year international trends from 24 countries. *International journal of obesity (2005)*, *38*(7), 988–994. https://doi.org/10.1038/ijo.2014.62

Ramos P, Moreno-Maldonado C, Moreno C and Rivera F (2019) The Role of Body Image in Internalizing Mental Health Problems in Spanish Adolescents: An Analysis According to Sex, Age, and Socioeconomic Status. Front. Psychol. 10:1952. doi: 10.3389/fpsyg.2019.01952

Rees, R., Oliver, K., Woodman, J., & Thomas, J. (2011). The views of young children in the UK about obesity, body size, shape and weight: a systematic review. *BMC public health*, *11*, 188. https://doi.org/10.1186/1471-2458-11-188

Rodriguez-Ayllon, M., Cadenas-Sánchez, C., Estévez-López, F., Muñoz, N. E., Mora-Gonzalez, J., Migueles, J. H., Molina-García, P., Henriksson, H., Mena-Molina, A., Martínez-Vizcaíno, V., Catena, A., Löf, M., Erickson, K. I., Lubans, D. R., Ortega, F. B., & Esteban-Cornejo, I. (2019). Role of Physical Activity and Sedentary Behavior in the Mental Health of Preschoolers, Children and Adolescents: A Systematic Review and Meta-Analysis. *Sports medicine (Auckland, N.Z.)*, *49*(9), 1383–1410. https://doi.org/10.1007/s40279-019-01099-5

Rowland, T. W. (1991). Effects of obesity on aerobic fitness in adolescent females. *American Journal of Diseases of Children*, *145*(7), 757-762.

Sabiston, C. M., Pila, E., Pinsonnault-Bilodeau, G., & Cox, A. E. (2014). Social physique anxiety experiences in physical activity: A comprehensive synthesis of research studies focused on measurement, theory, and predictors and outcomes. *International Journal of Sport and Exercise Psychology*, *12*(4), 158–183. https://doi.org/10.1080/1612197X.2014.946947

Sawyer, S. M., Afifi, R. A., Bearinger, L. H., Blakemore, S. J., Dick, B., Ezeh, A. C., & Patton, G. C. (2012). Adolescence: a foundation for future health. *Lancet (London, England)*, *379*(9826), 1630–1640. https://doi.org/10.1016/S0140-6736(12)60072-5

Shi, C., Yan, J., Wang, L., & Shen, H. (2022). Exploring the self-reported physical fitness and self-rated health, mental health disorders, and body satisfaction among Chinese adolescents: A cross-sectional study. *Frontiers in Psychology*, *2022*(13). https://doi.org/10.3389/fpsyg.2022.1003231

Sypeck, M. F., Gray, J. J., & Ahrens, A. H. (2004). No longer just a pretty face: fashion magazines' depictions of ideal female beauty from 1959 to 1999. *The International journal of eating disorders*, *36*(3), 342–347. https://doi.org/10.1002/eat.20039

Tabachnick, B. G., & Fidell, L. S. (2013). Using multivariate statistics (6th ed.). Pearson.

Tabak, I., & Mazur, J. (2016). Social support and family communication as factors protecting adolescents against multiple recurrent health complaints related to school stress. *Developmental period medicine*, *20*(1), 27–39.

Tardy, C. H. (1985). Social support measurement. *American journal of community psychology*, *13*(2), 187.

Torsheim, T., & Wold, B. (2001b). School-related stress, support, and subjective health complaints among early adolescents: A multilevel approach. *Journal of Adolescence*, *24*, 701–713.

UNESCO. (2022). Understanding open science. UNESCO. Retrieved April 16, 2024, from https://unesdoc.unesco.org

Voelker, D. K., Reel, J. J., & Greenleaf, C. (2015). Weight status and body image perceptions in adolescents: current perspectives. *Adolescent health, medicine and therapeutics*, 149-158.

Way, N., Reddy, R., & Rhodes, J. (2007). Students' perceptions of school climate during the middle school years: Associations with trajectories of psychological and behavioral adjustment. *American Journal of Community Psychology, 40*, 194–213.

Whitehead, R., Berg, C., Cosma, A., Gobina, I., Keane, E., Neville, F., ... & Kelly, C. (2017). Trends in adolescent overweight perception and its association with psychosomatic health 2002–2014: Evidence from 33 countries. *Journal of Adolescent Health*, *60*(2), 204-211.

Wordsworth, W. (1807). My heart leaps up. In *Poems, in two volumes* (Vol. 1, p. 200). Longman.

World Health Organization. (1986). Ottawa Charter for Health Promotion. https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global-conference

World Health Organization. (2001). *Mental health and substance abuse, including alcohol-report and documentation of the technical discussions* (No. SEA-Ment-124). WHO Regional Office for South-East Asia.

World Health Organization. (2024). *Obesity and overweight*. Retrieved April 7, 2024, from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

Yavuz, C. M. (2023). Prevalence and trends of overweight and obesity among children and adolescents in Turkey: A meta-analysis. *International Journal of Human and Health Sciences*, *7*(1), 20-30. https://doi.org/10.31344/ijhhs.v7i1.492

Zaker, A., & Radzi, A. A. (2015). Body image perception and physical activity among female adolescents. In S. Ismail, N. Sulaiman, & R. Adnan (Eds.), *Proceedings of the 2nd*

International Colloquium on Sports Science, Exercise, Engineering and Technology (pp. 291–300). Singapore: Springer.

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, *52*(1), 30–41.

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THESIS

APPLIED PSYCHOLOGY PART

Salman Esra

2024

EÖTVÖS LORÁND UNIVERSITY

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Premature Birth Follow Up System in Hungary

Salman Esra **Supervisor: Nagy Anett**

PHD

Budapest, 2024

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CONFIRMATION OF THESIS CONSULTATION

Student's name: Esra Salman

Student's programme: Psychology MA – Developmental and Clinical Child Psychology

The thesis's topic: Premature Birth Follow Up System in Hungary

Supervisor's name: Dr. Anett Nagy

Time of consultation	Topic of the consultation, notes, suggestions	Supervisor's signature
7 March 2024	Informing about the institution, follow-up system in Hungary	
13 March 2024	Discussing the research topic, the subject, aim and Developmental Measures	
20 March 2024	Discussing the layout of the applied thesis, and sources	
27 March 2024	Discussing the institution and the collaboration between	
10 April 2024	Discussing the content of the thesis, planning the deadlines	
2 May 2024	Discussing all parts, overall review of the thesis	

I allow the sumbission of the thesis.

.....

supervisor's signature

Budapest, 12 May 2024.

SEMMELWEIS EGYETEM
Általános Orvostudományi Kar
Szülészeti és Nőgyógyászati Klinika

PROF. DR. ÁCS NÁNDOR
egyetemi tanár, igazgató

INFORMATION SHEET

Dear Parents,

Our course titled "Fieldwork," led by Dr. Anett Nagy at Semmelweis University Department of Obstetrics and Gynecology Outpatient's Clinic of Developmental Neurology, Budapest, Hungary in collaboration with Eötvös Loránd University, focuses on providing practical and in-person experience in the field of child development. This practice is designed to allow students to gain insights into preterm birth and follow-up care systems. To achieve this, they will be observing assessments and interactions within the hospital setting. A parent or guardian will be present throughout these observations. It is important to note that no data recorded during these observations will include identifiable information about the family; only nicknames will be used.

Your written consent for these practical observations is valuable and greatly enhances our students' learning experience in child development.

Should you consent to your child's participation in this activity, please fill out the Consent Form and provide details regarding any specific circumstances you wish to be considered. Please be aware that you may revoke your permission at any time.

Thank you for your contribution:

YOUR NAME

Anett Nagy, PhD
clinical child psychologist

Kedves Szülők!

A Semmelweis Egyetem Szülészeti és Nőgyógyászati Klinikájának Fejlődésneurológiai Ambulanciáján, az Eötvös Loránd Tudományegyetemmel együttműködve, Dr. Nagy Anett vezetésével, végezzük a "Terepgyakorlat" című kurzusunkat, mely a gyermekek fejlődése területén szerzett gyakorlati és személyes tapasztalatszerzésre fókuszál.
A gyakorlat célja, hogy betekintést nyerjünk a koraszülöttség és az utógondozás rendszerébe. Ennek érdekében megfigyeljük az ambuláns környezetben történő felméréseket és interakciókat. A megfigyelések során egy szülő vagy gondviselő is jelen lehet. Fontos megjegyezni, hogy a megfigyelések során rögzített adatok nem tartalmaznak azonosítható információkat a családról; csak álneveket használnak.
A gyakorlati megfigyelésekhez adott írásos beleegyezése lényeges. Amennyiben hozzájárul gyermeke részvételéhez ebben a tevékenységben, kérjük, töltse ki a beleegyezési nyilatkozatot. Felhívjuk figyelmét, hogy hozzájárulását bármikor visszavonhatja.

Köszönjük hozzájárulását:

YOUR NAME Nagy Anett, PhD

gyermek klinikai szakpszichológus

NYILATKOZAT

Alulírott (szülő/gondviselő neve):
……...……..,
gyermekem nevében (Gyermek neve: ……..
(későbbiekben álnéven ellátott)
Elérhetősége:……)
hozzájárulok, hogy Nagy Anett, PhD, klinikai szakpszichológus által vezetett dolgozatban gyermekem neve és eredményei és személyi adatai teljes titokban tartásával tudományos elemzés, előadás céljára felhasználásra kerüljenek, azokból dolgozat íródhasson.
A vizsgálat menetéről és körülményeiről megfelelő és elfogadható felvilágosítást kaptam.

Budapest,

……..……..
A vizsgálatban résztvevő gyermek szülőjének/gondviselőjének aláírása

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ABSTRACT

The purpose of the current study is to investigate the developmental follow-up system for preterm children in Hungary by observing a child from within the follow up system. Preterm birth is highly common nowadays, 1 in every 10 births, and involves survival and future risks for children. Adequate and well-organized care and follow-up system increase the survival rate and life quality of children and their families. The development of the child in this current study is measured by Bayley III and Brunet-Lèzine Psychomotor Developmental Scales. Additionally, several interviews took place with parents. The findings indicate that development of the child found to be aligned with his developmental stage except the language skills are found moderate and slight below average level. The study underscores the importance of a follow-up system for such vulnerable group, premature children, to optimize developmental outcomes.

1. INTRODUCTION

The time between conception and birth is called gestation. Gestational age is used to refer the length of the pregnancy. In other words, gestational age is the first day of the woman's last menstrual cycle to the current date, it is calculated in weeks. Typical pregnancy lasts between 38-42 weeks (MedlinePlus, 2021a). Preterm birth is defined as earlier than 37 weeks of gestation, consist adverse infant outcomes for survival and quality of life (McCormick, 1985). Based on the gestational age 3 subcategories are defined for preterm birth; extremely preterm (less than 28 weeks), very preterm (28 to less than 32 weeks), moderate to late preterm (32 to 37 weeks) (World Health Organization, 2023). Preterm birth is found to be the most dominant cause of perinatal and neonatal (the first 4 weeks of a child's life) mortality and morbidity (Kinney et al., 2012; MedlinePlus, 2021b). Annually 1 in every 10 babies born premature (Kinney et al., 2012). Ohume et al., (2010) found that around 900.000 preterm infants died in 2019. However, with the use of cost-effective interventions (e.g. kangaroo method) 75% of these deaths would have been prevented (World Health Organization, 2023)

Preterm babies are under risk of variety of complications such as respiration, feeding, body temperature regulation issues and high risk of infection (Escobar et al., 2006). Neonatal deaths have a dominant influence on overall child mortality, it is important to evaluate the negative factors of preterm births to be able to decrease child mortality (Liu et al., 2012). In fact, complication due to preterm birth is causing over a million neonatal death every year (Lawn et al., 2013a).

Experts in the field are addressing a two solution to ease the burden of preterm birth; prevention and after birth care (Lawn et al., 2013a). There are some measures taken to reduce the risk of preterm birth; before, during and between pregnancies with the help of preconception and antenatal care packages (Dean et al., 2013; Requejo et al., 2013). Growing body of studies in high income countries attempted prevent preterm birth but unfortunately high effective interventions had not been found (Lawn et al., 2013a). Chang et al. (2013), studied on preterm birth prevention in 39 high-income countries. Their study proved that five interventions would only 5% reduces the preterm birth rate (from 9·59% to 9·07%). Five interventions are following; quitting smoking, cervical cerclage, when using assisted reproductive technologies minimizing the number of embryos transfers, decreasing the planned labor inductions or caesarean sections that are not medically necessary, use of progesterone agents. The lack of effective interventions addresses the knowledge gap and requires further studies.

The difference in survival rates between high income countries and low- or middle-income countries has been found to increase the likelihood of survival and reduce the rate of

disability by improving the implementing the effective interventions (Lawn et al., 2013b). Variety of underlying reasons exist behind the lack of proper care system among low- or middle-income countries such as human resource capacity, health facility infrastructure, supply and demand systems, financial resources, government stewardship, district-level management, and use of data (Kinney et al., 2010). Lawn et al. (2013a) points out that care of premature baby consists of such interventions; feeding support and thermal care, neonatal resuscitation, when necessary, extra care of premature babies (Kangaroo Mother Care), paying attention to complications of premature babies especially respiratory distress syndrome and infections. Kangaroo Mother Care (KMC) includes skin-to-skin contact between caregiver and newborn, frequent skin contacts and breast feeding, and leads to early discharge from hospital (Conde-Agudelo et al., 2011). Furthermore, KMC allows caregivers to improve their skills and responsibility as infant's primary caregiver and provide the all the needs of the infant (Nyqvist, 2010).

Studies had shown that mortality rate for preterm infants are dramatically improved, however morbidity for those infants remains due to their vulnerability (Behrman & Butler, 2007; Çiçek et al., 2005). Variety of factors helped this improvement such as increased number of perinatal care centers specialized in high-risk obstetric care and neonatal intensive care, expanded use of corticosteroids prenatally and surfactant postnatally for the treatment, advancement in the equipment such as incubators, overhead warmers, and respirators (Ward & Beachy, 2003).

In terms of morbidity, possible complications for preterm babies consist of respiratory distress syndrome, chronic lung disease, injury to the intestines, a compromised immune system, cardiovascular disorders, hearing and vision problems, and neurological insult (Behrman & Butler, 2007), developmental delay, growth reduction, catheter complications, intraventricular hemorrhage, neonatal abstinence, nosocomial infections (Ward & Beachy, 2003), disability, learning difficulties (World Health Organization, 2023). Furthermore, premature babies with low birth weight shows typical outcomes however they are still under high risk for neuropsychological, cognitive, and physiological difficulties (Hack et al., 1995) also, learning disabilities and academic hardship (Xu & Filler, 2005). Therefore Çiçek et al. (2005) suggest that the development of preterm infants should be followed up and measures for possible complications should be taken.

Majority of premature babies born before 32nd week gestation is going to retain in the newborn intensive care units (NICUs) to get a care for independent of intensive care until the organ maturation reaches to a sufficient level. In the case of immaturity of multiple organ

systems put preterm baby to a high-risk situation for many complications during their hospital stay (Ward & Beachy, 2003).

Since this study takes part in Hungary, Hungarian Child Healthcare in terms of preterm infants follow up is going to be explained in the next paragraphs. Hungary is central European country with 10 million of population, 1.8 million are consist of children and adolescents under 18 years old (Laszlo et al., 2020). As cited in Laszlo et al., (2020); Kósa et al., (2002) indicated Hungary listed as 20th for child well-being among the Rich Countries. In Hungary, most important risk factor for infant death is low birth weight (LBW). In 2014, the rate of LBW found 8.9%, preserved its rate for 20 years (Laszlo et al., 2020).

Hungarian Central Statistical Office (KSH) indicates that in terms of morbidity, with 20% the respiratory system complications are the main reason for hospitalization among 0-14 age group, second injuries with 13% and infectious diseases with 9% (as cited in Laszlo et al., 2020). Infants with LBW is less than 2.5 kg regardless their gestational age (Cutland et al., 2017). As mentioned earlier in the text, low birth weight and respiratory system complications are conditions that preterm babies are affected frequently; this proves the vulnerability of the group.

In Hungary, there is a special pediatric and a special preterm new-born transport system. This network is built in 1975 with the participation of 10 Neonatal Intensive Care Units (NICU) inside the country. The determination and hard work of the NICU specialists not only helped perinatal mortality drastically decrease (by more than 70%) but also positively influenced the survival rate and quality of life of those preterm infants (Laszlo et al., 2020).

Following-up the child development is a useful tool for promoting healthy development and clarify possible complication, it is a process of monitoring child's development overtime (Dosman et al., 2012).

The field work as a part of this applied thesis took place in Semmelweis University's Faculty of Medicine (Department of Obstetrics and Gynecology, Developmental Neurology Clinic). This institution provides intensive care for preterm babies and their parents. Furthermore, they implemented a follow-up system where the experts follow the preterm children's developmental and health status to be able to make sure if there is any developmental delay or complications. For the first 30 months of infant's life, they have two appointments each year. After this period, hospital staff invites them once a year until child reach 6 years of age. Clinical and developmental psychologists are conducting several tests and inventories to track preterm infants' development. Surveillance of children's development conducted by official institutions such as hospitals, developmental centers, universities are essential for early

detection and treatment in terms of developmental disorders (Dosman et al., 2012). This paper is going to be focusing on the developmental and psychological aspects of a case from the follow-up system of Semmelweis University.

The policy of Semmelweis University Hospital is to take care of the baby until they gain weight and then they transfer the patient to another available hospital. During the time of baby in the NICU, they work very carefully to not interrupt babies sleep since undisturbed sleep is the key for development. Small infants are fed every 2 hours, bigger infants are fed every 3 hours by feeding tube if it is necessary. The nursing services includes diaper changes, measuring physiological indicators, checking, and changing infusions. Medical examinations are synchronized with this pattern of care where takes place twice a day, in the morning and early evening. The infants' breathing, heartbeat and oxygen level are continuously monitored with medical monitors where they place not only on the monitor above the baby also on the central monitor at the nursing desk. Therefore, in the need of intervention doctors and nurses can act quickly. Furthermore, the department motivate and encourage parents to visit their child any time during the day. To secure the healthy bonding between infant and parent, Kangaroo Care Method, skin to skin contact, and breastfeeding suggested (Semmelweis University Department of Obstetrics and Gynecology, n.d.).

Canadian Pediatric Society (2022) underlines the importance of the collaboration among experts from different specializations by including the team experts from following: neonatologist, pediatrician or developmental pediatrician, nurse or nurse practitioner, occupational therapist, physiotherapist, and speech-language therapist, educational or clinical psychologist and psychometrist, dietitian and social worker, orthoptist, ophthalmologist, and audiologist. As an outsider observer of the follow-up system in Semmelweis University, I could witness collaboration among different specialists. Semmelweis University staff provides longitudinal assessment, early diagnosis and treatment, referral to local resources when needed by working together as specialists from different disciplines. Murthy et al. (2021) indicate that it is crucial for experts to work collaboratively and with high quality coordination to provide the lack of gaps in care and services, and early referral for specialty and rehabilitation services, and access to funding and community resources.

The subject in the thesis was accessed through the premature child development follow-up system of Semmelweis University. The case of this subject is going to be named as "Pearl" for the sake of the anonymity of the child and the family. Pearl's birth took place in the 32nd week of the gestation. His corrected age is 33 months 27 days (the calculation displayed on 29th April 2024). Corrected age is extracting the number of weeks born before 40 weeks of gestation

from the chronological age and it is recommended to measure until the child reach 3 years of age (Engle & American Academy of Pediatrics Committee on Fetus and Newborn, 2004). Using the chronological age might result in underestimated scores for the infant because of the preterm infants' delayed maturation therefore The American Academy of Pediatrics recommends using the corrected age for preterm infants until the 3 years of age (Wilson-Ching et al., 2014). However, the practice varies greatly, as a matter of fact, in Hungary corrected age is used until 2 years of age.

He is a boy; he has a dizygotic twin. He born as 39 cm and 1.410 gram. According to World Health Organization (2023) he falls under the very preterm (28 to less than 32 weeks) group. Considering his birth weight, he has low birth weight because he is lighter than 2500 gram (Cutland et al., 2017). Low birth weight has two sub-categories: very low birth weight (<1500g) and extremely low birth (<1000g) (World Health Organization, 2004). Pearl is considered as very low birth weight.

This family is a multicultural family with 4 members: mother (Turkish), father (Hungarian) and twin boys. Both parents are university graduates and have career in finance, however mother is not working due to the maternity leave. Twin boys go to the daycare. Both parents are taking responsibilities to take care of the needs of their children.

Considering the corrected age of Pearl; 33 months 27 days, typical developmental consists of transition from infancy to childhood. Around the 30 months of age, children start symbolic pretend play by using specific objects and toys with another aim and intention depending on their own actions (Dosman et al., 2012). Also, tantrums, aggression, and refusal to cooperate with rules increase (Dixon & Stein, 2006).

2. METHODS

This study was conducted in Semmelweis University's Faculty of Medicine, Department of Obstetrics and Gynecology, Developmental Neurology Clinic. An agreement was reached between Eötvös Lorand University (ELTE) and Semmelweis University regarding the 80-hour fieldwork that students must complete to graduate from ELTE, and the writing of an applied thesis related to the fieldwork. The fieldwork process was carried out within this framework between March-April 2024.

Data was collected at various time periods and locations. There are different information sources, there is data from the initial hospital records based on measurements taken immediately after birth including head circumference, body length, neonatal reflex assessments.

Furthermore, as part of the preterm follow-up examination at the Obstetrics and Gynecology Clinic of Semmelweis University child was assessed in various times (by the corrected age of 13, 19 and 24 months old) by the clinical psychologist. Bayley III assessments was done at 13 and 24 months of corrected age and Brunet-Lèzine Psychomotor Developmental Scale applied at 19 months of corrected age.

Finally, several interviews are conducted with parents when the child's corrected age is 32 months. The meeting took place in the family's house and 2 online meeting conducted afterwards. In the beginning family has been informed about the nature of the study. They sign the consent form where consists of the aim of the study, their rights such as anonymity,

3. FINDINGS

3.1 Initial Hospital Records

3.1.1 Birth Weight – 1410 gram

The subject is weighed 1410 gram based on the measurement by the hospital staff right after the birth. Prematurity and low birth weight not only contains many risks for the infancy such as mortality, developmental disabilities, retinopathy of prematurity, but also in the adulthood increased risk of adult-onset chronic conditions such as obesity and diabetes (United Nations Children's Fund & World Health Organization, 2019). According to Villar et al., (2016), 1410 gram with 32^{nd} of gestational age is falls just below the 50^{th} percentile which indicates that the infant's weight is about average, tending slightly towards the lower normal limit for his gestational age.

3.1.2 Occipitofrontal Circumference – 29 cm

Head Circumference is measured 29 cm after birth of the infant. Neuroimaging techniques provide important outcomes regarding head size of the infant. MRI studies link small head size with decreased amount of gray matter, furthermore ultrasonography studies link small head size with white matter injury (Lee &Hayes, 2015). Also, Occipitofrontal circumference (OFC) is associated with reflect intracranial volume and correlate with actual brain size (Bray et al., 1969). These findings show the importance of the head circumference measurement on infants whether they are preterm or not. However, the important emerges specifically for the preterm due to their vulnerability. For the current case, his OFC is measured 29 cm. This value falls within the normal range (50^{th} percentile), it typically indicates normal grow (Villar et al., 2016).

3.1.3 Length - 39 cm

When the length of the infant's body measure it is found 39 cm significantly above 90^{th} percentile for boys which is considered taller than his gestational age average (Villar et al.,

2016). Birth and length of the infant found to be associated with the growth rates of weight and length of pre-term and full-term infants (Kang et al., 2019). Specifically, birth length is the main indicator for fetal linear growth that is linked to infant growth retardation (Krebs et al., 2022).

3.1.4 APGAR - 9/10

APGAR scoring is found by Dr. Virginia Apgar, an anesthesiologist at Columbia University, in 1952. APGAR is also a mnemonic device that describes the components of the score: Appearance, Pulse, Grimace, Activity and Respiration (Simon et al., 2023). In other words, the APGAR scoring system is a standardized assessment for infants after delivery which scores of 0,1 or 2 on five components: color, heart rate, muscle tone, reflexes, respiration. The score is measured at 1 minute and 5 minutes after the delivery. (American College of Obstetricians and Gynecologists, 2015). Higher scores indicate a more positive result.

The subject's APGAR score is reported at 9, this score is reassuring according to American College of Obstetricians and Gynecology, & Task Force on Neonatal Encephalopathy, & American Academy of Pediatrics (2014).

3.2 Developmental Scales

3.2.1 Bayley III

The Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III) is conducted in two different times for the current case. First time it is conducted when child's corrected age was 13 months. And the second time took place when child's corrected age was 24 months. Both times Bayley-III conducted during the hospital visit as a part of the developmental follow-up program, by the same clinical psychologist.

They Bayley-III assess developmental functioning of children between 1 month and 42 months of age. It is an individually administered instrument. The aim of conducting Bayley-III is to check whether a developmental delay in children. With the result of Bayley-III specialists can plan an intervention and refer child to another institution (Piñon, 2010). Bayley-III examines five major development areas: cognitive, communication (receptive, expressive), physical (fine motor, gross motor), social emotional and adaptive (Maccow, 2008). It is one of the most frequently used developmental scales (Johnson et al., 2014).

The results from the Bayley-III screening test that indicated that the child presented a low risk of developmental delay in cognitive, receptive communication, fine motor, and gross motor skills, scoring 18, 13, 14, and 17 points, respectively. Notably, expressive communication was the only domain where the child exhibited a moderate risk of delay with a score of 12 points.

A follow-up developmental assessment was conducted when child's corrected age is 24 months using the Bayley-III test. The results indicate average cognitive development with a composite score of 100, reflecting typical abilities in sensorimotor functions, exploration, and manipulation. However, the language skills were slightly below average with a composite score of 94, suggesting mild delays in both receptive and expressive communication. Conversely, the child demonstrated average motor skills with a composite score of 103, showing strong fine and gross motor abilities. According to Dr. Nagy Anett's report, the child's overall development aligns appropriately with their age when corrected for prematurity.

3.2.2 Brunet-Lèzine Psychomotor Development Scale

Brunet-Lézine is a French test that measures the psychological and motor development of children between 1 month and 30 months age old. The test is developed in 1950s by Odette Brunet and Irène Lézine. The test also called as The Scale of Psychomotor Development of Children. The test assesses the following developmental areas; posture, hand-eye coordination, language, and socialization (Cardoso et al., 2017).

Brunet-Lézine scale was conducted for Pearl when he is 19-month-old corrected age. The results indicate that the child's development is on track with age-appropriate levels in various domains: gross motor skills scored at a 22.5-month level with a Developmental Quotient Postur (DQP) of 115, coordination and manipulation at a 24-month level with a DQC of 122, language development at a 22-month level with a DQL of 112, and socialization and autonomy at a 27-month level with a SRQ of 137. The overall Developmental Quotient for the child is 121, suggesting overall development consistent with their corrected age.

3.3 Interview with Parents

Several interviews are conducted with parents in their home and online. The interview process is an opportunity in terms of observing Pearl in his natural environment, his relationships with parents and twin brother, emotional bond, parents' impressions and representations of Pearl and parenting.

The interview with parents from a multicultural family (Turkish mother and Hungarian father) provided profound insights into the upbringing and developmental trajectory of the case, born prematurely at 32 weeks. The mother, currently on maternity leave while the father works, shared their experience starting from a planned pregnancy that involved a healthy lifestyle at their lake house in the countryside, though not without the challenges of twin pregnancy, including severe nausea due to increased progesterone level and heightened concerns for Pearl leading to steroid injections in the third trimester. During the interview, mother stated that using the steroid use was a hard decision to take because of the consequences of the Prednisolone

such as increased chance of preterm delivery and low birth weight (Organization of Teratology Information Specialists, 2022). However, there are some cases that used steroid pulse therapy, and completed her pregnancy at 37 weeks of gestation, delivered a healthy male baby (Sato et al., 2017). Conversely, other studies have shown that use of prednisone or prednisolone might prevent some negative outcome of pregnancy (Organization of Teratology Information Specialists, 2022). It was a hard decision for the family since it was already considered as a risky pregnancy due to the twins. Furthermore, she developed insulin resistance due to the Prednisolone use. Mother claimed herself so stressed and anxious, spending her days reading possible side effects of the medicine.

Doctors mentioned about the risk of preterm birth in the 26th week, mother advised to have bed rest in 29th week of gestation. Bed rest was highly uncomfortable for the mother given her active lifestyle and energic nature. Hearing about the preterm birth risk was not surprising for the parents because they were prepared to have some setbacks due to twin pregnancy. However, goal of the parents is to adapt the current situation and do best for twins.

Post-birth, twins required immediate medical attention, undergoing incubation, and spending 33 days in two different hospitals, which included a stressful transfer to a different hospital where they experienced mistreatment before receiving adequate care. This period fostered the parents' reliance on kangaroo care and an intense focus on maintaining equality in breastfeeding and bonding with both infants.

Regarding their developmental environment, the family's approach is structured around enriching activities, including board games, flashcards, and a variety of toys as suggested by Kottman (2011), which range from nurturing items like dolls and stuffed animals to more imaginative ones like play dough and doctor kits. The mother, who speaks Turkish, and the father, who communicates in Hungarian, are dedicated to bilingual upbringing, enhancing their children's linguistic and cognitive skills through books and songs in three languages (English, Hungarian, and Turkish). The infant is always so interested with books and any sorts of teaching materials, even his nickname in the family is “Professor”.

The interview highlighted the parents' meticulous attention to fostering a warm, nurturing environment, as reflected in the Mother’s Object Relations Scales Short-form (MORS-SF), where both children scored high on 'warmth' and relatively low on 'invasion' items, indicating a balanced and positive family dynamic. MORS is a time saving, easy to use and efficient measure that assess difficulty areas in the early mother-infant relationship from two dimensions warmth-coldness and invasion-withdrawal. The test is inspired by attachment theory, the mother’s perception of her infant effects the dual relationship between them overall

it effects child's health and well-being (Oates & Gervai, 2019). This holistic view, enriched by a strong team effort and collaboration between the parents, underpins their children's promising intellectual and social development despite the initial medical hurdles.

4. DISCUSSION

Current study aims to display the Hungarian Developmental Follow-up Program for Preterm Infants and the methods that they employed by observing a patient from the follow-up program. He born in the 32 weeks of gestation with 1410-gram weight. He falls into very preterm birth and very low birthweight (Szanati et al., 2022).

The subject's corrected age is 33 months 27 days; his latest developmental tests are Bayley III and Brunet-Lézine Scale.

Bayley-III Test – Corrected Age 13 months Old

The Bayley-III assessment showed a low risk of developmental delay in cognitive, receptive communication, fine motor, and gross motor skills. A moderate risk of delay was observed in expressive communication with a score of 12.

Brunet-Lézine Scale - Corrected Age 19 months Old

The child's development was on track with age-appropriate levels across various domains: gross motor skills scored at a 22.5-month level (DQP of 115), coordination and manipulation at a 24-month level (DQC of 122), language development at a 22-month level (DQ of 112), and socialization and autonomy at a 27-month level (QSR of 137). The overall Developmental Quotient was 121, indicating development consistent with the child's corrected age.

Follow-up Bayley-III Test - Corrected Age 24 months Old

Conducted at the same clinic, the follow-up assessment showed average cognitive development with a composite score of 100, suggesting typical abilities in sensorimotor functions, exploration, and manipulation. Language skills were slightly below average with a composite score of 94, indicating mild delays in both receptive and expressive communication. However, motor skills were above average with a composite score of 103, highlighting strong fine and gross motor abilities. The child's overall development aligns appropriately with their corrected age for prematurity.

Moderate and slight below average level language skills had been found based on the results of Bayley-III Test. The last Bayley-III results suggest mild delays in both receptive and expressive communication. Receptive communication consists of receiving messages and understanding another individual. On the other hand, expressive communication is sending message to other individuals (National Technical Assistance Consortium for Children and Young Adults Who Are Deaf-Blind, 2002). A study found a significant difference in the

receptive and all the expressive language characteristics between extremely low birth weight and full-term children with normal birth weight (Van Lierde et al., 2009).

Delays in language development are the result of complex interplay between risk and protective factors. Risk factors are found to be the male gender, low birth weight, preterm birth, low parental schooling, low socioeconomic status, having four or more children living in the same household, family history of language delay, father working outside the house all day, difficult temperament, intracranial hemorrhage, brain injury and persistent otitis media, poor quality of communication with the mother, family dynamics, the family does not read to the child at home and problems with the mother's mental health. On the other hand, protective factors are higher parental schooling, caregiver frequently talk to child, be single child, higher family income, maternal responsiveness, sociable temperament, good maternal mental health, cognitive nonverbal abilities in early childhood, read to the child daily, caregiver offer daily opportunities for informal play, having as primary care centers for children (Bettio et al., 2019).

It is important to know which factors influence the language development to formulate the case. For Pearl, risk factors are male gender, low birth weight, and preterm birth. Protective factors are higher parental schooling, caregiver frequently talk to child, higher family income, maternal responsiveness, sociable temperament, good maternal mental health, cognitive nonverbal abilities in early childhood, read to the child daily, caregiver offer daily opportunities for informal play, having as primary care centers for children. This situation proves the functionality of developmental follow-up service for long term benefits. Pearl is being observed and followed by a specialist and when it is needed, he can be referred to another service. Van Lierde et al. (2009) suggested the logopedic approach for 3-year-old children born with extreme low birth weight focusing on helping them understand and use the language better. This involves improving child's ability to understand questions, complex sentences, directions and improving skill such as definition of words and explaining the relationship among objects.

Szanati et al., (2022) indicated since the survival rates of the preterm infants increased nowadays researchers concern about the developmental deficiencies in this group. Furthermore, prematurity can have a negative influence on the central nervous system development, differs among different brain parts such as axon and astrocyte death (Back, 2015), or thinness in entorhinal cortex and the corpus callosum (Feldman et al., 2012), smaller hippocampus and cerebellum size (de Kieviet et al., 2012). Most importantly, there are several methods to compensate the effect of prematurity such as plasticity, reorganization processes, and environment factors (e.g., cognitive stimulation) (Szanati et al.,2022).

For the current case, his result from developmental scales shows that child's general development aligns with his corrected age. Considering the protective factors; invested parents, rich stimulants in terms of books, toys, games, cards. There are many studies proves that child brain development has genetic and environmental indicators (Huang et al., 2013). Having an enriched environment for a child favors the brain development of infant in terms of development of language, motor skills, behavior and emotional management (Hochberg et al., 2010). It influences further periods of life too such as neuronal resilience which can prevents neurodegenerative disease as a part of natural aging (Schoentgen et al., 2020).

The pregnancy was one of the important themes of the interview with parents of Pearl. Hearing the preterm birth risk in the 26th week, spending last weeks of the pregnancy on bed due to bed rest suggestion by doctor, and using a medicine (Prednisolone) that might trigger the preterm birth stressful for the parents. Generally, childbirth is carrying the risk of being a traumatic event due to extreme fear, helplessness, pain, and loss of control during the delivery (Aagard et al., 2015). As expected, these factors are present in preterm birth. From maternal perspective, experiencing preterm and NICU leads to psychological distress (Misund et al., 2014). NICU is reported as a stressful place for parents and infants specifically because of the babies' need for respiratory support (Ionio et al., 2019). During interview, mother reported that it was hard to see their babies connected to respiratory support. This is a typical disappointment from parents. However, they were still happy and thankful because at the end their twins were healthy and getting the support they need.

Maternal mental health is linked with the physical and mental development of the infants as aligns with the attachment theory (Goodman et al., 2011). Parental mental health has role the cognitive, emotional, social and physical development (Bhutta et al., 2002). Specifically preterm delivery cause significantly higher levels of stress and depression compared to full term deliveries (Vigod et al., 2011). The preterm delivery is also called as loss of ideal pregnancy (Aagaard et al., 2015) however for the mother of Pearl, she was prepared with the idea of there might be setbacks due to twin pregnancy. Being prepared possible setback was an adaptive method for this case.

Overall, even though preterm delivery was disappointing and hard experience, collaboration between parents, focusing on the positives in the current situation were functional for them. As Hall et al. (2017) indicated anxiety during adverse occasions may be an adaptive response. Additionally, mother had an intention to take active role to take care of Pearl even though nurses were responsible of basic childcare activities (changing diapers, feeding etc.). This was another

protective factor for safe mother-child bond. Hall et al. (2017) indicated the importance of the parent's active role for their preterm babies in the NICU for a healthy bonding.

5. CONCLUSION

In a nutshell, current article is aiming to observe the development of a preterm infant and understand the developmental follow-up system in Hungary for preterm infants. Hungary has a well-established follow-up system for preterm infants until they reach 6 years of age to detect and follow their development. Observed child and family is a well-functioning family and the according to interviews and developmental test's results child aligns with his developmental stage.

REFERENCES

Aagaard, H., Uhrenfeldt, L., Spliid, M., Fegran, L., (2015). Parents' experiences of transition when their infants are discharged from the Neonatal Intensive Care Unit: a systematic review protocol. JBI.Evid.Synth. 13 (10), 123–132. https://doi.org/ 10.11124/jbisrir-2015-2287.

American College of Obstetricians and Gynecologists. (2015). The Apgar score. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2015/10/the-apgar-score

American College of Obstetricians and Gynecology, & Task Force on Neonatal Encephalopathy, & American Academy of Pediatrics. (2014). *Neonatal encephalopathy and neurologic outcome* (2nd ed.). American College of Obstetricians and Gynecologists.

Back, S. A. (2015). Brain Injury in the Preterm Infant: New Horizons for Pathogenesis and Prevention. *Pediatric Neurology*, *53*(3), 185–192. https://doi.org/10.1016/j.pediatrneurol.2015.04.006

Behrman, R. E., & Butler, A. S. (2007). Preterm birth: causes, consequences, and prevention.

Bettio, C. D. B., Bazon, M. R., & Schmidt, A. (2019). Risk and protective factors for language development delay. *Psicologia em Estudo*, *24*, e41889.

Bhutta, A. T., Cleves, M. A., Casey, P. H., Cradock, M. M., & Anand, K. J. (2002). Cognitive and behavioral outcomes of school-aged children who were born preterm: a meta-analysis. *Jama*, *288*(6), 728-737.

Bray, P. F., Shields, W. D., Wolcott, G. J., & Madsen, J. A. (1969). Occipitofrontal head circumference – an accurate measure of intracranial volume. *Journal of Pediatrics*, *75*(2), 303-305.

Canadian Paediatric Society. (2022). Follow-up care for infants discharged from a neonatal intensive care unit - Paediatrics & Child Health. Retrieved from https://cps.ca/documents/position/follow-up-care#ref6

Cardoso, F. G. C., Formiga, C. K. M. R., Bizinotto, T., Tessler, R. B., & Rosa, F., Neto (2017). Concurrent Validity of the Brunet-Lézine Scale with the Bayley Scale For Assessment of the Development of Pretem Infants Up To Two years. *Revista paulista de pediatria : orgao oficial da Sociedade de Pediatria de Sao Paulo*, *35*(2), 144–150. https://doi.org/10.1590/1984-0462/;2017;35;2;00005

Chang, H. H., Larson, J., Blencowe, H., Spong, C. Y., Howson, C. P., Cairns-Smith, S., Lackritz, E. M., Lee, S. K., Mason, E., Serazin, A. C., et al. (2013). Preventing

preterm births: Analysis of trends and potential reductions with interventions in 39 countries with very high human development index. *The Lancet, 381*(9862), 223-234. https://doi.org/10.1016/S0140-6736(12)61856-X

Çiçek, N., Vitrinel, A., Cömert, S., Erdağ, G., Aksoy, F., & Akın, Y. (2005). Prematüre bebeklerin izlem sonuçları. *Türk Pediatri Arşivi*, *40*(1), 33-38.

Conde-Agudelo, A., Belizán, J. M., & Diaz-Rossello, J. (2011). Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. Cochrane Database of Systematic Reviews, 2011(3), CD002771. https://doi.org/10.1002/14651858.CD002771.pub2

Cutland, C. L., Lackritz, E. M., Mallett-Moore, T., Bardají, A., Chandrasekaran, R., Lahariya, C., Nisar, M. I., Tapia, M. D., Pathirana, J., Kochhar, S., Muñoz, F. M., & Brighton Collaboration Low Birth Weight Working Group (2017). Low birth weight: Case definition & guidelines for data collection, analysis, and presentation of maternal immunization safety data. *Vaccine*, *35*(48 Pt A), 6492–6500. https://doi.org/10.1016/j.vaccine.2017.01.049

de Kieviet, J. F., van Elburg, R. M., Lafeber, H. N. & Oosterlaan, J. (2012). Attention problems of very preterm children compared with age-matched term controls at school-age. *The Journal of Pediatrics*, *161*(5), 824–829. https://doi.org/10.1016/j.jpeds.2012.05.010

Dean, S. V., Mason, E. M., Howson, C. P., Lassi, Z. S., Imam, A. M., & Bhutta, Z. A. (2013). Born too soon: Care before and between pregnancy to prevent preterm births: From evidence to action. *Reproductive Health*, *10*(Suppl 1), S3. https://doi.org/10.1186/1742-4755-10-S1-S3

Dixon, S. D., & Stein, M. T. (2006). *Encounters with children: Pediatric behavior and development* (4th ed.). Mosby.

Dosman, C. F., Andrews, D., & Goulden, K. J. (2012). Evidence-based milestone ages as a framework for developmental surveillance. *Paediatrics & child health*, *17*(10), 561–568. https://doi.org/10.1093/pch/17.10.561

Engle, W. A., & American Academy of Pediatrics Committee on Fetus and Newborn (2004). Age terminology during the perinatal period. *Pediatrics*, *114*(5), 1362–1364. https://doi.org/10.1542/peds.2004-1915

Escobar, G. J., McCormick, M. C., Zupancic, J. A., Coleman-Phox, K., Armstrong, M. A., Greene, J. D., Eichenwald, E. C., & Richardson, D. K. (2006). Unstudied infants: outcomes of moderately premature infants in the neonatal intensive care unit. *Archives*

of disease in childhood. Fetal and neonatal edition, *91*(4), F238–F244. https://doi.org/10.1136/adc.2005.087031

Feldman, H. M., Lee, E. S., Yeatman, J. D. & Yeom, K. W. (2012). Language and reading skills in school-aged children and adolescents born preterm are associated with white matter properties on diffusion tensor imaging. *Neuropsychologia*, *50*(14), 3348–3362. https://doi.org/10.1016/j.neuropsychologia.2012.10.014

Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical child and family psychology review*, *14*, 1-27.

Hack, M., Klein, N.K. and Taylor, H.G. (1995) Long-Term Developmental Outcomes of Low Birth Infants. Future Child, 5, 176-196. http://dx.doi.org/10.2307/1602514

Hall, E. M., Shahidullah, J. D., & Lassen, S. R. (2020). Development of postpartum depression interventions for mothers of premature infants: a call to target low-SES NICU families. *Journal of Perinatology*, *40*(1), 1-9.

Hall, R. A., Hoffenkamp, H. N., Braeken, J., Tooten, A., Vingerhoets, A. J., & Van Bakel, H. J. (2017). Maternal psychological distress after preterm birth: Disruptive or adaptive?. *Infant Behavior and Development*, *49*, 272-280.

Hochberg Z. E., Feil R., Constancia M., Fraga M., Junien C., Carel J. C., et al. (2010). Child health, developmental plasticity, and epigenetic programming. *Endocr. Rev.* 32 159–224. 10.1210/er.2009-0039

Huang H., Shu N., Mishra V., Jeon T., Chalak L., Wang Z. J., et al. (2013). Development of human brain structural networks through infancy and childhood. *Cereb. Cortex* 25 1389–1404. 10.1093/cercor/bht335

Ionio, C., Mascheroni, E., Colombo, C., Castoldi, F., & Lista, G. (2019). Stress and feelings in mothers and fathers in NICU: Identifying risk factors for early interventions. *Primary health care research & development*, *20*, e81.

Johnson, S., Moore, T., & Marlow, N. (2014). Using the Bayley-III to assess neurodevelopmental delay: which cut-off should be used?. *Pediatric research*, *75*(5), 670–674. https://doi.org/10.1038/pr.2014.10

Kang, L., Wang, H., He, C., Wang, K., Miao, L., Li, Q., Wang, Y., Zhu, J., Li, X., Liu, X., Chen, J., Chen, Q., & Mu, D. (2019). Postnatal growth in preterm infants during the first year of life: A population-based cohort study in China. *PloS one*, *14*(4), e0213762. https://doi.org/10.1371/journal.pone.0213762

Kinney, M. V., Kerber, K. J., Black, R. E., Cohen, B., Nkrumah, F., Coovadia, H., Nampala, P. M., Lawn, J. E., Axelson, H., & Bergh, A. M. (2010). Sub-Saharan Africa's mothers, newborns, and children: Where and why do they die? PLoS Medicine, 7(6), e1000294. https://doi.org/10.1371/journal.pmed.1000294

Kinney, M. V., Lawn, J. E., Howson, C. P., & Belizan, J. (2012). 15 Million preterm births annually: what has changed this year?. *Reproductive health*, *9*, 28. https://doi.org/10.1186/1742-4755-9-28

Kottman, T. (2011). *Play therapy: Basics and beyond*. (2. Edition). Alexandria, VA: American Counseling Association.

Krebs, N. F., Hambidge, K. M., Westcott, J. L., Garcés, A. L., Figueroa, L., Tshefu, A. K., Lokangaka, A. L., Goudar, S. S., Dhaded, S. M., Saleem, S., Ali, S. A., Bauserman, M. S., Derman, R. J., Goldenberg, R. L., Das, A., Chowdhury, D., & Women First Preconception Maternal Nutrition Study Group (2022). Birth length is the strongest predictor of linear growth status and stunting in the first 2 years of life after a preconception maternal nutrition intervention: the children of the Women First trial. *The American journal of clinical nutrition*, *116*(1), 86–96. https://doi.org/10.1093/ajcn/nqac051

Laszlo, S., Katalin, S., Júlia, T., Gy, V., Peter, A., Gy, P., Andrea, V., & Zsófia, M. (2020). Child Healthcare in Hungary. *Turk Pediatri Arşivi*, *55*(Suppl 1), 41–56. https://doi.org/10.14744/TurkPediatriArs.2020.13333

Lawn, J. E., Davidge, R., Paul, V. K., von Xylander, S., De Graft Johnson, J., Costello, A., Kinney, M. V., Segre, J., & Molyneux, E. (2013b). Born too soon: Care for the preterm baby. Reproductive Health, 10(Suppl 1), S5.

Lawn, J. E., Kinney, M. V., Belizan, J. M., et al. (2013a). Born too soon: Accelerating actions for prevention and care of 15 million newborns born too soon. *Reproductive Health*, *10*(Suppl 1), S6. https://doi.org/10.1186/1742-4755-10-S1-S6

Lee, K. A., & Hayes, B. C. (2015). Head size and growth in the very preterm infant: a literature review. *Research and Reports in Neonatology*, 1-7.

Liu, L., Johnson, H. L., Cousens, S., Perin, J., Scott, S., Lawn, J. E., Rudan, I., Campbell, H., Cibulskis, R., Li, M., Mathers, C., Black, R. E., & Child Health Epidemiology Reference Group of WHO and UNICEF (2012). Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *Lancet (London, England)*, *379*(9832), 2151–2161. https://doi.org/10.1016/S0140-6736(12)60560-1

Maccow, G., Ph.D. (2008). *Bayley Scales of Infant and Toddler Development - Third Edition*. Pearson Education, Inc.

McCormick, M. C. (1985). The contribution of low birth weight to infant mortality and childhood morbidity. *The New England Journal of Medicine, 312*(2), 82–90.

MedlinePlus. (2021a). *Gestational age*. Retrieved [25 of April 2024], from https://medlineplus.gov/ency/article/002367.htm

MedlinePlus. (2021b). *Neonate*. Retrieved [24th of April 2024], from https://medlineplus.gov/ency/article/002271.htm

Misund, A. R., Nerdrum, P., & Diseth, T. H. (2014). Mental health in women experiencing preterm birth. *BMC pregnancy and childbirth*, *14*, 263. https://doi.org/10.1186/1471-2393-14-263

Murthy, S., Haeusslein, L., Bent, S., Fitelson, E., Franck, L. S., & Mangurian, C. (2021). Feasibility of universal screening for postpartum mood and anxiety disorders among caregivers of infants hospitalized in NICUs: a systematic review. *Journal of perinatology : official journal of the California Perinatal Association*, *41*(8), 1811–1824. https://doi.org/10.1038/s41372-021-01005-w

National Technical Assistance Consortium for Children and Young Adults Who Are Deaf-Blind. (2002). Communication fact sheets for parents [Fact sheets]. U.S. Department of Education. http://www.tr.wou.edu/NTAC

Nyqvist, K. H., Anderson, G. C., Bergman, N., Cattaneo, A., Charpak, N., Davanzo, R., ... & Wheeler, J. (2010). Towards universal Kangaroo Mother Care: Recommendations and report from the First European conference and Seventh International Workshop on Kangaroo Mother Care. Acta Paediatrica, 99(6), 820-826.

Oates, J., & Gervai, J. (2019). Mothers' perceptions of their infants. *Journal of Prenatal & Perinatal Psychology & Health*, *33*(4), 282-300.

Organization of Teratology Information Specialists (OTIS). (2022, July). *Prednisone/Prednisolone*. Mother To Baby | Fact Sheets. https://www.ncbi.nlm.nih.gov/books/NBK582908/

Piñon, M. (2010). Theoretical background and structure of the Bayley scales of infant and toddler development, third edition. In *Bayley-III clinical use and interpretation* (pp. 1-28). Elsevier Inc.

Requejo, J., Althabe, F., Merialdi, M., Keller, K., Katz, J., & Menon, R. (2013). Born too soon: Care during pregnancy and childbirth to reduce preterm deliveries and improve

health outcomes of the preterm baby. *Reproductive Health*, *10*(Suppl 1), S4. https://doi.org/10.1186/1742-4755-10-S1-S4

Sato, H., Asami, Y., Shiro, R., Aoki, M., Yasuda, M., Imai, S., Sakai, R., Oida, K., Kawaharamura, K., Yano, H., Taguchi, N., Suzuki, T., & Hirose, M. (2017). Steroid Pulse Therapy for De Novo Minimal Change Disease During Pregnancy. *The American journal of case reports*, *18*, 418–421. https://doi.org/10.12659/ajcr.902910

Schoentgen, B., Gagliardi, G., & Défontaines, B. (2020). Environmental and Cognitive Enrichment in Childhood as Protective Factors in the Adult and Aging Brain. *Frontiers in psychology*, *11*, 1814. https://doi.org/10.3389/fpsyg.2020.01814

Semmelweis University Department of Obstetrics and Gynecology, (n.d.). Koraszülött osztály [Premature department]. Retrieved April 28, 2024, from https://semmelweis.hu/noiklinika/ulloi/fekvobeteg-ellatas/koraszulott-osztaly/

Simon, L. V., Hashmi, M. F., & Bragg, B. N. (2023, May 22). APGAR score. In *StatPearls [Internet]*. StatPearls Publishing. Available from https://www.ncbi.nlm.nih.gov/books/NBK470569/

Szanati, D., Nagy, A., & Kalmár, M. (2022). Impacts of premature birth and low birthweight on the development of language and executive function. *Gyermeknevelés Tudományos Folyóirat*, *10*(2–3), 111-124.

United Nations Children's Fund & World Health Organization. (2019). *UNICEF-WHO low birthweight estimates: Levels and trends 2000–2015*. World Health Organization. https://creativecommons.org/licenses/by-nc-sa/3.0/igo/

Van Lierde, K. M., Roeyers, H., Boerjan, S., & De Groote, I. (2009). Expressive and receptive language characteristics in three-year-old preterm children with extremely low birth weight. *Folia Phoniatrica et Logopaedica*, *61*(5), 296-299.

Vigod, S. N., Villegas, L., Dennis, C. L., & Ross, L. E. (2010). Prevalence and risk factors for postpartum depression among women with preterm and low-birth-weight infants: a systematic review. *BJOG: An International Journal of Obstetrics & Gynaecology*, *117*(5), 540-550.

Villar, J., Giuliani, F., Fenton, T. R., Ohuma, E. O., Ismail, L. C., Kennedy, S. H., & INTERGROWTH-21st Consortium (2016). INTERGROWTH-21st very preterm size at birth reference charts. *Lancet (London, England)*, *387*(10021), 844–845. https://doi.org/10.1016/S0140-6736(16)00384-6

Ward, R. M., & Beachy, J. C. (2003). Neonatal complications following preterm birth. *BJOG: an international journal of obstetrics and gynaecology*, *110 Suppl 20*, 8–16. https://doi.org/10.1016/s1470-0328(03)00012-0

Wilson-Ching, M., Pascoe, L., Doyle, L. W., & Anderson, P. J. (2014). Effects of correcting for prematurity on cognitive test scores in childhood. *Journal of paediatrics and child health*, *50*(3), 182–188. https://doi.org/10.1111/jpc.12475

World Health Organization. (2004). ICD-10 : international statistical classification of diseases and related health problems : tenth revision, 2nd ed. World Health Organization. https://iris.who.int/handle/10665/42980

World Health Organization. (May 10, 2023). Preterm birth. Retrieved April 28, 2024, from https://www.who.int/news-room/fact-sheets/detail/preterm-birth

Xu, Y., & Filler, J. W. (2005). Linking assessment and intervention for developmental/functional outcomes of premature, low-birth-weight children. *Early Childhood Education Journal*, *32*, 383-389.