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Associations among childbirth-related factors and cognitive, emotional and social development in early childhood

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Social sciences,
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VILNIAUS UNIVERSITETAS

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Gimimo aplinkybių ir pažintinės, emocinės, socialinės raidos ankstyvoje vaikystėje sąsajos

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1. INTRODUCTION

Relevance of the research

Birth in the modern world is considered to be a critical, otherwise known as 'sensitive' moment in human life. From a biological point of view birth, a fetal transition from life in the mother's womb to life in the outside world, is one of the most dramatic and most fundamental phenomena, as fetus experiences severe and special adaptation required changes: exit from the water environment where oxygen is obtained through a placenta, and entry into a dry environment in which breathing requires lungs' aid, transition from the body temperature environment to a significantly cooler one, and the fetus must also exit the sterile bacterial environment (Lagercrantz & Slotkin, 1986). From a psychological point of view, birth is simultaneously a versatile and unique experience. It is a significant event in a family's life, impacting further development of the family as a system, family's and women's health, and a number of women and men describe the birth of a baby as one of the most challenging but also the most meaningful life experiences (Saxbe, 2017).

In the most psychological evolution theories the moment of birth becomes a starting point from which analysis of human development and its regularities begins, and representatives of the majority psychology schools of thought recognize the importance of the first stages of development after birth, infancy and early childhood, for further personal development. In the meantime, psychology researchers do not give much attention to childbirth and birth in theoretical or empirical studies, although studies on the early human development reveal that the most intensive epigenetic, immunological, physiological and psychological changes and adaptation to the environment take place from the moment of conception to 2 - 3 years of age. Changes that occur during the development of this phase, including the moment of birth, lay the

groundwork for further human functioning and development (Britto et al., 2016; Black et al., 2017; Provençal & Binder, 2015; Reading, 2007).

One of the ways to analyze childbirth and birth, and their roles in the further human development is on the basis of biopsychosocial approach (Saxbe, 2017). Based on this approach, it is important to view the human development processes as a prerequisite for biological, social, family and parental factors interaction result. Biopsychosocial approach to child development reveals that the early child 's experiences in a family and parental behavior with their children in the first months and years of life, shapes a child's physiological, cognitive and behavioral reactions, and this multilayer process has deep consequences in other development stages, plays an important role in the cognitive and social development of children, as well as with the emergence of childhood developmental psychopathology such as expression of emotional and behavioral difficulties (Cox, Mills-Koonce, Propper, & GariéPy, 2010). Biopsychosocial approach allows us to look at the meaning of birth in human development in two ways. Firstly, by assessing the biological, psychological and social factors present during childbirth and which may be important not only for the childbirth itself but also for a woman's perception and evaluation of the childbirth experience, and through this - for a woman's overall emotional wellbeing and early interactions with a child. Secondly, studying and evaluating the moment of birth as a factor of biological or psychological origin, which affects further child's development. Therefore we use few terms in this study: childbirth and delivery, when we are talking from a woman's perspective and birth, when we are talking from a child's perspective.

Biomedical data show that neonates respond to birth experiences differently. Measurements of cortisol level in the neonatal blood reveal that neonates born by vaginal delivery feature a higher amount of cortisol in blood immediately after delivery compared to neonates born by cesarean section operation (Chis, Vulturar, Andreica, Prodan,

& Miu, 2017; Gitau et al., 2001; Kolas, Saugstad, Daltveit, Nilsen, & Oian, 2006; Miller, Fisk, Modi, & Glover, 2005). Since the hormone content in neonatal blood differed from the hormone content in maternal blood, it allows us to presume that the stress experienced by a neonate is not directly related to the stress experienced by a mother (Gitau et al., 2001; Miller et al., 2005; Vogl et al., 2006). Such research results raise some interesting and yet still unanswered questions about how a different neonatal response to the birth experience at a biochemical level can leave a track in the further child's development. It has been noted that neonates born by different delivery mode and infants respond to later occurring stressful events differently. For example, in the case of vaccination, infants born by vaginal delivery feature a higher level of cortisol in blood than infants born by cesarean section (Taylor, Fisk, & Glover, 2000; Chis et al., 2017), but demonstrate less stress related behavior (Chis et al., 2017). Olza Fernández and colleagues (2013) noted that neonates born by elective cesarean section react more sluggishly to isolation from mothers than infants born vaginal delivery, which allows making presumptions of modified neonatal affectionate behavior.

Development researches mostly analyze the mode of delivery and more specifically the role of cesarean section operation in the child's physical and psychosocial health and the emergence of behavioral and emotional problems. There is a considerable amount of evidence that delivery by cesarean section is a risk factor for certain physical child development problems, such as short-term lung function impairment (Martelius et al., 2013), long-term immune system impairment (Cho & Norman, 2013) or health conditions related to the functioning of immune system, such as asthma (Magnus et al., 2011), alergy disorders (Almqvist, Cnattingius, Lichtenstein, & Lundholm, 2012; Metsälä et al., 2008), cesarean section is also being associated with risk of obesity (Leth et al., 2011). Studies on the delivery mode's associations with the psychosocial child development reveal that elective cesarean section may be associated with the worse intellectual abilities of 5 years old children (Wang, Yan, Qu, Chen, & Zhu, 2011),

both emergency and elective cesarean section may be risk factors of the delayed gross motor development (Al Khalaf et al., 2015; Leite Rodriguez & Marques Silva, 2018), whereas instrumental delivery may be a risk factor of emotional and behavioral problems in early childhood (Li et al., 2010). Kelmanson (2013), who compared the pre-school age children born by elective cesarean section at the mothers requests and the children born by vaginal delivery, states that namely the 5 years old children born by elective cesarean section have been characterized by higher emotional problems such as anxiety/depression and withdrawal, as well as more defined sleep problems - associations among delivery mode, emotional and sleep problems remained significant when controlling such factors as the child's gender, newborn's weight at the time of birth, gestational age, maternal age and education (Kelmanson, 2013). However, the results of researches on the associations among birth circumstances and the psychosocial child development, in the short-term or long-term, are often controversial and also there are researches that do not find the role of birth circumstances as significant in child development, while taking into account other factors such as parental education (e.g. Khadem & Khadivzadeh, 2010).

One of the explanations of a biological origin on how the cesarean section operation may be associated with the children's physical health characteristics, and also with the differences of psychosocial development - due to a different bacterial media, which forms during the childbirth by vaginal delivery and by cesarean section (de Weerth, 2017; Nagpal & Yuichiro, 2017). Studies of the past decade suggest that the bacterial layout of a digestive tract of children born under different circumstances, is different and this may relate to the later occurring different characteristics of children's health and development. Infants born by vaginal delivery feature a digestive tract's bacterial composition similar to the microflora of mother's delivery pathways, while in the digestive tract of ifants born by cesarean section, there is less bacteria found in the mother's delivery pathways and more bacteria found on the mother's skin and on the

outside environment. An intensive bacterial colonization in an infant's organism takes place during the first years after birth - it has been noticed that children born by cesarean section feature a lower bacterial diversity and delayed colonization of certain bacteria (Heijtz, 2016; Rutayisire et al., 2016). A successful bacterial colonization after birth is primarily important for the smooth development of digestive tract, immune system (de Weerth, 2017; Heijtz, 2016), and also is more often associated with the neonatal brain development (Cryan & Dinan, 2012; Mayer, Knight, Mazmanian, Cryan, & Tillisch, 2014; de Weerth, 2017).

Besides a delivery mode, there are also other birth circumstances whose roles in child development have not been investigated. For example, pain relief consumption during delivery raises a question about what possible impact these medications may have on immature neonatal brain. It has been noticed that if pain relief medication was used during birth, in the first days after delivery infants were more listless (Ransjo-Arvidson et al., 2001), begin to suck more sluggishly (Brimdyr et al., 2015), feature lower Apgar points and are born with hypoxia features more often (Miron, Bradbury, & Singh, 2011; Örnell et al., 2015), however so far no research has identified any evidence that a single dose of analgesics at birth would be related to delayed child development. Debates about the use of synthetic oxytocin to induce and stimulate labor and its' harmful effects also leave some unanswered questions. Oxytocin is known as a hormone actively participating in the delivery at the initiation stage of labour, and after delivery - in preparation of a woman's body for lactation and is associated with a successful breastfeeding start. Kenkel, Yee and Carter (2014) review the recent studies, which sought to answer what are the roles of naturally occurring oxytocin and synthetic oxytocin used during delivery, in further neonatal and maternal neuropsychological functioning. According to the authors, so far, it is a subject of more questions than answers, but there is growing evidence that in addition to the already mentioned role of oxytocin during and after delivery, this hormone also prepares the fetal nervous

system for life in the outside world. Some, although scarce, research results suggest that manipulation with the oxytocin's quantity at birth may cause long-term changes in the neonatal brain and behavior, when synthetic oxytocin affects not only further activities of oxytocin receptors but also other related peptides, such as vasopressin and its receptors (Kenkel et al, 2014). The use of synthetic oxytocin during delivery is associated with the origins of some of the development problems - with attention-deficit and hyperactivity disorder (e.g. Kurth & Davalos, 2012; Kurth & Haussmann, 2011), cognitive development problems (e.g. Freedman, Brown, Shen, & Schaefer, 2015), psychomotor development problems (Diaconu, Anton, Anton, & Filipeanu, 2017; Gonzalez-Valenzuela, Lopez-Montiel, & Gonzalez-Mesa, 2015), autism spectrum disorders (e.g., Gregory et al., 2013; Weisman et al., 2015). Our study (Jasiulionė, Jusienė & Markūnienė, 2016) published a few years ago revealed that infants born by oxytocin induced and/or stimulated delivery, at 3 months of age were evaluated by their mothers as less interested in environment when awake, at the age of 6 months - as being tense or tend to cry when taken on arms and at the age of 1.5 years as having more expressed withdrawal scale problems. This means that by mother-based evaluation, children whose births were induced or stimulated by oxytocin, at the age of 1.5 years were more often characterized by such behavior as avoidance of looking into the eyes of others, poorer response to tenderness, non-responsiveness when being addressed by people, etc.

So we can see that there are at least several birth circumstances which may affect psychosocial child development: delivery mode, injuries sustained during delivery, the use of certain pharmacological interventions during delivery - synthetic oxytocin and pain relief medications. All these childbirth factors can be seen as the risk factors of biological origin for child development. If the delivery mode, and specifically a cesarean section operation, potentially affect human development through the bacterial colonization of infant's digestive tract and its changes during the first years of life (Heijtz, 2016;

Rutaysire et al., 2016), then in addition to this biological impact we also find the factors of a social or even psychological origin. For example breastfeeding, which in Carlson and co-authors study (2018) was associated with the digestive tract's bacterial medium of older infants, and through it - with the cognitive child development. This allows us to raise assumptions that the delivery mode can be related to the child's development characteristics not only directly, but also within certain intermediate factors - breastfeeding, mother's emotional wellbeing in the first years after the childbirth, through her early interactions with the newborn, the baby, or applied maternity practices.

Childbirth experience and its subjective evaluation may be important factors in woman's overall wellbeing after childbirth, as well as for her bond with a newborn and for maternal identity formation. Such circumstances of childbirth as complicated and painful delivery, emergency cesarean section operation, as well as a woman's subjective experience of childbirth could be attributed to the short-term factors potentially interrupting the mother-child bond formation (Forcada-Guex et al., 2011; Korja et al., 2010). Researchers noted that women who delivered by cesarean section experience more indifference during the first contact with an infant, compared to the women who delivered by vaginal delivery (diMatteo et al., 1996; Garel et al. In 1988, cit. pg. Weisman et al., 2010), they also experience less joy and satisfaction at the time of the first interactions with an infant (Cranley et al., 1983, as cited in Weisman and Others, 2010). Cesarean section is also one of the postnatal depressiveness risk factors (Xu et al., 2017), and depressiveness experienced following a birth is associated with both short-term and long-term consequences for mother-child bond and maternity practices, for example a postnatal depressiveness relates to lactation problems (Borra, Iacovou, & Sevilla, 2015), a lesser maternal sensitivity to the infant's signals, and through this - with the problems occurring during infancy (Field, 2010).

In conclusion, it is important to say that in order to create the most optimal conditions for psychosocial development of young children and to prevent emotional and behavioral problems or risk of disorders occurring in early childhood, it is important to pay as much attention to the children's early mental health safety and determine risk factors in the research as possible. According to the World Health Organization, mental health is one of the most important public health issues of this century, and the mental health of young children should be considered as a priority area, since the onset of more than 50% of mental health disorders diagnosed in adults begin in childhood (WHO, 2013). Therefore, along with the biological, psychological and social factors that have been already established as favorable or, on the contrary, hazardous to development in the period of prenatal, postnatal and the first few years of child's life, it is important to include the characteristics of birth and childbirth periods, and their associations with the early child development. We believe that more comprehensive studies of the associations among birth-related factors and child development are essential in order to have a deeper understanding of early reasons for children's behavioral and emotional problems, to search for more effective preventive measures and also to enhance the early prevention of various mental disorders.

The novelty of the study

There are not many studies analyzing the significance of circumstances of childbirth to further emotional, social and cognitive child development, furthermore it is difficult to find research covering various medical factors of childbirth, and there are even less research that would take into account the psychological circumstances of childbirth at the same time. And the studies, which would analyze the associations between circumstances of birth and further development, taking into account other relevant factors such as maternal interactions with child and maternity practices, are almost non-existent.

The first novelty aspect of this study is the aim to assess the relationship among circumstances of birth as factors of biological and psychological origin and child development from a long-term perspective. The study covers child development from birth to 4 years of age and takes into account various biological, psychological and social maternal factors - mediating or acting in parallel. Out of the biological factors we included child temperament and circumstances of birth. Two groups of psychological and social factors were included in this study as well. The first group consists of factors associated with maternal sociodemographic characteristics, personality traits and emotional wellbeing: maternal emotional distress, depressiveness, personality traits and maternal education. We also included a subjective evaluation of relationship between mother and her husband or partner as an important social factor that may be associated with a maternal emotional state on the one hand, and with the characteristics of maternal interactions with children on the other hand. The second group is associated with maternity practices and characteristics of mother-child interactions. This group includes such factors as maternal attitudes to infant-rearing, the duration of breastfeeding, maternal self-efficacy, responses to child's negative emotions and maternal behavior while interacting with children, observed by researchers. We raise assumptions that circumstances of (child)birth - delivery mode, medicaments used during delivery, psychological circumstances of birth - can have a direct impact on the early child's development and indirect impact through such mediating factors as maternal emotional state or maternity practices and characteristics of mother-child interactions. The theoretical model of this study is presented in Figure 1.

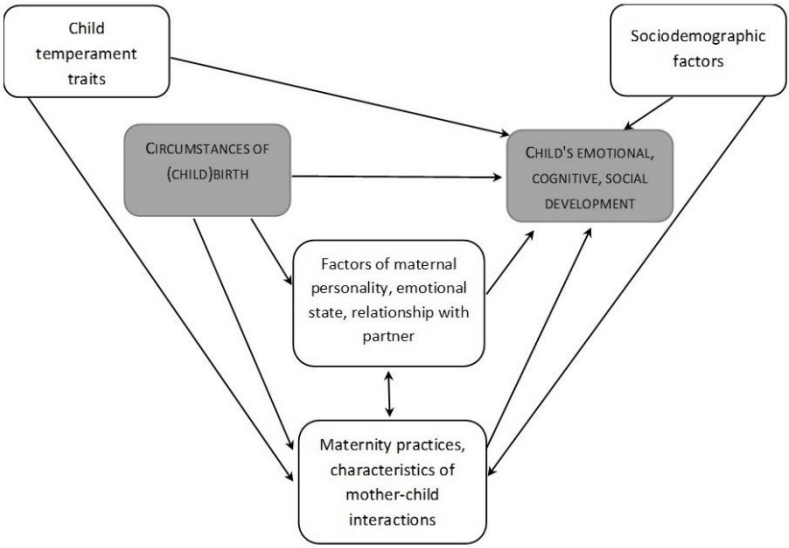

Figure 1. The theoretical model of the study

The second novelty aspect of this study is the attention not only to individual factors associated with (child)birth, but also to the role of the sum of those factors in child development, investigating deliveries when pregnancy was uncomplicated and a child was born full-term. In some studies the role of childbirth-related biological risk factors is analyzed using the concept of suboptimal birth, including a sum of factors related to complications of childbirth or some newborn's conditions, i.e. small newborn's weight, insufficient gestational age, low Apgar scores (i.e. De Weerth & Buitelaar, 2007; Delonis et al., 2017). Meanwhile, in our opinion, it is equally important to analyze the significance of other childbirth-related factors of biological origin such as the use of pain relief medication, or use of oxytocin to induce and stimulate delivery.

The impact of two risk factors groups will be assessed in this study: the sum of biological risk factors related to pregnancy and childbirth (covering certain risky maternal behavior during pregnancy, such as

smoking or alcohol consumption, unfavorable biomedical conditions during pregnancy and childbirth, and various interventions applied during delivery) and the sum of psychological risk factors related to pregnancy and childbirth, such as a woman's reaction to pregnancy, preparation for childbirth, social and emotional support received during childbirth. We have not yet succeeded in finding studies that would assess in an integrated manner the meaning of childbirth-related factors to the development of children and maternity context.

The participation of children delivered at home and their mothers is another novelty aspect of this study – this group of mothers and children have never participated in psychological study in Lithuania and are seldom to be found in other studies worldwide. There are studies analyzing the medical outcomes of deliveries in hospital and deliveries at home, i.e. neonatal and maternal mortality indicators, number of interventions, etc. (e.g., Zielinski et al., 2015), however, studies rarely assess the importance of a woman's psychological safety and emotional state during childbirth at home. It is worth mentioning, that pharmacological and medical interventions usually are not being used during deliveries at home, and families delivering at home choose the place of childbirth deliberately. We assume that the involvement of home-born children and their mothers in this study may contribute to a broader, more comprehensive assessment of the significance of both biological and psychological birth-related risk factors for children's psychosocial development and maternal well-being and interactions with children.

The aim and research questions of the study

The aim of the study is to analyze the role of circumstances of birth in cognitive, emotional and social development of children up to 4 years of age, taking into account maternal psychological and social factors: personality traits, emotional state, and relationship with

partner, maternity practices and characteristics of interactions with children.

Research questions:

1. How circumstances of birth are associated with children's up to 4 years of age emotional and behavioral problems, based on maternal evaluations?
2. How circumstances of birth are associated with children's up to 4 years of age reasoning and self-regulation abilities, based on researchers' evaluations?
3. How circumstances of childbirth are associated with maternal personality traits, emotional state and relationship with a husband/partner during the first four years of child's life?
4. How circumstances of childbirth are associated with maternity practices and characteristics of mother-child interactions?
5. What is the model explaining the associations among circumstances of birth, children's psychosocial development and maternal psychological and social factors?

2. METHOD

Participants

There were total of 284 children participants (54.2 % male and 53.2 % first-borns) and their mothers. The main sample consisted of 253 mothers and children (89 %) born in hospital and they have been taking part in the ongoing longitudinal study since 2009. An additional sample of children (N = 31) born at home and their mothers were added to the study from 2013 to 2018. All children participants were born from singleton childbirth, full-term (during gestational weeks 37-42), and without any inborn abnormalities or disabilities. The mean age of mothers (during childbirth) participating in the study was 29.59 years (SD = 5.41), 61.7 % of the mothers had a higher education, 87.2 % were married, and 77.7 % were living in an urban area.

Participants of the main and additional samples differed by some sociodemographic characteristics. The analysis showed that the mothers who gave birth at home were older (U = 1373.00. p < .001), and were more likely to have a higher education (99.3 % of mothers who gave birth at home and 58 % of mothers who gave birth in hospital) and their partners more likely have had a higher education (90.3 % of the participants who gave birth at home and 44.2 % - in hospital). Just 1 of 31 children born at home was a first-born, while in the sample of children born in hospital 52 % were first-borns.

Procedure of the study

This doctoral dissertation is a part of the research group projects funded by the following grants: T-09157/2009 from the Lithuanian State Science and Studies Foundation, MIP-147/2010 from the Research Council of Lithuania, and MIP-014/2012 from the Research Council of Lithuania. The study was performed with the approval of the

Regional Biomedical Research Ethics Committee and informed consent was obtained from all participating mothers.

The main sample of the study participated in a longitudinal research on biological and psychosocial factors of early self-regulation and data of this sample was collected in 8 stages. We provide the data collected at several stages of this study: collected on the second/third day after childbirth, 3 months, 1.5 years, 2.5 years, 3 years and 4 years after birth. Children born at home and their mothers were added to the study when children were 1.5 year old. At this stage of the evaluation women who gave birth at home, submitted information on circumstances of pregnancy and childbirth, maternal attitude to infant-rearing and care retrospectively. Hereinafter data was being collected the same as the main sample's of the study - when children were 2.5 years, 3 years and 4 years old.

Decision to include mothers who gave birth at home and their children not from birth was made in the light of certain factors of the situation: families who give birth at home are scarce, and at the time when it was planned to include in the study the children born at home and their mothers, court proceedings on giving birth at home took place, and this could have affected both the numbers of births at home and willingness to participate in the study.

We provide information about the stages of research, the number of children involved and a description of the evaluated variables in Table 1.

Table 1. *Description of the stages of the study*

Study stage	Number of participants		Children's age (months) M (SD)		Variables
	Born in hospital	Born at home	Born in hospital	Born at home	
2-3 day after childbirth	253	-	-	-	Delivery mode, maternal acceptance of pregnancy, maternal preparedness for childbirth, participation of supporting people in childbirth, perceived hardship of childbirth
3 months	178	-	3.36 (0.43)	-	Maternal attitudes to infant care, duration of breastfeeding.
1.5 year	233	28	19.00 (1.29)	19.57 (1.62)	Maternal self-efficacy, emotional distress, experience of stressful and traumatic events, quality of the relationship with the partner, duration of breastfeeding, children's emotional and behavioral problems.
2.5 years	171	29	29.01 (1.36)	29.63 (1.47)	Children's emotional and behavioral problems, duration of breastfeeding, maternal emotional distress, experience of stressful and traumatic events, quality of the relationship with the partner.
3 years	155	25	39.98 (1.56)	39.16 (1.97)	Children's temperament, maternal depression, experience of stressful and traumatic events, maternal responses to children's negative emotions, quality of the relationship with the partner.
4 years	127	18	50.34 (1.46)	50.06 (1.79)	Children's reasoning and self-regulation (resistance to temptation, cognitive control and planning abilities), children's emotional and behavioral problems, mother-child interaction quality during free play and structured task (maternal interactive style and Mutually Responsive Orientation), maternal traits of personality.

Measures

Pregnancy and childbirth related factors

Delivery mode – information about delivery mode, medication administered during delivery were collected by the staff of the hospital. By defining groups by the mode of delivery several factors were taken into account: the place of birth (home or hospital), whether and which medications were administered during the vaginal delivery and whether a cesarean operation was performed. From a medical and physiological perspective, giving birth at home is identical to giving birth in a hospital when no medication were administered and no intervention were performed as well as delivery by emergency cesarean section is similar to the elected cesarean section. But we assume that psychologically these modes of delivery are not identical. Thus participants were divided into 5 groups by the mode of delivery:

1) Vaginal delivery at home.
2) Vaginal delivery in hospital without any medication administered.
3) Vaginal delivery in hospital with administration of medication such as oxytocin, epidural analgesia, nitrous oxide, systemic medications, ketoprofen, or pethidine.
4) Elective caesarean section.
5) Emergency caesarean section.

Maternal acceptance of pregnancy was evaluated by requesting the women to answer the question "Have you considered the possibility of an abortion when you found out that you are expecting?" and select one of the options "1) No, I have not consider this option", "2) Yes, I did consider" or type in your own answer.

Maternal preparedness for childbirth was evaluated by requesting to answer the question "Have you attended the special

courses or lectures, intended for the preparation of childbirth and motherhood?".

Participation of supporting people during childbirth was evaluated by the question "Who of close family members were present during the childbirth?" with the answer options, e.g. husband/partner, mother, sister.

Subjective childbirth severity. Women were asked to evaluate the severity of childbirth on a scale from 1 to 5, where 1 means that the childbirth was extremely difficult, and 5 - very easy.

Biological and psychological risks of pregnancy and childbirth. In order to evaluate not only the associations of occasional childbirth-related factors with other variables of our study, but also to evaluate a potential cumulative impact of risk factors, we have combined the biological and psychological factors related to pregnancy and childbirth into the cumulative biological and psychological risk variables. These variables were concluded by summing several risk factors, converting each risk factor of a certain group into a dichotomous variable, where 0 signifies that a child did not experience this risk factor, and 1 - that a child has suffered a higher or lower intensity risk factor.

Biological risk in pregnancy and childbirth includes the sum of such factors as the use of psychoactive substances during pregnancy, unfavorable biomedical conditions which arose during pregnancy and childbirth, the use of oxytocin in labor induction and stimulation, the use of pain relief medications.

Psychological risk in pregnancy and childbirth includes the sum of such factors as a woman's reaction to the pregnancy, i.e. risk was calculated when woman was considering a termination of this pregnancy, preparation for childbirth, family members participation during childbirth and subjective childbirth severity.

Children's emotional and behavioral problems were measured using the Child Behavior Checklist for Ages 1½-5 (CBCL/1½-5; Achenbach & Rescorla, 2000) completed by mothers. This measure was used at three times: at children's age of 1.5, 2.5 and 4 years. The questionnaire consists of 100 items describing various aspects of young children's behavioral, emotional, and social functioning. Aggregated scales of emotional (internalizing), behavioral (externalizing) and total problems as well as DSM-oriented scales of Pervasive Developmental Problems and Attention deficit and hyperactivity were computed. Emotional problems include such aspects of emotional functioning as anxiety, depressiveness, somatic complaints, and withdrawal; behavioral problems include aggressive behavior and attention problems. The total score of emotional and behavioral problems is calculated by summing up all 100 items scores. The internal consistency (Cronbach's α) of scales used in the analysis ranged from .55 to .94.

Children's reasoning abilities at 4 years were measured by Raven's Colored Progressive Matrices Test. Raven's colored progressive matrices test consists of 36 matrices divided equally into three sets (A, AB, B). In each matrix there are six choices (answer alternatives). The correct answer is given a score of one whereas the wrong answer is given zero. Thus, the raw score on the colored progressive matrices test ranges between zero and 36. The psychometric properties of the test are acceptable in most of the studies (Raven, Court & Raven 199. 2002). The reliability coefficient of the split half method in the sample of four year olds is acceptable (r = .70) (Butkienė & Gintilienė, 2011).

Children's self-regulation abilities were assessed at the age of 4 years by using few different tasks:

a) *Resistance to temptation* was measured by *Gift Wrap task* (Kochanska et al., 1996). In the Gift Wrap task, interviewers told children that they would be receiving present but they could not peek at the present while the presents was being wrapped. The interviewers then noisily wrapped the present for 60 seconds behind the children's backs. The Gift Wrap task yielded three measures including latencies to turn and peek (ranging from 0 to 60 seconds) and a peek score (from 1 = turns body around to look and never returns fully forward to 5 = never turns around to peek). The peek score and latency measures were significantly inter-correlated (mean r = 0.52). Thus, a composite peeking score was created by averaging the standardized peek score and latencies to turn and peek. A high score on this composite indicated that the child was less likely to peek and better able to keep attention away from the tempting gift.

b) *Cognitive control* was measured by *Head and Feet task* (McCabe, Rebello-Britto, Hernandez & Brooks-Gunn, 2004; adapted by Breidokienė, 2014). Children were asked to touch their head when the interviewer said "feet" and to touch their feet in response to a "head" command. Children were first taught to play the game, and then were given at least two practice trials. Practice trials were followed by 10 test trials. Children's behaviors on individual trials were scored as 0 (incorrect), 1 (switch to incorrect), 2 (switch to correct), 3 (correct). Inter-rater reliabilities were calculated on the basis of a random selection of 21.13% of the sample that was coded independently by 2 coders. Intra-class correlation (ICC) indicates very good inter-raters reliability (.95).

c) *Planning abilities* were assessed by Truck Loading task (Fagot & Gauvain, 1997; Carlson, Moses & Claxton, 2004). In this task, children played the role of a mail carrier who needed to deliver party invitations. An inverted U-shaped street with arrows was drawn on a large piece of cardstock. The colors of the five houses

matched the colors of five invitations. Children were asked to deliver the invitations to the houses using a small truck while adhering to four rules, namely a) the street is one-way and so one can drive in only one direction, b) one can drive around the block only once because invitations need to be delivered as quickly as possible, c) the color of the invitation must match the color of the house, d) invitations must be taken only off the top of the pile from the back of the truck. These rules were introduced one or two at a time to the children, with corresponding practice trials. There were four possible levels: from two houses to five houses on the street. Children were given two trials at each level, and their score corresponded to the highest level they achieved, for a total score of 0 to 4.

Overall self-regulation rating. The scores of the resistance to temptation, cognitive control and planning abilities was analyzed separately as well as one overall self-regulation rating was computed. Tasks for measuring different self-regulation abilities were scored on different scales, thus we rescaled them on a common scale (0-100; Cohen, Cohen, West & Aiken, 2003) and summed up to one overall self-regulation rating. The following formula was used for the rescaling: N = 100 x (I–possible minimal score)/(possible maximal score–possible minimal score), where N is a new scale scores and I is old score. This transformation obtains the original shape of distribution while allowing for meaningful differences in variation to be studied (Cohen et al., 2003).

Children's temperament were assessed using the Children's Behavior Questionnaire Short Form (Rothbart, Ahadi & Hershey, 1994; Rothbart, Ahadi, Hershey & Fisher, 2001) at the age of 3 years. This instrument contains 94 items describing the behavior of the child within specific contexts (e.g. "My child gets angry when told he or she needs to go to bed"), and ratings refer to the degree to which statements accurately describes the child (extremely untrue, quite

untrue, slightly untrue, neither true nor untrue, slightly true, quite true, or extremely true). Three dimensions of the temperament are measured by this questionnaire: Extraversion, Negative affectivity and Effortful control. Cronbach α is .85 for Extraversion, .78 for Negative affectivity and .80 for Effortful control.

Maternal emotional well-being, personality and relationship with partner variables

Quality of the relationship with partner was evaluated 1.5, 2.5 and 3 years after childbirth using one question with a Likert type scale ranging from "a very bad relationship" (1 point) to "a very good relationship" (5 points).

Maternal emotional distress was evaluated 2.5 years after childbirth by a few questions on how often mothers had experienced emotions such as irritability or bad mood, feeling sad or low, and feeling nervous or anxious. A higher score on this measure indicates a lower level of distress. Cronbach alpha for this measure is .91.

Maternal experience of stressful and traumatic events was evaluated by asking whether or not women had experienced any stressful and traumatic events after 1.5, 2.5 and 3 years after childbirth.

Maternal depression was measured 3 years after childbirth using the Edinburgh Postnatal Depression Scale EPDS; Cox, Holden & Sagovsky, 1987; Lapkienė et al., 2004). Cronbach alpha for this measure is .89.

Maternal traits of personality were measured by Big Five Inventory (BFI) (Benet-Martinez & John, 1998; John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008; John & Srivastava, 1999). This 44-items inventory measures 5 personality traits: Extraversion, Neuroticism, Agreeableness, Openness, and

Conscientiousness. The factor structure of Lithuanian version of BFI was assessed using exploratory factor analysis that yielded anticipated 5 factor structure, however, some items have been excluded due to the small factor loadings. Final version of the inventory consisted from 35 items. The reliability of 5 subscales consisting from remaining items ranged from .63 to .86.

Variables related to maternal parenting practices and mother – child interactions

Maternal attitudes to infant care were assessed using the Infant-Rearing Attitudes and Beliefs Scale (Zeifman, 2003) 3 months after delivery. The scale consists of 8 statements and mothers were asked to indicate on an 8 point scale ranging from very strong agreement to very strong disagreement how much they supported the viewpoint expressed in each of the statements. The scale allows evaluating the extent to which mothers hold "infant-oriented" versus "parent-oriented" attitudes regarding infant care. The internal consistency of this scale is good (Cronbach's $\alpha = .77$).

Duration of breastfeeding was evaluated 3 months, 1.5 years and 2.5 years after childbirth by asking „Are you still breastfeeding your child?" If mothers choose answer „no", they were asked to specify at what child's age they stopped breastfeeding.

Maternal self-efficacy was measured with the 22-item Parental Efficacy Questionnaire (Van Ijzendoorn, Bakermans-Kranenburg, & Juffer, 1999) when children were 1.5 years old. Items (e.g., "Even when I am visiting other people, I can prevent my child from arguing over a toy") were rated on a five-point scale from -2 (I really can't) to 2 (I really can) and summed up to create an overall score of maternal self-efficacy. A higher score on this scale indicates a higher level of mother's self-efficacy. Cronbach's alpha for internal consistency of the scale was .88.

Maternal responses to children's negative emotions were assessed using the Coping with Children's Negative Emotion Scale (CCNES; Fabes, Eisenberg & Bernzweig, 1990) 3 years after childbirth. This is a self-report measure where mothers respond to 12 hypothetical situations in which her child expresses distress (e.g., "If my child loses some prized possession and reacts with tears, I would…"). Two aggregates of strategies, e.g. supportive (problem-focused, emotion-focused, expressive encouragement) and non-supportive (distress, minimizing, punitive) responses, were calculated as averages of the subscales. Cronbach alphas in this study for supportive and non-supportive aggregates were .83 and .89 correspondingly.

Mother-child interaction quality was evaluated when children were 4 years old using *Free play and structured task procedure* (prepared by Jusienė & Čekuolienė, 2010 and 2012). Each mother–child dyad was observed for approximately 10 min. in the laboratory session during 2 tasks: 1) structured task – the mother and the child were invited to sit at the table and were asked to build lego construction according to the instruction provided in the picture (mean time – 4.69 min.); 2) free play – the mother and the child were asked to play with different toys as they usually play at home (mean time – 5.11 min.) All interactions were videotaped and coded by trained coders using two measures:

a. *Maternal interactive style* (Calkins, Smith, Gill, & Johnson, 1998). 4 styles of maternal interaction were scored during the both mother-child tasks (free play and structured task): positive guidance, direct control, intrusive behavior and withdrawn behavior. *Positive guidance* was a score reflecting frequency of positive verbal expressions (praise, affection, laughter); frequency of physical affection (eg. Mom holds child's hand, hugs or kisses child); and frequency of verbal

expressions of support/guidance (mother provides positive feedback, encouragement, makes suggestions). *Direct control* was a score reflecting frequency of verbal control (directing the child's activity, telling the child what to do); frequency of physical control (restricting child's movement, pulling, pushing, picking child up, hand slapping); and frequency of negative verbal expressions (scolding, anger expressions, derogatory remarks directed to child, threats, no's). Maternal *intrusive behavior* was a score reflecting the frequency of mother actions that precluded the child from doing an activity themselves (eg., placing lego blocks for of a child, poking a toy to a child when he plays to another one, etc.). Maternal *withdraw behavior* was a score reflecting frequency of maternal non-participation in tasks with child (eg. mother looks in the cell phone instead of playing with child, looking around, etc.). Each of the interaction styles was scored from 0 – such behavior is not observed to 3 – such behavior is observed often (more than 5 time during interaction). Finally an overall rating of interactive style was calculated by summing up scores of direct control, intrusive behavior, and withdrawn behavior and reversed score of positive guidance. A higher score on this measure indicates less positive overall maternal interaction style.

b. *Mutually Responsive Orientation (MRO)* (Aksan, Kochanska, & Ortmann, 2006) is 17 items observational measure reflecting 3 main dimensions of dyadic relationship between mother and child: 1) Harmonious Communication – how effectively dyad resolves potential sources of conflict, are mother and child open to each other's influence, are they psychologically in tune with each other. 2) Mutual Cooperation – are verbal and nonverbal aspects of communication flowing smoothly and harmoniously, is communication flowing effortlessly and has a connected

back- and-forth quality, do the dialogue and exchanges promoting intimacy and connection. 3) Emotional Ambiance - is dyad enjoying an emotionally positive atmosphere, indicating clear pleasure in each other's company, how effectively dyad addresses occurrences of distress and negative affect, is the overall emotional ambiance positive and warm. The coder watches the entire context, focusing on the dyad rather than on either individual. Then, for that context, the coder assigns one overall rating for each mother-child interaction on the scale from 1 - untrue of dyad, very low MRO, poor relationship, to 5 - very true of dyad, very high MRO, excellent relationship.

Inter-rater reliabilities were calculated on the basis of a random selection of 21 interactions that was coded independently by 2 coders. Intra-class correlation (ICC) was used and ICC values for different aspects of the interaction quality ranged from satisfactory (.53) to very good (.84).

Data analysis

Statistical data analysis was conducted using IBM SPSS 22 and Mplus 6.12. Nonparametric statistics were used in order to compute correlations between variables and compare differences between groups: Mann-Whitney U were used to compare two groups, Kruskal-Wallis test was used to compare more than two groups, Spearman's correlation coefficient was used to evaluate the strength of associations between variables. The effect sizes (*r* for Mann-Whitney U test and *Cramer's V for* χ^2 test) were calculated as well. The interpretation of the strength of associations and effect sizes was based on Cohen (1988, 1992) guidelines where ± .10 is considered small, ± .30 moderate, and ± .50 strong (cit. from Field, 2013)). In the analysis of structural equation models with Mplus to deal with missing

values the Full Information Maximum Likelihood (FIML) method was used. The fit criteria of CFA and structural equation models was assessed using these criteria: RMSEA < .05, CFI and TLI > .90 (Pakalniškienė, 2012).

3. THE MAIN RESULTS

Comparison of the rates of children's born under different circumstances emotional and behavioral problems

First we compared, whether and how different are emotional and behavioral problems of children born under different circumstances. These problems were evaluated by mothers in three stages of the study - when children were 1.5, 2.5 and 4 years old. As we can see from the results in Table 2, differences in children's emotional and behavioral problems evaluated by mothers were identified at the age of 1.5 and 2.5 years, while there were no differences found at the age of 4.

We applied a pairwise comparison with adjusted *p* values to the obtained inter-group differences and calculated effect sizes (r). The results showed that the most differences are observed between evaluations of emotional and behavioral problems of two groups of participants: children born by vaginal delivery at home compared with children born by emergency C-section. Mothers evaluated 1.5 years old children born at home as having the least, while children born by emergency C-section as having the most attention deficit and hyperactivity symptoms (z = -3.864, p = .001, r = -.43), behavioral problems (z = -3.211, p = .013, r = -.37) and problems in general (z = -2.934, p = .033, r = -.33).

In addition, significant differences were found on attention deficit and hyperactivity scale when comparing scores of children delivered at home and children born by vaginal delivery with medication (z = -3.18. p = .015, r = -.27), as well as children delivered at home and children born by vaginal delivery without medication in hospital (z = -2.899, p = .037, r = -.37).

Table 2. *Comparison of the rates of children's emotional and behavioral problems*

		Ranks					Kruskal-Wallis test	
		Vaginal delivery at home (n)	Vaginal delivery in hospital without medication (n)	Vaginal delivery in hospital with medication (n)	Elective caeserean section (n)	Emergency caesarean section (n)	H (df)	p
1.5 year	DSM: pervasive devel. problems	110.74 (27)	109.37 (30)	117.83 (107)	113.61 (22)	129.62 (49)	2.376 (4)	.667
	DSM: Attention Deficit / Hyperactivity	76.71 (28)	128.38 (34)	123.81 (108)	118.26 (21)	139.97 (52)	15.635 (4)	.004**
	Emotional problems	89.67 (27)	101.82 (31)	117.25 (99)	120.61 (22)	129.93 (50)	8.018 (4)	.091†
	Behavioral problems	81.96 (25)	129.09 (33)	113.04 (103)	111.48 (21)	134.69 (50)	11.873 (4)	.018*
	Total problems	72.41 (23)	110.09 (28)	105.09 (95)	110.95 (20)	118.28 (44)	9.096 (4)	.059†
2.5 year	DSM: pervasive devel. problems	90.89 (28)	98.26 (23)	87.26 (80)	67.43 (15)	109.15 (37)	8.252 (4)	.083†
	DSM: Attention Deficit / Hyperactivity	61.14 (28)	101.44 (25)	96.07 (81)	83.00 (15)	113.24 (38)	16.566 (4)	.002**
	Emotional problems	81.61 (27)	95.50 (25)	85.08 (80)	81.33 (15)	118.99 (37)	12.940 (4)	.012*
	Behavioral problems	76.59 (27)	97.94 (24)	88.44 (80)	81.67 (15)	111.28 (37)	8.571 (4)	.073†
	Total problems	71.71 (28)	95.62 (21)	82. 64 (76)	79.67 (15)	113.44 (36)	13.541 (4)	.009**

		Ranks					Kruskal-Wallis test	
		Vaginal delivery at home (n)	Vaginal delivery in hospital without medication (n)	Vaginal delivery in hospital with medication (n)	Elective caeserean section (n)	Emergency caesarean section (n)	H (df)	p
4 year	DSM: pervasive devel. problems	86.58 (18)	100.99 (34)	91.60 (83)	79.74 (21)	109.28 (32)	5.103 (4)	.277
	DSM: Attention Deficit / Hyperactivity	75.75 (18)	94.95 (33)	94.08 (83)	89.13 (20)	105.76 (33)	3.841 (4)	.428
	Emotional problems	101.29 (17)	90.52 (32)	92.66 (81)	71.70 (20)	102.17 (33)	4.663 (4)	.324
	Behavioral problems	92.65 (17)	92.11 (33)	92.00 (82)	81.93 (20)	103.27 (33)	2.115 (4)	.715
	Total problems	100.21 (17)	94.39 (33)	92.69 (85)	82.95 (21)	106.53 (33)	2.795 (4)	.593

Note: *** $p < .001$, ** $p < .01$; * $p < .05$; † $p < .1$.

Mothers evaluated children born by emergency C-section at 2.5 years of age as having the most, and children born at home as having the least attention deficit and hyperactivity symptoms (z = -3,892, p = .001, r = -.49), emotional problems (z = -2.895, p = .038, r = -.36), and total problems (z = -3,252, p = .011, r = -.41). It is also important to mention, that based on mothers' evaluation, children born by emergency C-section had more emotional problems (z = -3.216, p = .013, r = -.30) and problems in general (z = -2.989, p = .028, r = -.28) than children born by vaginal delivery with medication.

We also looked at whether the biological and psychological risks of pregnancy and childbirth related factors were associated to emotional and behavioral problems evaluated by mothers at different stages. Biological risk was associated statistically significantly with attention deficit/hyperactivity symptoms (r_s = .153, p = .017) and emotional problems (r_s = .148, p = .025) at 1.5 years. Psychological risk of pregnancy and childbirth related factors were significantly associated with the emotional problems evaluated by mothers in two stages - at 1.5 (r_s = .134, p = .053) and at 2.5 years (r_s = .155, p = .041).

The results of our study consequently reveal that based on the mothers' evaluations, children born under different circumstances have a distinctive expression of emotional and behavioral problems up to 2.5 years and these results are in line with the studies carried out by other researchers. Kelmanson's (2013) research revealed that children born by elective cesarean section were characterized by higher emotional problems, especially anxiety/depression - which could correspond to emotional problems in general and sleep disorders in our study. Širvinskienė's (2014) study shows that emotional and behavioral problems at the age of 1.5 year were significantly predicted by emergency cesarean section, as well as by less optimal neonatal physiological condition, indicated by a lower Apgar score, the necessity to revive a newborn and a smaller indicator of umbilical cord's arterial blood pH. While Huang and co-authors in the recently published study (2019) note that the elective cesarean section is an independent risk factor for emotional and general problems in the pre-

school age children, especially when the operation is carried out up to 39 week of pregnancy.

On the other hand, such results of our study can also mean that mothers with different childbirth experiences may differently evaluate similar expressions of child behavior. For example, child's behavior which may appear as problematic behavior for one mother, can be seen as completely adequate to child's development and anxiety-free behavior by another mother. Women who participated in our study and gave birth by different delivery mode differed by some sociodemographic indicators. For example, mothers who gave birth at home were older, there were more mothers with a higher education and they were raising their second, third or fourth child. These factors may be relevant assessing the evaluations provided by mothers - higher education and maternal age are seen as the protective factors for child's development and in some researches are associated with lower level of children's emotional and behavioral problems (Goisis, 2015; Jusienė et al., 2007; Tearne et al., 2015). It is important to mention that mothers raising their first-borns are more likely to experience anxiety related to a smooth development of their children, since they are lacking child-rearing experience to date (e.g. Marleau et al., 2006; Minatoya et al., 2017).

Comparison of self-regulation and reasoning abilities of children born under different circumstances

In order to answer the second question of the study - how circumstances of birth are associated with children's up to 4 years of age reasoning and self-regulation abilities, based on researchers' evaluations, we conducted a comparison of these abilities in the groups of children born by different delivery modes (Table 3).

Table 3. *Reasoning and self-regulation abilities of 4 years-olds evaluated by researchers in the different delivery mode groups*

	Ranks					Kruskal-Wallis test	
	Vaginal delivery at home (n)	Vaginal delivery in hospital without medication (n)	Vaginal delivery in hospital with medication (n)	Elective caeserean section (n)	Emergency caesarean section (n)	H (df)	p
Reasoning abilities	85.25 (18)	49.92 (26)	63.81 (53)	69.14 (14)	85.34 (25)	14.521 (4)	.006**
Resistance to temptation	71.97 (18)	61.10 (26)	69.48 (57)	60.48 (14)	86.88 (25)	7.626 (4)	.106
Cognitive control	70.56 (17)	57.95 (22)	54.63 (48)	63.00 (10)	64.25 (22)	3.267 (4)	.514
Planning	89.44 (18)	57.58 (26)	62.15 (51)	62.07 (15)	81.10 (26)	12.137 (4)	.016*
Overall self-regulation rating	71.03 (17)	48.52 (22)	52.41 (47)	68.65 (10)	72.55 (22)	10.131 (4)	.038*

Note: *** $p < .001$, ** $p < .01$; * $p < .05$; † $p < .1$.

Pairwise comparison with adjusted *p* values show that children born by vaginal delivery without medication are characterized by the lowest scores of reasoning abilities in comparison with the children born by emergency C-section (z = -3.228, p = .012, r = -.45) and with the children born by vaginal delivery at home (z = 2.941, p = .033, r = .44). Differences obtained in planning abilities evaluation were of a statistical trend size but of a moderate effect size – children born by vaginal delivery at home show the highest planning scores in comparison with the children born from vaginal delivery in hospital without medication (z = 2.714, p = .067, r = .41) and with the children born by vaginal delivery with medication (z = 2.600, p = .093, r = .31). When we compared the overall estimate of self-regulation, the initial analysis shows that children born by emergency C-section differ significantly compared to children born with and without medication in hospital, as well as the children born at home compared to those born without medication in hospital, however the adjusted *p* values did not show statistically significant inter-group differences.

After calculating correlation coefficients between biological and psychological risks of pregnancy and childbirth related factors, and abilities of reasoning and self-regulation, we found one close to statistically significant link between children's planning abilities and psychological risk of pregnancy and childbirth (r_s = -.161, p = .072) - the more psychological risk factors were observed during pregnancy and childbirth, the lower planning abilities showed 4 years old children, based on researchers evaluation.

Accordingly, based on this study's data children up to 2.5 years of age which were evaluated by mothers as having especially little (born at home) or a lot (born by emergency cesarean section) of emotional and behavioral problems, at 4 years of age have been evaluated by researchers as having the highest reasoning and self-regulation abilities. This allows us to make an assumption that the delivery mode is not so much a factor of a biological origin, having a direct impact on child development's characteristics, but rather a factor of a psychological origin, which is significant for child's development

through the maternal factors such as mother's emotional state or her relationship with a child. Breidokienė (2014), Jusienė (2014) also observed a positive impact of cesarean section to a child's self-regulation and cognitive abilities. These researchers raised the assumption that such a positive link between the delivery mode of emergency cesarean section and children's self-regulation abilities may show a greater mother's involvement in the child's education, and also since the study is dominated by women with higher education, it is likely that they see an emergency cesarean section as an unfavorable factor to the child's development and they might thus strive to compensate it through certain maternity practices.

Finally, at this point we want to expose what lies behind differences in children's self-regulation and what the motives for children's self-regulation are. It seems that children are good at self-regulation and are compliant in one case because they are well adapted overall, express low level of emotional and behavioral problems. In the meantime other children can be obedient and demonstrate a good self-regulation because they are anxious (since mothers also are experiencing more anxiety caused by these children's behavior and notice more of their emotional and behavioral problems) and therefore may be inclined to suppress their behavior.

Associations among circumstances of childbirth and maternal emotional state, personality and relationship with partner

Another question we raised in this study - how circumstances of childbirth are associated with the maternal personality traits, emotional state and relationship with a husband/partner during the first four years of child's life. We compared the aforementioned characteristics of women's wellbeing, personality and relationship in different delivery mode groups and learnt that the first couple of years after childbirth there are no differences in maternal wellbeing, stress experience, evaluation of relationship with a husband. When comparing

personality traits we found only one statistically significant difference in Openness trait expression ($H(4)$ = 11.151, p = .025) - women who gave birth at home showed the most expressed Openness trait, while women who gave birth by vaginal delivery in hospital without medication expressed it the least. There are also two inter-group differences that reached the level of statistical trends - women who gave birth at home have been characterised by a higher Neuroticism ($H(4)$ = 7.893, p = .096) and the women who gave birth by elective C-section felt more depressive 3 year after childbirth ($H(4)$ = 7.869, p = .097) than women from other groups.

These results highlight one of our study's shortcomings and limitations - study measurements do not cover an important, and we can say even critical to woman's wellbeing, period of the first months after childbirth. Although the birth of a baby is often seen as a joyful, positive event in a woman's life, it may also be a potential stressor corresponding to a stressful event criteria defined in the International Classification of Diseases and disturbing woman's post-natal wellbeing (King, McKenzie-McHarg, & Horsch, 2017). Metaanalysis performed by Xu and colleagues (2017) reviewed the 28 studies on post-natal depression risk factors and revealed that any kind of cesarean section operation increases a woman's risk to experience a post-natal depression after childbirth - post-natal depression risk increases by 1.15 times after elective cesarean section, and after emergency cesarean section it increases by 1.62. Women's wellbeing is not being measured in the first months after childbirth in our study, therefore it does not allow us to assess adequately whether a woman's post-natal wellbeing could be one of the mediating factors that could explain detected differences of emotional and behavioral difficulties, self-regulation and reasoning abilities in children born under different circumstances.

Analysis of mother-child interactions characteristics in different delivery mode groups

In this study we collected the data on the maternal interactions with children in two ways: by requesting mothers themselves to evaluate various characteristics of interactions with children and by researcher's monitoring the maternal interactions with 4 years old children. We present the comparison of interaction characteristics of mothers' who delivered by a different mode in Table 4.

The results presented in Table 4 and inter-group differences found in pairwise comparison with adjusted *p* values show that women's, who gave birth at home, attitude to infant care significantly differed and were mostly infant-oriented compared with all other groups of women - who gave birth by emergency C-section ($z = 5.888$, $p < .001$, $r = .72$), elective C-section ($z = 4.436$, $p < .001$, $r = .69$), by vaginal delivery in hospital with medication ($z = 5,.38$, $p < .001$, $r = .52$) and by vaginal delivery in hospital without medication ($z = 2.810$, $p = .049$, $r = .37$). Women who gave birth by vaginal delivery in hospital without medication also showed more infant-oriented attitudes to infant care compared to the attitudes of women who gave birth by emergency C-section ($z = 2.985$, $p = .028$, $r = .36$). Also women who gave birth at home statistically significantly longer breastfed their children than all other women who participated in the study - comparing the breastfeeding duration of women who gave birth at home with the breastfeeding duration of other groups of women, all *p* values < .001, while effect size is ranging from $r = .5$ compared to the group of childbirth in hospital with medication, to $r = .73$ compared to the group of emergency C-section. Self-efficacy indicators evaluated by women are the highest in the group of mothers who gave birth in hospital with medication, and women who gave birth at home evaluated their self-efficacy the lowest ($z = -3.060$, $p = .022$, $r = -.26$).

Table 4. *Comparison of the characteristics of maternal interactions with children evaluated by mothers in different delivery mode groups*

	Ranks					Kruskal-Wallis test	
	Vaginal delivery at home (n)	Vaginal delivery in hospital without medication (n)	Vaginal delivery in hospital with medication (n)	Elective caeserean section (n)	Emergency caesarean section (n)	H (df)	p
Breastfeeding duration	201.86 (22)	126.70 (35)	111.80 (109)	106.11 (18)	93.29 (51)	42.345 (4)	.000***
Maternal attitudes to infant care (3 months)	167.83 (27)	123.42 (30)	91.97 (95)	80.79 (14)	80.46 (40)	46.405 (4)	.000***
Maternal self-efficacy (1.5 year)	83.30 (27)	126.21 (34)	128.82 (107)	121.42 (19)	116.34 (52)	9.794 (4)	.044*
Maternal responses to children's negative emotions (3 years):							
Distress reactions	50.31 (26)	95.32 (22)	85.63 (72)	91.42 (13)	78.57 (27)	14.960 (4)	.005**
Punitive reactions	47.63 (26)	86.98 (22)	88.40 (73)	95.00 (13)	81.50 (27)	16.732 (4)	.002**
Expressive encouragment	112.02 (26)	83.72 (23)	75.26 (73)	78.27 (13)	68.65 (27)	14.446 (4)	.006**
Emotion-focused reactions	45.37 (26)	71.48 (23)	100.20 (76)	65.23 (13)	89.20 (27)	29.664 (4)	.000***
Problem-focused reactions	75.02 (26)	72.61 (23)	92.83 (76)	81.27 (13)	72.70 (27)	6.324 (4)	.176
Minimisation reactions	38.15 (26)	76.00 (22)	93.36 (73)	103.81 (13)	81.94 (27)	30.487 (4)	.000***

Supportive strategies	86.87 (26)	77.00 (23)	88.65 (76)	74.77 (13)	72.44 (27)	3.301 (4)	.509
Non- supportive strategies	37.75 (26)	86.57 (22)	91.59 (73)	102.92 (13)	78.93 (27)	29.392 (4)	.000***
Observed mother – child interactions (4 years)							
Stuctured task							
MRO	84.70 (15)	57.83 (24)	54.47 (49)	52.00 (13)	63.14 (18)	11.187	.025*
Positive guidance	62.20 (15)	60.19 (24)	58.39 (49)	59.58 (13)	62.61 (18)	.526	.971
Direct control	35.00 (15)	70.94 (24)	60.95 (49)	69.00 (13)	57.17 (18)	12.684	.013*
Intrusive behavior	22.50 (15)	62.71 (24)	63.78 (49)	82.96 (13)	60.78 (18)	27.379	.000***
Withdraw behavior	59.00 (15)	59.00 (24)	61.43 (49)	59.00 (13)	59.00 (18)	2.881	.578
Overall rating of interactive style	23.23 (15)	67.79 (24)	64.66 (49)	76.88 (13)	55.36 (18)	23.297	.000***
Free play							
MRO	75.60 (15)	57.98 (23)	52.03 (49)	56.00 (13)	60.06 (18)	6.752	.150
Positive guidance	62.00 (15)	59.46 (23)	57.39 (49)	53.85 (13)	57.36 (18)	.559	.968
Direct control	45.93 (15)	61.87 (23)	60.37 (49)	65.92 (13)	51.33 (18)	5.154	.272
Intrusive behavior	61.50 (15)	59.33 (23)	58.61 (49)	62.88 (13)	48.31 (18)	2.556	.635
Withdraw behavior	61.30 (15)	59.83 (23)	58.76 (49)	50.00 (13)	56.75 (18)	2.814	.589
Overall rating of interactive style	50.23 (15)	61.39 (23)	59.91 (49)	64.58 (13)	50.50 (18)	2.730	.604

Note: *** $p < .001$, **$p < .01$; *$p < .05$; † $p < .1$.

Analyzing the differences of strategies mothers apply when reacting to child's negative emotions, we compared the use of expressive encouragement strategy and the use of unsupportive strategies in pairwise comparisons. Mothers who gave birth at home, tend to encourage children to express their emotions significantly more frequently in comparison with mothers who had emergency C-section (z = 3.366, p = .003, r = .49) and mothers who gave birth in hospital with medication (z = 3.432, p = .002, r = .37). Also mothers who delivered at home applied non-supportive strategies less frequently than other mothers who participated in the research - significant differences were observed comparing the evaluations of women who delivered at home with women from all other delivery mode groups: emergency C-section (z = -3.215, p = .027, r = -.42), elective C-section (z = -4.116, p = .001, r = -.65), vaginal delivery in hospital without medication (z = -3.615, p = .006, r = -.49), and vaginal delivery in hospital with medication (z = -5.057, p < .001, r = -.48).

Finally, when analyzing the mother-child interactions characteristics evaluated by researchers, we see that during the free play task all mothers demonstrated similar characteristics of interactions with children. In the meantime, several statistically significant differences were highlighted in the interactions during the structured task. Significant differences were observed comparing the structured task's mutually responsive orientation (MRO) estimates of mother-child dyads of different delivery mode groups ($H(4)$ = 11.187, p = .025), comparing frequencies of mothers' using control ($H(4)$ = 12.684, p = .013), interference ($H(4)$ = 27.379, p < .001), and comparing overall rating of interactive style ($H(4)$ = 23.297, p < .001), which is composed by summing up scores of control, interference, withdrawal and reversed score of positive guidance and where a higher number means a less positive guidance style. The overall rating of interactive style of mothers who gave birth at home significantly differed from all other groups - the biggest differences were observed comparing it with the interaction style of mothers who gave birth by

C-section (z = -4.167, p < .001, r = -.79), as well as by vaginal delivery without medication (z = -3.985, p = .001, r = -.65), by vaginal delivery with medication (z = -4.132, p < .001, r = -.52), and by emergency C-section (z = -2.705, p = .068, r = -.47). Also mother-child dyads who gave birth at home received the highest estimates of mutually responsive orientation in comparison with the mother-child dyads who gave birth in hospital by vaginal delivery with medication (z = 3.158, p = .016, r = .39) and by elective C-section (z = 2.660, p = .078, r = .50).

Before finishing this analysis we looked at the associations between mother-child interactions characteristics based on maternal evaluations compared with the researchers' evaluation (Table 5).

Hence results of our study show that according to both mothers' and researchers' evaluations, mothers of different delivery mode groups were characterized by certain maternity practices and characteristics of interactions with children. Identified differences of maternity practices and mother-child interactions may relate to certain sociodemographic differences in groups - already mentioned different numbers of mothers with higher education, numbers of first-borns in groups. It has been noted in some studies that first-born children face higher parents' expectations and requirements, but at the same time parents “invest” in them more, give more quality attention and time for common activities, for example for reading a book with a child, playing together or doing other activities, etc., compared to the later born children (e.g. Price, 2008; Hertwig, Davis, & Sulloway, 2002). In other research some differences in parental interactions with the first-born and later born children were observed, for example, mothers demonstrate more sensitivity with the first-born children, and more positive emotions with the ones born later (Kennedy, Betts, & Underwood, 2014), both parents tend to be more sensitive to the first-borns and less interfering than with the later born children (Hallers-Haalboom et al., 2017).

Table 5. *Associations between mother-child interactions characteristics evaluated by mothers and evaluated by researchers' (Spearman's correlation coefficients r_S are presented)*

	1. Breastfeeding	2. Maternal attitude to infant care	3.S Maternal self-efficacy	5. Supportive strategies	6.Non-supportive strategies
1.Breastfeeding	-				
2.Maternal attitude to infant care	.414***	-			
3.Maternal self-efficacy	-.177**	.079	-		
4.Supportive strategies	.023	-.006	.147†	-	
6.Non-supportive strategies	-.155†	-.375**	-.061	.046	-
7.MRO (strctured task)	.050	.107	-.074	.086	-.239*
8.Interactive style (structured task)	-.100	.076	.333***	.107	.236*
9.MRO (free play)	-.031	.204†	-.126	.083	-.195†
10.Interactive style (free play)	.145	-.005	.202†	.043	.066

Note: *** $p < .001$, ** $p < .01$; * $p < .05$; † $p < .1$. Interactive style – overall rating of interactive style.

When analyzing factors which could relate characteristics of mother-child interactions observed in our study, we discovered that the estimates of mutually responsive orientation attributed to mother-child dyads at the age of 4 years had a positive correlation with the attitudes to infant-care and rearing - the more infant-oriented attitudes mothers had at the age of 3 months, the more harmonious maternal interaction with 4 years old children seemed to be. And the more non-supportive strategies to the child's negative emotions mothers used at the age of 3 years, such as punishment, minimizing or distress, when a mother herself reacts with the negative emotions to the child's negative emotions - the more researchers evaluated their dyads with children as less harmonious and less mutually co-operating at the age of 4 years. We find similar results in studies of other researchers. For example, more children-oriented maternal attitudes to infant care are associated with more sensitive maternal response to infant's distress (Zeifman, 2003), while more parents-oriented attitudes (for instance, a fear to "damage" child, overreacting to his distress or showing him too much attention) are associated with less sensitivity, as well as increased probability of negative parental behavior, such as a tendency to use punishments or negative comments against child (Barnett, Shanahan, Deng, Haskett, & Cox, 2010). The study of Spinrad and colleagues (2007) reveal that maternal non-supportive response strategies to negative child's emotions - the same as they were evaluated in our study - had a negative association with maternal sensitivity and warmth observed during interactions. Thus mothers, who by their own evaluations, use more punishment, minimization reactions when reacting to the children distress, were seen by researchers as less sensitive and less warm in interacting with small children.

Ending the discussion of these results, it is important to point out that mothers who participated in our research were in general characterized by relatively positive interactions with their children. Based on researchers' evaluation, a big part of the mother-child dyads received high mutually responsive orientation estimates – scores

indicating good or very good MRO were predominant, and all mothers used a lot of expressions of positive guidance during interactions with children. Therefore the identified differences in mothers of diferent delivery groups' behavior with their children virtually are between "good" and "very good" interactions.

Model explaining the associations among children's under 4 years of age psychosocial development, circumstances of birth and maternal factors

The last question we are interested to answer in this study - what model explains associations among circumstances of birth, children's psychosocial development and maternal psychological and social factors. In theoretical model of this research we have raised an assumption that circumstances of birth can directly relate to children's psychosocial development - emotional and behavioral problems, self-regulation and cognitive abilities - along such factors as mother's sociodemographic characteristics and child's temperament features. Second assumption was that the significance of circumstances of birth to child's development in early childhood can be indirect through certain intermediate factors: maternal well-being, personality traits, relationship with partner or husband, maternal parenting practices, characteristics of maternal interactions with children. In order to answer the last question of this research, we constructed structural equation model analyzing interconnections of variables measured in the research.

For constructing structural equation model we chose the total scores of emotional and behavioral problems, measured in different study stages, which were obtained by summing up evaluations of all aspects of young children's behavioral, emotional, and social functioning, measured by Child behavior checklist (CBCL/1½-5). Based on the aforementioned data analysis, we decided to include two variables into the model. Both related with birth circumstances - birth

by emergency cesarean section and birth by vaginal delivery at home. The primary model fitted poorly with the data $\chi^2(173) = 28.772$, $p = .00$. *CFI* = .719 *RMSEA* = .084, therefore the model was adjusted by removal of the minor variables and by introducing new variable interconnections. During the model's correction process maternal personality traits were eliminated from the model's variables, because data on personal traits provided a rather small number of participants and due to decrease in number of study participants included in the model, we failed to obtain a meaningful model, explaining the interconnectedness of variables measured in the study. The final model fit indices although were not excellent, but were sufficient: $\chi^2(154) = 18.299$, $p = .073$, *CFI* = .926, *RMSEA* = .044 (Figure 2).

As we can see from the model coefficients presented in Figure 2, there are several intermediate factors that help to clarify the meaning of circumstances of birth to emotional and behavioral problems evaluated by mothers and reasoning and self-regulation abilities evaluated by researchers. The delivery mode impacted children's emotional and behavioral problems evaluations through the two variables of maternal interactions with children. Firstly, delivery at home predicted significantly more child-orientated attitudes to infant care, and the more mothers followed more child-oriented attitudes, the more they were inclined to evaluate their children as having less emotional and behavioral problems. Also both delivery at home and delivery by emergency cesarean section significantly predicted lower maternal self-efficacy, which was significantly related to evaluations of emotions and behavior problems - the lower mother evaluated her self-efficacy, the higher emotional and behavioral problems a child displayed, based on her evaluation.

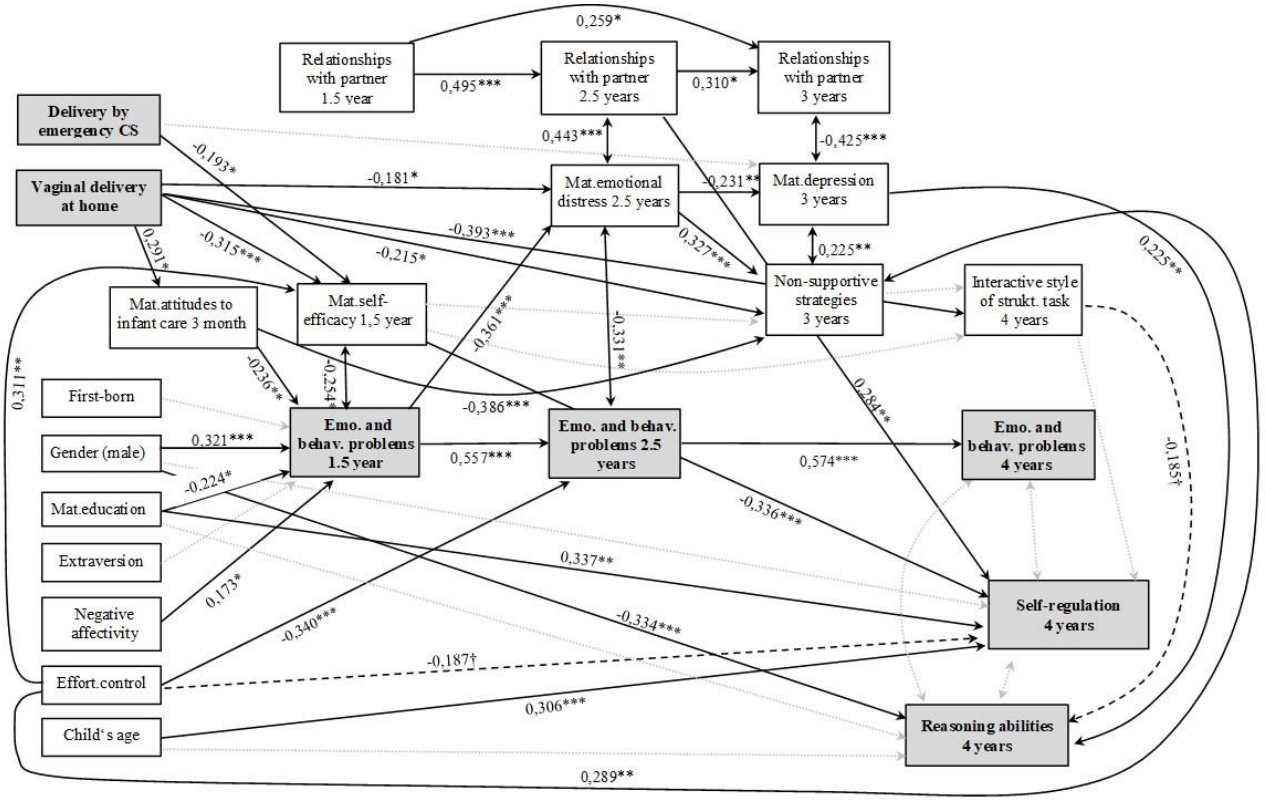

Figure 2. Model explaining the associations among children's emotional and behavioral problems, self-regulation, cognitive abilities and other variables measured in the research. *** p < .001, **p < .01; *p < .05; † p < .1.

The differences found in self-regulation abilities among children born under different circumstances unfold through the maternal self-efficacy factor - both delivery by emergency cesarean section and delivery at home predicted a lower maternal self-efficacy, and as per our analysis lower maternal self-efficacy has had a positive effect on the self-regulation of 4 years old children. Besides self-efficacy, few other factors directly predicted children's self-regulation abilities: maternal higher education, greater child's age at the time of research, and more harmonious mother's relationship with a husband/partner when a child was 2.5 years old.

Reasoning abilities were directly predicted by child's gender and maternal depressiveness measured at the age of 3 years - girls whose mothers were characterized by a higher depressiveness than other women, had higher reasoning abilities at the age of 4 years, based on researchers' evaluation. When evaluating which mediating factors could explain higher reasoning abilities of children born at home and children born by emergency cesarean section, we can see that the model has highlighted intermediate factors between delivery at home and reasoning abilities evaluation only. One being maternal emotional state through which delivery at home affects higher reasoning abilities. Delivery at home predicted higher maternal emotional distress when children were 2.5 years of age, and more frequently experienced negative emotions predicted a higher maternal depressiveness at the age of 3 years, which has a positive effect on children's reasoning abilities. The other one is mother-child interactions which affects children's born at home reasoning abilities . Mothers who delivered at home showed more positive maternal interactions style during a structured task with children, and the more positive maternal interaction style is when completing a structured task, the higher children's reasoning abilities are, based on researchers' evaluation. Actually, maternal interaction style reached only to a trend level of statistical significance when predicting children's reasoning abilities, therefore this intermediate factor between the delivery mode and the child's reasoning abilities deserves to be treated carefully.

The structural equation model, analyzing interconnections of various variables evaluated in the research, demonstrated that evaluations of children's emotional and behavioral problems, reasoning and self-regulation abilities are predicted by several interlinked factors of different origin: biological (child's gender, delivery mode, age at the time of research and negative emotionality), sociodemographic (maternal education), such psychological and social factors as maternal wellbeing (depressiveness, negative emotions experience), relationship with a partner or husband, certain maternal practice or attitudes related to the child-rearing (attitudes to infant care, self-efficacy, interaction style). Such results of our study are in line with the studies of other researchers. For example, value of such socio-economic factor like parent education is noticeable both in the development of the self-regulation abilities (e.g. Zalewski et al., 2012), and in the higher child's cognitive abilities (Butkiene and Gintilienė, 2005). The importance of the child's age when evaluating self-regulation and cognitive abilities is clarified through the growing child's brain maturity and studies show that children characterized with a higher neurobiological development carry out the self-regulation tasks more smoothly (e.g. Atance & Jackson, 2009; Carlson, Moses, & Claxton, 2004). In the meantime, the associations of child's gender with self-regulation and cognitive abilities are more diverse, it was noted in some studies that the girls perform better at least in some of the self-regulation tasks (e.g. Kochanska et al., 2000), whereas the other studies show that the self-regulation tasks, which are related to the cognitive control, and thus with cognitive abilities, children of different gender may carry out equally well (e.g. Li-Grining, 2007).

The model confirmed the raised assumptions that circumstances of birth affect child's emotional, social, cognitive development in early childhood through certain factors related to maternal wellbeing, maternity practices, interactions with children: maternal attitudes to infant-rearing, self-efficacy, maternal emotional distress and

depressiveness, interaction style when performing a common structured task with a child, relationship with a partner.

It is important to mention that our study has revealed a rather controversial role of maternal self-efficacy's for the child's development. Parental self-efficacy, understood as parental sense of competence, self-assessment as likely to have a positive impact on child's behavior and development, often is related to the more positive paternity practices, as well as to parents ability to create an adaptive, exciting and growth promoting environment for a child. Therefore we can assume that it is through the positive paternity practices parental self-efficacy is related to the lower level of children's problems, especially behavior (Coleman & Karraker, 2000 and 2003; Yaman, Mesman, van Ijzendoorn, & Bakermans-Kranenburg, 2010). However, our research revealed that a higher maternal self-efficacy was related with the lower child's emotional and behavioral problems, but at the same time the lower maternal self-efficacy predicted higher child's self-regulation abilities. Mothers evaluating their self-efficacy higher, during interactions observed by researchers were regarded as more controlling and interfering when playing with a child, particularly when completing a structured task with a child. This raises a question - what kind of maternal behavior self-efficacy scale used in our study actually measures? It seems that maternal feeling of competence measured in our research, may reflect more the situations in which a mother feels able to control, manage or suppress her child's behavior, rather than to adapt to changing conditions and to respond sensitively to a child's persisting problems and needs. Thus, mothers who feel able to control child's behavior, on the one hand they evaluate that the child has less emotional or behavioral problems, but on the other hand they potentially lack sensitivity in the situations significant to a child and through this their contribution to the development of children' self-regulation abilities is insufficient.

Research results also revealed a rather unexpected significance of maternal emotional distress measured at the age of 2.5 years and maternal depressiveness measured at the age of 3 years to the child's

reasoning abilities. Mothers who delivered at home experienced more negative emotions when children were 2.5 years of age, which predicted higher maternal depressiveness estimates measured at 3 years of age, and children of more depressive mothers received higher ratings of reasoning abilities. In order to better understand and explain the results presented here, we feel that it lacks an important component - evaluation of maternal post-natal wellbeing and interactions with the children during their first year of life. In Breidokienė's (2014) study the associations between lower maternal wellbeing and better certain self-regulation abilities were identified, however this connection was observed when evaluating maternal wellbeing within the first few months and it has been assumed that maternal stress experienced at an early age can promote a particularly high children's self-control, which may be associated with the later measured better self-regulation abilities on one hand, but on the other hand - with emotional problems that could emerge in the later development stages. Generally a maternal depressiveness, particularly observed in the first year after the childbirth, is associated with the negative consequences to child's development, for example, with higher emotional, behavior, cognitive and self-regulation problems (Lengua et al., 2008; Maughan et al., 2007). However, in our study we didn't measure depression as a disorder but rather depressiveness as a temporary emotional mother's state. The impact of mother's emotional wellbeing on child's development may be linked to the nature of maternity practices. For example, Baker's (2018) study shows that the symptoms of maternal depression affect children's cognitive control abilities not directly but rather through maternal factors - specifically through a maternal warmth: the more depression symptoms mother is experiencing, the less warm her interactions with the child are, the lower child's cognitive control abilities are evaluated. Although the model in our study has highlighted that women who delivered at home have been characterized by a higher depressiveness, at the same time they showed more positive interactions with 4-year-olds - and that could

have functioned as one of the protective factors, reducing the negative impact of maternal depressiveness.

Summarizing the results of the associations of the circumstances of birth with emotional and behavioral problems, self-regulation and reasoning abilities in early childhood, we can state that such birth circumstances like emergency cesarean section and birth at home are significant factors of child development that are involved in child's development not directly but through a certain mother's behavior with children - more conforming to children's needs, less interfering or less controlling. However, it is important to note that the participants in our research are mostly with higher education, in marriage and living in cities, therefore the results of our research cannot be summarized on a wider scale and reflects precisely a group of women with higher education, living in marriage and residing in cities. With regard to some limitations of the study - sociodemographic characteristics of the study participants, small groups of participants in some of the study stages, absence of some important variables - it is worthwhile to continue to analyze the role of the circumstances of birth in child's development in future studies, including in this research families of a more diversified socioeconomic status, focusing more on the maternal emotional wellbeing and interactions with a newborn and an infant in the first months after childbirth, not only by collecting information from mothers but also using information obtained during observation. It is equally as important to evaluate how the experience of childbirth impacts fathers' emotional well-being, their involvement in a child's upbringing, care, activities with a child and what does that mean to children's development.

CONCLUSIONS

1. Study identified the following characteristics of emotional and behavioral problems of children born under different circumstances:
   a. According to mother-based evaluation, children of 1.5 and 2.5 years of age delivered at home showed the lowest, and children born by emergency cesarean section - the highest level of attention-deficit/hyperactivity, emotional and behavioral problems.
   b. A greater biological risk of pregnancy and childbirth is weakly but significantly linked with attention-deficit/hyperactivity and emotional problems of 1.5 year old children, while at the age of 2.5 years children's emotional problems evaluated by mothers is linked with a higher psychological pregnancy and childbirth risk.

2. Children born by emergency cesarean section and born at home have been characterized by the highest reasoning and self-regulation abilities, furthermore children born at home showed the highest planning abilities.

3. Women who gave birth in different circumstances have had similar characteristics of emotional wellbeing and relationship with a husband/partner when children were from 1.5 to 4 years old. Women of different delivery modes differed by one personality trait only: women who delivered at home have been characterized by the highest expressed openness trait.

4. Women who gave birth in different circumstances showed the following characteristics of interactions with children:
   a. Women who delivered at home were more likely to have longer breastfeeding duration than other women, applied more

child-oriented attitudes to infant care, more often used supportive response strategies to negative child's emotions, i.e., expressive encouragement, and less frequently applied non-supportive response strategies to the negative child's emotions.

b. Women who delivered by emergency or elective cesarean section showed the shortest length of breastfeeding, their attention to infant-care and rearing was mostly parent-oriented, and women who delivered by cesarean section also most often applied non-supportive response strategies to negative child's emotions.

c. Based on researchers' evaluation, women who delivered at home were characterized by more positive interaction style during a structured task with 4 years old children: they used more positive guidance, which includes the use of suggestions, compliments, encouragement, less control and interference. These mother-child dyads have been regarded as more harmonious and cooperating than mother-child dyads of other delivery mode groups.

5. Model explaining associations among children's up to 4 years of age psychosocial development, circumstances of birth and maternal psychological and social factors reveal the following:
   a) Emotional and behavioral problems evaluated by mothers at the age of 1.5 year were directly predicted by male gender of a child, higher child's negative affectivity, lower maternal education, parents-oriented maternal attitudes to infant-care and rearing, and a lower maternal self-efficacy.
   b) The mode of delivery indirectly predicted children's emotional and behavioral problems through intermediate factors. Mothers who gave birth at home showed more child-oriented attitudes to infant care, and these in turn predicted lower estimates of behavior and emotional problems. Women who gave birth through emergency cesarean section showed a

lower self-efficacy, which was related to the higher estimates of children's problems.

c) Higher children's self-regulation abilities were directly predicted by mother's higher education, older child's age at the time of research, lower maternal self-efficacy when children were 1.5 year of age and better mother's relationship with a husband/partner when children were 2.5 years of age. Lower maternal self-efficacy is a mediating factor explaining positive significance of delivery at home and emergency cesarean section for children's self-regulation abilities.

d) Higher children's reasoning abilities were directly predicted by female gender of a child, higher maternal depressiveness, measured when children were 3 years old and maternal interaction style characterized by use of the positive guidance during a structured task with the 4-year-old children. Greater emotional distress, experienced 2.5 years after delivery, greater depressiveness at the age of 3 years and more positive interaction style with a 4 years old child during the structured task are intermediate factors explaining a positive impact of delivery at home to children's reasoning abilities.

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Since 2001 Jurgita Smiltė Jasiulionė works as a psychologist and volunteers' trainer at the NGO "Child Line", where she teaches volunteer consultants to provide emotional support to children and adolescents, actively participates in educational projects, leads trainings, seminars and lectures for children, parents and educators. Jurgita Smiltė Jasiulionė is one of the initiators and implementators of the national campaign "WITHOUT BULLYING" initiated by NGO "Child Line". In this campaign she prepares methodical materials for schools, delivers seminars on the bullying prevention for school workers, also she is the co-author of several methodological publications about bullying prevention. From 2018 Jurgita Smiltė Jasiulionė provides psychological help for children and families in NGO "The Blessed J. Matulaitis Family support center".

PUBLICATIONS AND PRESENTATIONS

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