On the Psychology of Birth

Inaugural-Dissertation zur Erlangung der Doktorwürde

der

Philosophischen Fakultät

der

Rheinischen Friedrich-Wilhelms-Universität

zu Bonn

vorgelegt von

Lisa Hoffmann

aus

Sankt Augustin

Bonn, 2020

Gedruckt mit der Genehmigung der Philosophischen Fakultät
der Rheinischen Friedrich-Wilhelms-Universität Bonn

Zusammensetzung der Prüfungskommission

Prof. Dr. Henning Gibbons
(Vorsitzender)

Prof. Dr. Rainer Banse
(Betreuer und Gutachter)

Prof. Dr. Franz J. Neyer
(Gutachter)

PD Dr. Ina Grau
(weiteres prüfungsberechtigtes Mitglied)

Tag der mündlichen Prüfung: 25. September 2020

ACKNOWLEDGEMENTS

The implementation and completion of this thesis would not have been possible without the support of many. My gratitude goes to my advisor Rainer Banse, for your help and your courage in letting me choose this research topic – a subject you had (scarcely) anything to do with until I came to your office telling you I had finally found a PhD theme. Yet, you have supported the idea from the beginning and enriched the research process with your suggestions and expertise. Furthermore, I want to thank you for not only being so feministic to hire me pregnant but also for your unrestricted understanding of all matters parenthood brings with it. In a perfect world, perhaps this should be taken for granted. But I know that it is certainly not in the real world. I hope your biggest regrets were that I skipped lunch quite often.

My work has also benefited from the many suggestions and help from my colleagues. I want to thank Ina Grau for your assistance in the initial development of the Mindset and Birth Questionnaire; Mareike Kholin and Andreas Wihler for the statistical advice; Judith Kopehele-Gossel for all for the countless SPSS support services in the early days; Jelena Rönspies for thinking along during the questionnaire development; Verena Oberlader and Alexander Schmidt for all the spontaneous conversations in our office; and especially Roland Imhoff for the many little and not-so-little questions you answered for me over the years, the support in data collection when our computer program left us in the lurch (though, I guess you do not even remember), and for your nagging but so helpful comments on this thesis. I do not think I would have completed this dissertation so calmly without Norbert Hilger. Not only because you 'simply helped with the *on*s and *by*s' (your words, not mine) during the SI modeling process, but also for making it actually fun. Seriously, I am extremely grateful for your support, expertise, and patience.

It would also not have been possible to conduct the validation studies without the help in data collection by Anna Risch and Pauline Sturtz. The longitudinal study was founded by the German Research Foundation (Deutsche Forschungsgemeinschaft; DFG), making its realization possible in the first place. Carolin Nettemann has always actively supported me with the organizational aspects. Julia Gipperich, Annika Lenz, Helena Lügering, and Jana Petrovic carried out the complex data collection of the longitudinal study both conscientiously and to a large extent independently while I was on parental leave. Annika Lenz has also contributed to the research question in terms of content, by addressing the issue of a potential stress-reducing effect of the couple's

relationship in her master's thesis, from which I profited in Study 6. I am very grateful for all these aspects.

Over the years, I have also received much support from my family and friends, especially from Deborah Elschner who took care of my daughters when they were not yet in kindergarten as well as from my mother-in-law Iris Laaser. Thank you for your immense support and flexibility. This also applies to my daughter's kindergarten teachers, who always responded so empathetically to our needs. I also need to thank my parents Bettina and Claus Hoffmann for many things but especially for always encouraging and never stopping me from thinking critically. This has certainly contributed to the development of this thesis. With her professional, but at the same time warm birth assistance, Birgitt Sauerland also made an (unintended) contribution. I am sure, if childbearing women were all accompanied in this way, it would not be necessary to conduct a study on the psychological relevance of birth experience.

Finally, I want to thank Lars Laaser. Our relationship began with you helping me push my bike through school because I thought that was a better idea than riding around on the outside. Your support has not waned since then. I am very lucky for having you through all the years.

And last but not least: Rike and Okka. Just because.

ABSTRACT

In this dissertation thesis, I propose the theoretical construct of a birth-related mindset and direct and indirect measures for its assessment. I assume that childbirth can be mentally presented as a rather natural (natural mindset) or a rather medicalized (medicalized mindset) event and that, in addition to medical factors, the birth-related mindset causally influences labor and birth. In three initial studies (Study 1: *N* = 117, Study 2: *N* = 206, Study 3: *N* = 192), I aimed to explore whether the proposed birth-related mindset is related to the retrospectively reported process of labor and birth (operationalized e.g., by performed interventions, duration of birth, place of birth). In a final longitudinal study (divided into sub-component Studies 4, 5, and 6) I examined the causal effect of the mindset and expanded the research question to address the relevance of birth experience for short- and long-term psychological well-being. Results of Study 4 (*N* = 311) could be integrated into a Single indicator model, displaying a sequential process: women with a prenatally more natural mindset were more likely to have low-intervention births, which resulted in a more positive evaluation of the birth experience, which in turn predicted well-being in the first weeks after birth (measured with Ecological Momentary Assessment), and subsequently postpartum depression and post-traumatic stress symptoms (eight weeks and six month after birth) as well as mother-infant-attachment six months after birth. In a fifth study (*N* = 304) the results could be replicated for a male sample. In a sixth study (*N* = 304 dyads) results further indicated that relationship quality can have a positive impact on the woman's birth experience and on transition to parenthood for both sexes. The indirect measure I used to assess implicit aspects of both the birth-related mindset and attitude towards the partner did not yield meaningful results. Overall, the studies demonstrate the relevance of psychological factors for childbirth. The construct of a birth-related mindset could contribute to a better understanding of childbirth and help to make women's birth experiences safer and more satisfying and improve the transition to parenthood for the whole family.

TABLE OF CONTENTS

PROLOGUE

"The safer the childbirth becomes there is almost,
hand in hand, an exaggerated fear of things going wrong."

Andrew Bisits
in The Face of Birth

(Banks, Gorman, & Vasiljevic, 2012)

This research began with the birth of my own daughter and the birth stories of women who gave birth around the same time I did. I had the impression that the different birth processes somehow fit into an overall picture, as if they were not completely random. Friends who were worried about giving birth, who saw birth as something women have to overcome, that was unsafe and somehow even disgusting, seemed to have births rich in medical interventions, with Cesarean section births (C-sections) above all. Friends who were confident in advance and were looking forward to not only the baby, but also to the birth process itself, reported easier births. They also seemed to have fewer problems with their newborn babies, as everything following childbirth was just a little bit easier. I started wondering if this anecdotal observation would also be seen in larger, empirical studies. At the same time, I noticed, although childbirth is a major life event entailing psychological challenges, the topic of birth is still not discussed much in psychology. However, the few available studies do point to the relevance of psychological factors for childbirth and its evaluation (e.g., DiMatteo et al., 1996; Durik et al., 2000; Haines et al., 2012; Preis et al., 2018). But which factors may contribute to the psychology of birth? To gain an understanding of the potential psychological aspects of birth, it seems necessary to take a brief look at the social representations of birth. Social depictions of birth are most visible through media presentation; in films and TV series birth is portrayed as a painful, often hysterical, and externally guided process. We see birthing women in hospitals, half-lying, instructed to push by obstetricians. We see women yelling in pain, demanding epidurals, cursing the birth, not knowing what is happening, because except for the pain their bodies do not really seem to belong to them. In the media, birth is portrayed as a process, which is only natural in the sense of its rather negative aspects such as pain and loss of (bodily) autonomy but above all it is a process that is controlled from the outside. Women do not give birth; doctors deliver the babies. Depending on the genre we also see dramatic births where women and babies almost die. The fear that something *could go wrong* also extends outside the media. During pregnancy, women are closely

monitored, e.g., via blood tests and ultrasounds. During labor and birth women's contractions and the child's heartbeat are recorded using cardiotocography (CTG). Technical equipment that can be used for an emergency is apparent. Although from a medical perspective those aspects are reasonable, the question arises of how the salience of not being in control and of potential risks affects the women giving birth and the other persons present. And beyond that, does it affect everybody in the same way, or are there differences in the perception of birth that are related to the mental representation humans have about childbirth?

What do we know about the psychology of birth?

There is research suggesting that there are certain factors within the person that could be associated with labor and birth. Most conducted studies focused on emotions, especially on fear. But the existing results lack consistency: Although some studies found correlations between fear and birth outcomes (Beck et al., 1980; Ryding et al., 1998), others did not (Johnson & Slade, 2002; Littleton et al., 2007). Differences in the operationalization of the measured constructs are possible reason for the discrepant results (Littleton et al., 2007; Reading, 1983). In rare cases, studies also investigated attitudes and their influence on the birthing process. Beck et al. (1980) found a correlation between birth-related attitudes and labor and birth pains. A more recent study (Haines et al., 2012) showed that birth-related attitudes (e.g., safety concerns, personal impact) and fear predicted labor and birth outcomes (e.g., having an epidural). Both studies underscore the importance of attitudes in childbirth. However, the studies also contain some critical issues. The reliabilities of the questionnaires used in the study by Haines et al. (2012) were insufficient (internal consistency ≤ .40). Beck et al. (1980) used an outdated questionnaire from 1960. Furthermore, because childbirth is a life-event that includes deep emotional involvement and presumably a strong motivation to cope with the situation effectively I questioned whether the rather separate consideration of individual emotions or attitudes sufficiently reflects the complexity of childbirth or whether a more comprehensive picture could be provided by the psychological concept of mindsets. Mindsets are mental representations that guide people's information processing, experiences, and behavior because they prepare the cognitive system for mindset-relevant demands (Dweck, 2012; Gollwitzer et al., 1990). Using a metaphor, mindsets can be seen as mental lenses that selectively guide persons' perception, interpretation, experience, and behavior (Crum et al., 2013; Dweck, 2008). Accordingly, a birth-related mindset could shape the perception of birth and likewise influence birth-related decisions and the process of giving birth. To understand the possible processes behind this, it is necessary to take a brief look at current obstetrics and the associated medical or natural views of childbirth.

Medical versus natural views of childbirth

In the last century and even in the last two decades, we have observed an increasing medicalization in obstetrics, which manifests itself in an increasing rate of interventions, most strongly reflected by a worldwide increase in C-sections rates (World Health Organization [WHO], 2015). Although medical interventions were introduced to improve the mothers' and babies' health and are in some cases necessary for survival of mother and/or child, a growing number of professionals raise concerns regarding the increasing medicalization of birth: In 1985, the WHO pointed out that medically motivated reasons for a C-section are expected in about 10-15% of births[1]. Nonetheless, the current C-section rate in most Western countries reaches more than double the anticipated 15%. In December 2014, the British National Institute for Health and Care Excellence (NICE) caught the media's attention by stating in their guideline for intrapartum care that women with uncomplicated pregnancies should consider giving birth at home or in a midwifery-led unit. This recommendation was based on a lower rate of interventions for the women with equally good outcomes for the baby when birth took place with midwife assistance either at home or in a birthing center (see also De Jonge et al., 2013).

This debate of the concerned professional stakeholders shows that childbirth is discussed in terms of more medical versus more natural approaches or settings for giving birth. The terms 'natural' and 'medical' childbirth are also widely used in newspaper articles, on the internet (e.g., yielding a large number of hits in a Google search), and also in the scientific context (e.g., Preis & Benyamini, 2017; Preis et al., 2018; Wilson & Sirois, 2010). Medicalization means the application of a medical framework on a specific issue such as birth by using medical terms, interventions, and technology to manage the situation (Conrad, 1992). In contrast, natural childbirth describes birth-related concepts, methods, and approaches that are related to minimizing medical interventions during labor and birth, such as not using epidurals, or choosing out-of-hospital birth settings for women with low-risk pregnancies (e.g., Cosans, 2004). I refer to these common representations by proposing a birth-related mindset conceived as a dimension with the poles *medical birth* and *natural birth*: Childbirth can be perceived as a rather medical process that needs a medical setting and support (e.g., hospitals, obstetricians/ gynecologists, pain relievers such as

[1] Although the WHO no longer holds explicit *recommendations* for an optimal rate, the organization claims that C-section rates above 10% do not have positive effects on mother and child mortality (WHO, 2015).

epidurals) or as a natural process that women are capable of handling without such intervention and with more natural supports (e.g., out-of-hospital birth settings, midwifery care).

During labor and birth, the laboring woman's information processing might depend on her mindset orientation. Emotions and cognitions resulting from the birth-related mindset could influence the birth process, e.g., via self-fulfilling prophecy or negative feedback loop. Since women with a more natural mindset might presume that the female body is capable of birthing and birth itself is a natural process, they might need less intervention during labor and birth than women with a more medical mindset who believe that interventions are necessary to cope with the event. I assume that women can be aware of these assumptions and therefore consciously decide for or against an intervention such as an epidural. However, it is also possible that a medical mindset leads to increased perception of alleged problems and actually makes difficulties during labor and birth more likely, e.g., by causing muscle tension that interferes with the physical process of birth. A resulting slowly progressing birth could then increase the possibility of interventions such as C-sections (American College of Obstetricians and Gynecologists [ACOG] /Society for Maternal-Fetal Medicine [SMFM], 2014), which were neither planned nor wanted by the women before birth. Thus, in addition to physical and medical conditions, the mindset might determine parts of labor and birth. For women with a more natural mindset, a natural birth process would be more likely, and for women with a more medical mindset, a more medical birth process. These assumptions imply that the birth-related mindset must have been developed before birth. However, it is a core assumption of social cognition theory that mental representations are based on experience, and causally influence decisions, experience, and behavior (e.g., Fiske, 1995). In the context of birth, I assume that the mindset and the situation exert mutual influence on each other (as is widely assumed for other mindsets, such as the construct of attachment – the thus far best studied and understood mindset). Accordingly, the birth-related mindset presumably develops on the basis of different sources of information (e.g., movies, TV series, previous births, birth stories of mothers and friends, books, newspaper articles, blogs). The information gathered affects the behavior, which in turn strengthens the mindset.

Three cross-sectional studies (Studies 1, 2, and 3) and a longitudinal study (divided into component Studies 4, 5, and 6) were conducted to test the theory of the birth-related mindset and its effect on labor and birth. In the first three studies I aimed to explore whether empirical evidence supports the basic premise of my theory, that a birth-related mindset is associated with labor and birth. Therefore, it was necessary to first develop and validate appropriate methods to assess the birth-related mindset. For the first validation studies I decided to use a retrospective

design with mothers rather than a prospective design with pregnant women. The novelty of the question and the uncertain validity of my measures made it ethically questionable to conduct a very time- and resource-consuming longitudinal study with pregnant women as a first step. However, the cross-sectional research design of the three validation studies did not allow for drawing conclusions about the direction of causality. Causality was examined in a final, fourth study using a prospective longitudinal design.

Indirect measures

In addition to a questionnaire I developed, I aimed to examine whether the use of indirect methods could be beneficial to corroborate a more comprehensive notion of the birth-related mindset. In Study 1 I used a Single-Category Implicit Association Test (SC-IAT; Karpinski & Steinmann, 2006) and the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes et al., 2006), in Study 2 five different SC-IATs, and in Study 3 two classic double-target Implicit Association Tests (IAT; Greenwald et al., 1998). One of the double-target IATs was also used in the prospective longitudinal study (Study 4 and Study 5). I took the use of the indirect measures into consideration, because some studies indicate that indirect measures can improve the prediction of certain outcomes (Banse & Kowalick, 2007; McNulty et al., 2013), even though empirical evidence is not consistent on this topic (e.g., Oswald et al., 2013). Furthermore, childbirth is often characterized by social expectations of or preference for specific birthing modes, and it is possible that indirect measures are more robust against socially desirable responding (Teige-Mocigemba et al., 2010). Another often mentioned advantage of indirect methods is the assessment of components at an introspectively inaccessible level (e.g., Greenwald et al., 2003; Greenwald & Banaji, 1995). However, whether this is the case has been highly debated in recent years (e.g., Hahn et al., 2014), and De Houwer (2006) argued for empirically testing whether an indirect procedure does in fact measure an implicit outcome. In this thesis, however, I was first interested in investigating whether indirect measures are at all suitable for measuring a birth-related mindset. The extent to which the outcome of this measure is implicit would have to be investigated in a further step[2].

[2] Although, the implicitness of the indirectly assessed birth-related mindset has to be empirical tested, I use the term implicit birth-related mindset for the purpose of stylistic simplification.

What about personality traits?[3]

Studies exploring the role of psychological factors for childbirth typically focus on emotions and attitudes or beliefs (Haines et al., 2012; Ryding et al., 1998; Preis & Benyamini, 2017; Wilson & Sirois, 2010). Some also examine personality traits such as general anxiety or the big five but are more likely to explore their relationship to fear of childbirth than focus on birth outcomes (e.g., Handelzalts et al., 2015; Huizink et al., 2004). An exception is a study by Johnston and Brown (2012), who found that personality traits such as extraversion can predict complications during labor and birth as well as birth outcomes. In this thesis, the role of personality traits was further investigated. I explored whether traits can predict birth outcomes (e.g., performed interventions) over and above the birth-related mindset. In the longitudinal study (Study 4 and Study 5) I also explored the role of the traits for the potentially stressful time after birth and for the development of symptoms of postpartum depression. Specifically, the personality traits neuroticism, extraversion, trait anxiety, self-efficacy, self-esteem, and regulatory focus (only in Study 1) were investigated.

Birth experience

A second factor closely associated with labor and birth is the birth experience, the women's subjective evaluation of the birth. Existing studies suggest that unexpected medical problems (Waldenströmet al., 2004) and corresponding births resulting in a C-section (DiMatteo et al., 1996) might lead to a poor birth experience. A negatively perceived birth experience can have a negative impact on the mother-child interaction even months after birth (DiMatteo et al., 1996; Durik et al., 2000) and on the occurrence of postpartum depression (Bell & Andersson, 2016). Thus, the birth experience represents a potentially impactful birth outcome, which I chose to examine alongside the birth-related mindset in two of the validation studies and in the prospective longitudinal study.

The role of men and relationship quality

Even though views on family structures are still influenced by stereotypes of traditional gender roles (Valiquette-Tessier et al., 2016), male involvement in birth and parental caregiving has increased in recent years. In the Western world, women now usually give birth in the company

[3] I assume that the birth-related mindset tends to be stable and, thus, could be classified as personality trait. However, due to the special role of the birth-related mindset in this thesis, I distinguish it from the rather *conventional* personality traits such as neuroticism or self-efficacy.

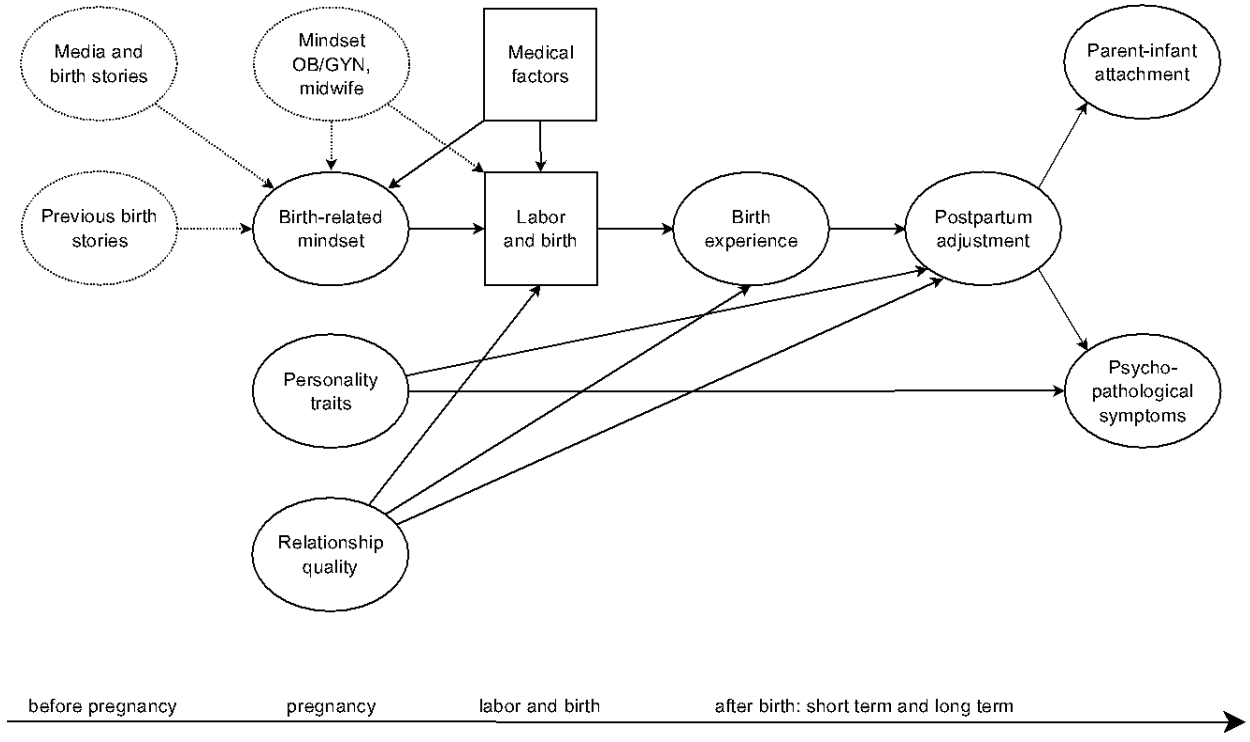
of their partner. Qualitative studies as well as studies with retrospective designs provide evidence that anxieties about childbirth also occur among men (e.g., Eriksson et al., 2007; Eriksson et al., 2005). This experience is also being increasingly recognized in practical settings, e.g., in form of specialized birth preparation classes for men and guidebooks to prepare men for pregnancy, birth, and fatherhood. Although the majority of women are in favor of the presence of the partner, there are opposing views, including those of gynecologists and midwives (Lutz & Kollip, 2006). A problematic couple relationship could have an unfavorable effect on women's relaxation during labor and birth and, thus, have a negative influence on the birth process. At the same time, the couple's relationship could provide important resources. In a study by Banse and Kowalick (2007), both explicit and implicit attitudes towards the partner could predict life satisfaction of women who were hospitalized due to the threat of preterm birth. The authors postulated the possibility of positive attitudes toward the partner as an essential resource for stressful life events. Birth and transition to parenthood are considered as such. In the prospective longitudinal study, I therefore examined the role of men and relationship quality for birth, birth experience, and postpartum well-being.

Purposes

I aimed to explore the role of psychological factors in childbirth as displayed in the model in Figure 1. This theoretical model represents the core assumptions of this thesis. I assume that the birth-related mindset – in conjunction with environmental factors (e.g., medical risk) – influences the process of labor and birth, which in turn has short- and long-term psychological consequences. Thus, using an empirical approach, I have investigated the role of (1) the birth-related mindset for labor and birth, (2) the relevance of the birth experience and its effect on psychological well-being after birth (e.g., emotional well-being, postpartum depression symptoms, attachment to the infant six months after the birth), and (3) the quality of the couple's relationship. For this purpose, I first conducted three online studies that aimed to validate the developed measures: a questionnaire and indirect measures for assessing the birth-related mindset, as well as a questionnaire for measuring the birth experience. In Study 1, the questionnaire for assessing the birth-related mindset was developed and then tested using its associations with retrospectively reported birth-related criteria. In Study 2 and Study 3 I aimed to replicate and expand the exploratory findings of Study 1 by using additional variables and different samples. In Study 2 and Study 3 I also explored whether the process of labor and birth and performed interventions were related to the subjective birth experience. Studies 4 to 6 used a prospective longitudinal design, which was used to examine the question of whether the birth-related mindset of women (Study 4) and men (Study 5) can also have a causal influence on labor

Figure 1

Representation of the influence of different agents and factors on labor and birth and resulting short-term and long-term psychological factors. The factors displayed in the dotted circles are not tested in the present thesis



and birth. Moreover, I explored how the birth experience affects psychological well-being up to six months after birth and whether the quality of the couple's relationship has an effect on labor and birth, on the birth experience, and on the transition to parenthood (Study 6). In all six studies different indirect measures for assessing potential implicit aspects of birth-related mindset were scrutinized in addition to personality traits such as neuroticism, extraversion, trait anxiety, self-efficacy, self-esteem, and regulatory focus. For the various questions or studies, I extracted separate, more specific models from the underlying theoretical model (Figure 1).

Design and approaches to reduce the probability of false positives findings

New research questions with multiple testing may increase the probability of false positive results (Simmons et al., 2011). In addition to reporting all measures, conditions, and data exclusions, I used replication as a tool to reduce the risk of false positive findings – initially using a retrospective design in the three validation studies and finally in the prospective longitudinal study. In the three validation studies, the size of the sample depended on how many mothers were willing to participate in a given period of time (approximately eight weeks). I set a minimum number of 100 participants per study because a priori power analysis with the parameters effect size $|\rho| = 0.3$, α-error probability = .05, and power = .80 suggested a total sample size of at least 82 participants was necessary. I aimed at a larger N than suggested so that the sample would still be adequate after necessary exclusions of cases due to problems with the questionnaires, high error rates in the indirect measures, and so on. For the longitudinal study I wanted to increase the N further, considering Schönbrodt and Perugini's (2013) recommendation of 250 participants for stable correlations and the multitude of research questions explored in the study. The number of participants (respectively in Study 6 couples) was set to 300. Data analysis of all studies started when the data collection for the specific study was completed. In order to facilitate participation, the studies were conducted online.

VALIDATION STUDIES

The validation studies (Studies 1-3, below) were conducted to develop and test the constructed measures: A questionnaire for measuring the birth-related mindset or the birth experience, as well as indirect measures for assessing potential implicit aspects of the birth-related mindset. Their results were also expected to provide information for the development of a comprehensive model for the final longitudinal study. In the validation studies I decided to use a retrospective design. The novelty of the research question and measurement methods made it ethically questionable to impose the burden of a prospective longitudinal study on the participants as a first step. It also seemed methodologically questionable to mix the measurement development with the hypothesis testing. The chosen retrospective approach implies that the presented results of the validation studies are not to be interpreted causally.

Hypotheses

I expected that a more medical mindset and the variables associated with general anxiety (e.g., neuroticism) are associated with the medical aspects of birth (e.g., clinical birth settings, epidurals, C-sections), and that a more natural mindset and higher scores in self-efficacy, self-esteem, extraversion, and promotion focus are associated with more natural aspects of birth (e.g., out-of-hospital birth settings, vaginal delivery). To explore whether the birth-related mindset shows incremental validity with respect to broader personality traits (as e.g., postulated by Huizink et al., 2004) I also tested whether the birth-related mindset accounts for additional variance in the assessed birth variables after controlling for the personality factors. For Study 2 and Study 3, I hypothesized that the association between birth variables and the birth-related mindset observed in the exploratory Study 1 can be replicated. In addition, I expected that the birth-related mindset can be distinguished from the subjective birth experience and that the mindset moderates a possible negative correlation between C-section and positive birth experience.

Data treatment

Effect coding

I analyzed both continuous variables (e.g., birth duration) and dichotomous variables (e.g., C-section or vaginal birth). The dichotomous variables were effect coded with 1 indicating the event did apply and -1 indicating the event did not apply. The name of the variable indicates the direction of coding. For example, for the variable C-section, a C-section was coded with 1 and a vaginal birth with -1.

Areas under the curve

As suggested by Babchishin and Helmus (2016), I report areas under the curve (AUCs) for the dichotomous variables because, unlike correlation coefficients, AUCs are not sensitive to base rates and therefore provide better estimates for the strength of an effect. This becomes especially necessary if base rates deviate strongly from 50%, which is the case for all central dichotomous variables in the studies (see sample descriptions). AUCs indicate the discrimination probability between a dichotomous or continuous variable (e.g., birth-related mindset) and a dichotomous grouping variable (e.g., birth mode: vaginal birth vs. C-section; see Babchishin & Helmus, 2016). Thus, in the present cases they indicate the probability that a randomly selected participant of the dichotomous grouping variable vaginal birth has a higher score on the birth-related mindset scale (indicating a more natural mindset) than a randomly selected participant of the grouping variable C-section has. AUCs can have values between 0 and 1, whereby an AUC of .5 indicates no relationship between measure and group membership (the dichotomous variable) and an increasingly strong relationship is indicated by greater difference from .5. An AUC of .56 (or .44) represents a small effect (corresponding to a Cohen's *d* of .20), an AUC of .64 (or .36) a moderate effect (corresponding to a Cohen's *d* of .50), and an AUC of .71 (or .29) a large effect (corresponding to a Cohen's *d* of .80; see Babchishin & Helmus, 2016). For continuous variables (e.g., duration of birth), correlation coefficients are reported.

Regression analyses

In order to test incremental validity of the different measures, I conducted multiple linear and logistic regression analyses for all birth variables. In all three validation studies (Studies 1-3), the measurements were included into the regression in the following order: (1) control variables, (2) personality traits, (3) directly measured birth-related mindset, and 4) indirectly measured birth-related mindset. When interpreting the logistic regression analyses, it should be noted that the frequency of the rarer category is often rather low and in an unfavorable proportion to the number of predictors. Due to the resulting danger of overfitting, the interpretation therefore focuses less on the individual analysis and more on the consistency of the results across the three validation studies.

Significance

If not stated otherwise, the critical *p*-value was set to .01 for all reported results. For the directly measured birth-related mindset results, the reported results in the text refer to the overall score of the developed questionnaire. See the corresponding tables for each of the studies for all results. The procedures described here are consistently used across all three validation studies.

STUDY 1

METHOD

Participants

In the first study, 117 first-time mothers (mean age = 30.25 years, *SD* = 3.80) without prenatal risks took part. Participants were recruited online (e.g., in Facebook groups for parents) or personally at playgrounds or in mother and toddler groups. The mothers participated four to 30 months after birth. Most of the women (90.6%) had given birth in a hospital, 6.8% in a birthing center, and 2.6% at home. The C-section rate was 17.1%, and 14.5% had an assisted vaginal delivery (i.e., by forceps or vacuum). Both the low C-section rate and the relatively high out-of-hospital birth rate differ from the population rates in Germany (C-section rate > 30%, out-of-hospital birth rate < 2%). About half the participants (48.7%) had an epidural. A freelancing midwife was hired by 23.1% of the sample. (Note: In Germany, freelancing midwives can attend births in hospitals, in birthing centers, or at home. A freelance midwife offers one-to-one support during labor and birth, is familiar to the women they attend due to prenatal care and meetings, and must be actively searched and requested, as well as partly privately paid. Freelance midwives and midwives employed by a hospital have the same professional training.)

Measures

Birth-related mindset

For assessing the birth-related mindset, I developed the Mindset and Birth Questionnaire (MBQ; see Table 1) based on different sources of information. First, I conducted semi-structured interviews with professionals (two obstetrician/gynecologists, three midwives, and five mothers). Interview partners were recruited through personal contact. Second, I scrutinized birth-related internet blogs and forums for mothers' statements about experiences and fears of birth. Third, I examined already existing questionnaires (Huizink et al., 2004; Klein et al., 2009; Wilson & Sirois, 2010; Wijma et al., 1998). Based on these materials, I identified four recurring themes: abilities of the maternal caregivers, opinions about birth modes, coping with pain, and fear of being exposed to potential unpleasant or embarrassing situations. I generated a total of 30 items, two of which were adapted from a questionnaire that measured birth-related attitudes of caregivers (Klein et al., 2009). The answer format was a six-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*).

For measuring the birth-related mindset, I also used a Single-Category Implicit Association Test (SC-IAT; Karpinski & Steinmann, 2006) and the Implicit Relational Assessment Procedure (IRAP; Barnes-Holmes et al., 2006). I chose the SC-IAT because it does not require a counter concept to birth and the IRAP because in contrast to the IAT, it is claimed to tap into stimulus relationships (Barnes-Holmes et al., 2009). Each participant completed both indirect measures, one at the beginning and one at the end of the study, and the order was randomized across participants. The SC-IAT and the IRAP were implemented using Inquisit 4 by Millisecond Software (2014).

For the SC-IAT the following stimulus words (in German) represented the attribute category *natural* (nature, primal, genuine, organic, natural), and *medical* (drug, medicine, surgery, anesthesia, medical), and the object category *birth* (birth, childbirth, delivery, deliver, give birth). The ST-IAT protocol was as follows: In 10 trials, participants first responded to the attribute categories *natural* (using the E key) and *medical* (using the I key). In the following five trials, they responded to the words of the object category *birth*. In the following combined block of 80 trials, participants responded to stimuli of the categories *birth* and *natural* using the E key and to the category *medical* using the I key. The first four trials were used as training trials and not scored. In the following block of 80 trials (with four training trials), items belonging to the categories *birth* and *medical* were assigned to the E key and items belonging to the category *natural* to the I key. In the SC-IAT all words were presented in German. Incorrect responses were followed by a red X. The inter-trial interval was 150 ms. Participants with an error rate exceeding 25% were excluded, which was the case for 17 participants. For the IAT scoring the D-index was used (Greenwald et al., 2003). Trials with latencies less than 200 ms and more than 10,000 ms were treated as missing. The mean latency difference of the two combined blocks were divided by the pooled standard deviation of the corresponding latencies. Higher ST-IAT scores indicate a more natural and less medical mindset. To determine Cronbach's α, the combined blocks were each divided into two test halves, D-scores were computed and used to calculate Cronbach's α (.69 in the present study).

For the IRAP participants were instructed to either agree or disagree in response to different combinations of presented word stimuli by pressing the E key for correct (agree) and the I key for wrong (disagree). For the target stimuli I used six words representing potential positive birth associations (safe, fulfilling, harmless, beautiful, risk-free, positive) and six words representing potential negative birth associations (unsafe, frightening, dangerous, terrifying, risky, negative). The positive and negative targets were simultaneously presented with the sentence *A natural birth is* or *A medical birth is*. Hence, four trial combinations were possible: natural and positive,

medical and negative, natural and negative, and medical and positive. The IRAP consisted of six experimental blocks. In Blocks 1, 3, and 5, participants were instructed to respond with "correct" to the combination *natural* and *positive* and to the combination *medical* and *negative*. Accordingly, they were instructed to respond with "wrong" to the combination *natural* and *negative* and to the combination *medical* and *positive*. In Blocks 2, 4, and 6, participants were instructed to respond "wrong" to the combinations *natural* and *positive* and to the combination *medical* and *negative*. For the combinations *natural* and *negative*, and *medical* and *positive* they were asked to answer "correct". The combined blocks contained 28 trials (Block 1 and 2) or 24 trials (Blocks 3 to 6). Incorrect responses were followed by a red X and had to be corrected in order to continue. The inter-trial interval was 400 ms. Trials with latencies lower than 200 ms and larger than 10,000 ms were deleted. Participants with an error rate exceeding 10% were excluded, which was the case for 13 participants. For the IRAP scoring the d-IRAP score proposed by Barnes-Holmes et al. (2009) was used: mean latencies were calculated for the four trial types separately for each block. Then the mean latencies of natural-compatible blocks were subtracted from mean latencies of medical-compatible blocks, standardized by the pooled *SD*. This procedure yielded 12 difference scores, which can be averaged into an overall d-IRAP, with higher scores indicating a more natural and less medical mindset. To determine Cronbach's α, block pairs were generated from Block 1 and 2, Block 3 and 4, and Block 5 and 6; those pairs were then used for the reliability analyses. Cronbach's α for the present study was .36, thus insufficient.

Personality traits

The personality traits neuroticism, extraversion, trait anxiety, self-efficacy, self-esteem, and regulatory focus were assessed. For neuroticism and extraversion, the German short-form version of the Big Five Inventory (BFI; Rammstedt & John, 2005) was used. Both subscales consist of four items. Cronbach's α was .79 for neuroticism and .85 for extraversion. Trait anxiety was assessed with the trait subscale of the German version of the State-Trait Anxiety Inventory (STAI; Laux et al., 1981), and Cronbach's α was .89. General self-efficacy was measured with 10 items developed by Schwarzer and Jerusalem (1999), and Cronbach's α was .91. Self-esteem was assessed with the German version of the Rosenberg self-esteem scale (Ferring & Filipp, 1996), and the internal consistency of the 10 items was α = .94. The same response format was used for all questionnaires (a six-point Likert scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*). The participants' regulatory focus was assessed using the Regulatory Focus Pride Questionnaire (RFQ; Higgins et al., 2001). A German version of the RFQ did not exist, so research colleagues and I translated the scale. The subscale *promotion focus* comprises six items

(Cronbach's α = .61), and the subscale *prevention focus* five items (Cronbach's α = .76). The items were answered on a five-point frequency scale ranging from 1 = *never or seldom* to 5 = *very often*.

Birth variables

In order to investigate a possible relationship between the birth-related mindset, labor and birth, the following aspects of the birthing process were assessed: duration of birth (in hours), use of an epidural (no, yes), birth mode (vaginal delivery, assisted vaginal delivery, C-section), location of birth (hospital, birthing center, homebirth), support during pregnancy (obstetrician, midwife), and support during birth (freelancing midwife, hospital midwife). The variables that contained more than two nominal response categories (e.g., birth mode) were effect coded.

Control variables

I assessed (1) the age of the mother and (2) the baby's birth weight as potential risk factors (e.g., Gemeinsamer Bundesausschuss, 2016). In order to gain insight into possible memory effects, I also controlled for (3) the baby's age at the time of data collection.

Procedure

The study was conducted online. In the beginning, participants were informed that their participation was voluntary, anonymous, and that it was possible to end participation at any time. Participants were first presented with demographic questions, second either a SC-IAT or the IRAP (randomized), then questionnaires measuring general personality traits, and next the more specific questions measuring the birth-related mindset. Participants then completed the second indirect measure (SC-IAT or IRAP). Finally, participants answered questions regarding labor and birth outcomes. The rather objective aspects of birth were queried last to reduce any possible influence on the mindset measures.

RESULTS AND DISCUSSION

Mindset and Birth Questionnaire

One aim of Study 1 was the development of a questionnaire to economically assess the birth-related mindset. The item reduction and selection of the 30 generated items was conducted in three steps. First, a principal axis factoring with oblimin rotation over all 30 items was performed. Second, corrected item-total correlations were taken into account. Third, it was required that items fit the content of the scale. Items were removed from the subscale when the corrected

Table 1

Rotated factor matrix for explorative principal axis factoring for the Mindset and Birth Questionnaire (MBQ) in Study 1

Scale/ item	R_{it-i}	O'^2	Factor loadings			
			I	II	III	IV
Trust in midwives (α = .87)		29.62				
Midwives that perform a delivery without a doctor overestimate their competences. (r)	.72		.84	-.04	-.04	.04
Midwives should always get the help of a doctor during the delivery of a baby. (r)	.71		.74	.12	-.15	-.06
Even if labor and birth go normally, mother and baby are safest with a doctor attending the process. (r)	.75		.72	.14	.15	-.00
Women should take an obstetrician's/gynecologist's advice more seriously than the advice of a midwife. (r)	.67		.70	-.03	.05	-.10
If labor and birth proceed normally, mother and baby are best placed in the hands of a midwife.	.66		.66	-.08	.17	-.06
Low birth-related shame and disgust sensitivity (α = .82)		11.96				
It is humiliating that women excrete urine and feces while giving birth. (r)	.69		-.02	.78	-.08	-.07
Labor and birth are disgusting. (r)	.69		.04	.75	.01	-.00
For women labor and birth are embarrassing in many respects. (r)	.63		-.08	.73	.01	-.11
It is not surprising that attending persons (e.g., partners) may experience labor and birth as disgusting since it is a bloody and filthy issue. (r)	.63		.10	.70	.13	.14
Positive view of vaginal birth (α = .77)		8.03				
Having a vaginal birth is a more empowering experience than delivering by C-section.[1]	.68		-.04	.12	.87	.10
For the baby it makes no difference if it's delivered by C-section or vaginal birth. (r)	.51		.05	.02	.61	.03
A C-section has numerous advantages over a vaginal birth. (r)	.52		.20	.01	.58	.00
Women who deliver their baby by C-section miss an important life experience. [1]	.55		-.10	.00	.53	-.31
Even if labor and birth take several hours and are very painful a vaginal delivery is worth it.	.43		-.02	-.12	.47	-.20
Negative view of drug support (α = .83)		6.03				
Women should aim to give birth without pain relievers.	.76		.06	-.05	.02	-.87
It is better to deliver without pain relievers.	.69		-.04	-.02	.10	-.76
The development of epidural analgesia was one of the biggest achievements in obstetrics. (r)	.63		.09	.17	-.02	-.62
It is ridiculous trying to give birth without pain relievers. (r)	.57		.27	.07	-.00	-.50
Overall score (α = .87)						

Note. N = 117. R_{it-i} = Corrected Item-Total-Correlation. O'^2 = explained variance in percent. Extraction method: PAF (Principal Axis Factoring). Rotation: Oblimin with Kaiser Normalization. Reliability (Cronbach's α) in brackets. Items that have to be recoded are marked with (r). [1]Item source: Klein et al. (2009). In the original questionnaire items were presented in German.

item-total correlations were lower than .40, factor double loadings were larger than |.40|, or when items had a low fit of content, e.g., because they were generated for another scale. The scree plot of the principal axis factor analyses suggested the extraction of four factors. They explained 29.62%, 11.96%, 8.03%, and 6.03% of the variance, and could be interpreted as trust in midwives (5 items, α = .87), low birth-related shame and disgust sensitivity (4 items, α = .82), positive view of vaginal birth (5 items, α = .77), and negative view of drug support (4 items, α = .83). Cronbach's α of the overall scale was .87 (using all 18 items). The four subscales constitute the Mindset and Birth Questionnaire (MBQ) that was used in all further analyses (see Table 1). For all scales, high scores indicate a more natural and less medical mindset (this coding is arbitrary). For the construct of birth-related shame and disgust sensitivity, high scores indicate lower birth-related shame and disgust sensitivity, and hence a more natural and less medical mindset. In Table 1, all recoded items are marked with (r).

Descriptive statistics, convergent and discriminant validity

Descriptive statistics, intercorrelations, and reliabilities of all measures are presented in Table 2. The overall score on the MBQ (mean of all 18 items) was highly correlated with all its subfactors. Except for the anxiety-related variables correlations between the MBQ and the questionnaires unrelated to birth were zero or small. The overall MBQ score did not significantly correlate with results from the SC-IAT or the IRAP.

Criterion validity

To test the criterion validity of the MBQ, the prediction of birth variables was calculated using AUCs for dichotomous variables. Consulting midwives for the routine check-ups during pregnancy, hiring a freelancing midwife for one-on-one support during birth, and out-of-hospital birth settings (*AUC*s ≥ .73) were significantly associated with higher scores on the MBQ, or a more natural mindset. Having an epidural and C-section were associated with a more medical mindset (*AUC*s ≤ .36, for C-section $p < .05$). All reported AUCs showed large effects (Babchishin & Helmus, 2016). There were no significant associations between MBQ and the birth variables assisted vaginal delivery, and the birth duration. All results are shown in Table 3.

Table 2

Descriptive statistics and zero-order correlations of the used measures in Study 1

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Overall score			(.87)	.78**	.80**	.55**	.66**	.12	.07	.09	.11	-.23*	-.14	-.03	.12	-.01
2. Midwives				(.87)	.48**	.32**	.32**	.02	.02	.10	.13	-.19*	-.13	.02	.15	-.12
3. Drug					(.83)	.21**	.46**	.00	.03	-.11	-.11	-.08	-.01	-.10	-.06	-.00
4. Shame & Disgust						(.83)	.12	.14	.02	.16	.19*	-.34**	-.26**	.10	.15	.14
5. Vaginal							(.77)	.23*	.14	.16	.16	-.08	-.04	.10	.13	-.03
6. SC-IAT								(.69)	.14	-.01	.04	.02	.02	.02	-.09	-.11
7. IRAP									(.36)	-.04	-.09	.04	.08	-.03	-.06	.08
8. Self-efficacy										(.91)	.94**	-.58**	-.61**	.35**	.56**	-.01
9. Self-esteem											(.95)	-.59**	-.60**	.31**	.51**	-.11
10. Trait anxiety												(.89)	.77**	-.18*	-.44**	-.15
11. Neuroticism													(.79)	-.30**	-.38**	-.07
12. Extraversion														(.85)	.17	-.17
13. Promotion focus															(.61)	.08
14. Prevention focus																(.76)
Age mother	29.32	3.92	-.06	-.07	-.08	.14	-.15	.03	-.18	.03	.09	-.10	-.13	-.07	.04	.17
Baby's birth weight (in gram)	3410	445.98	.07	-.02	.14	.09	-.03	-.19	-.16	-.02	-.01	-.07	-.14	-.01	.06	.11
Age child (in month)	11.81	5.77	-.20*	-.29**	-.10	-.21*	.07	-.04	.10	-.20*	-.21*	.23*	.17	-.04	-.15	.11

Note. $N = 117$, except SC-IAT: $n = 100$, IRAP: $n = 104$. $^{**}p$-value < 0.01. $^{*}p$-value < 0.05. Variable labels: Midwives = trust in midwives. Drug = negative view of drug support. Shame & Disgust = low birth-related shame and disgust sensitivity. Vaginal = positive view of vaginal birth. Efficacy = self-efficacy. Esteem = self-esteem. Reliability (Cronbach's α) in brackets.

Table 3

AUCs and partial correlations for/ between the birth variables and the MBQ, SC-IAT, IRAP, self-efficacy, self-esteem, trait anxiety, neuroticism, extraversion, promotion focus, prevention focus, and the control variables in Study 1

	MBQ				Indirect measures			Traits						Control variables		
	Overall	Mid	Drug	S&D	Vag	SC-IAT	IRAP	Eff	Est	Anx	N	E	Pro f	Pre f	Age	Weight	Date
	(.87)	(.87)	(.83)	(.82)	(.77)	(.69)	(.36)	(.91)	(.95)	(.89)	(.79)	(.85)	(.61)	(.77)			
Check-ups midwife	.86**	.79**	.83**	.68	.72*	.57	.51	.49	.48	.47	.50	.51	.44	.49	.39	.68	.37*
Check-ups in alternation	.66*	.68**	.59	.53	.61	.43	.49	.47	.49	.44	.46	.48	.50	.51	.58	.54	.48
1:1 support	.73**	.70**	.75**	.57	.62	.41	.58	.41	.43	.46	.52	.46	.33*	.51	.59	.54	.34*
Duration[r]	-.00	.15	-.12	.08	-.11	.10	-.02	.10	.08	-.08	.00	.04	.25**	-.11	-.08	-.09	-.07
Epidural	.24**	.33**	.19**	.45	.38*	.51	.45	.53	.55	.53	.51	.54	.54	.39*	.48	.46	.55
Out-of-hospital birth	.91**	.85**	.89**	.74*	.72*	.29*	.55	.44	.40	.54	.55	.51	.40	.63	.43	.66	.41
C-section	.36*	.35*	.42	.45	.37	.44	.34*	.37	.40	.58	.64	.34*	.47	.42	.49	.60	.43
Assisted vaginal delivery	.46	.44	.42	.56	.45	.57	.42	.42	.45	.52	.49	.42	.47	.51	.60	.59	.44

Note. N = 117, except for SC-IAT: n = 100, IRAP: n = 104, and assisted vaginal delivery: n = 97. **p-value < 0.01. *p-value < 0.05. Higher scores of the explicit birth-related mindset indicate a natural mindset. [r] Correlation coefficient, all other variables are AUCs. Variable labels: Mid = trust in midwives. Drug = negative view of drug support. S&D = low birth-related shame and disgust sensitivity. Vag = positive view of vaginal birth. Eff = self-efficacy. Est = self-esteem. Anx: trait anxiety. N = neuroticism. E = extraversion. Pro f = promotion focus. Pre f = prevention focus. Age = mother's age at birth. Weight = baby's weight at birth. Date = time of data collection. Check-ups in alternation = check-ups were performed alternately by obstetricians and midwives. Cronbach's α in brackets.

SC-IAT and IRAP

Results on the SC-IAT were significantly ($p < .05$) associated with out-of-hospital birth settings (*AUC* = .30) and results on the IRAP were significantly associated with having a C-section (*AUC* = .34). Thus, women who gave birth out-of-hospital were more likely to have higher scores in the SC-IAT (a more natural mindset) and women with vaginal births were more likely to have higher scores in the IRAP (a more natural mindset). No other significant AUCs were found (see Table 3).

Personality traits

AUCs indicated significant relationships between birth variables and only four trait variables. Extraversion was associated with a lower probably of having a C-section (*AUC* = .34, $p < .05$), prevention focus with having an epidural (*AUC* = .39, $p < .05$), and promotion focus was associated with a lower probability of one-on-one support during labor and birth (*AUC* = .33, $p < .05$). Promotion focus correlated positively with birth duration, such that women higher in promotion focus reported longer births ($r = .25$; see Table 3 for all results).

Control variables

Only two control variables showed significant associations ($p < .05$) with birth variables. The more time had passed since the birth (or the older the child was when the mother participated in the study), the lower the probability that the participant had seen midwives for routine prenatal care (*AUC* = .37) and the lower the probability that the participant had hired a freelancing midwife for one-on-one support during birth (*AUC* = .34; see Table 3).

Incremental validity

To test whether the birth-related mindset (directly and indirectly measured) had incremental validity over the control variables and personality traits in predicting birth-related variables, logistic regression analyses were conducted. As already described above, first the control variables, second the traits, third the MBQ, fourth the SC-IAT, and in a final fifth step the IRAP were entered into the regression models. Overall, the results suggest that for all variables except assisted vaginal delivery and birth duration the MBQ resulted in a significant ΔNR^2 over the traits and control variables ($6.8 \leq \Delta NR^2 \leq 36.2$). The SC-IAT only showed a significant increase in $\Delta(N)R^2$ for one-to-one support during labor and birth and the IRAP for none of the birth variables. For all results see Table 4.

Table 4

Logistic and linear multiple regression analyses for testing incremental validity of the control variables, personality traits, and birth-related mindsets (direct and indirect measures) in Study 1

Birth variable	Freq. of categories	Control variables	Traits		MBQ		SC-IAT		IRAP	
		$NR(1)^2$	$NR(2)^2$	$\Delta NR(2)^2$	$NR(3)^2$	$\Delta NR(3)^2$	$NR(4)^2$	$\Delta NR(4)^2$	$NR(5)^2$	$\Delta NR(5)^2$
						in percent				
Check-ups midwife	7:86	27.3*	41.4	14.1	58.3**	16.9**	59.2**	0.9	61.2**	2.0
Check-ups in alternation	27:66	1.9	11.7	9.8	19.6	7.9*	23.5	3.9	23.6	0.1
1:1 support	21:71	0.9	31.4*	30.5*	46.5**	15.1**	54.3**	7.8**	55.2**	0.9
Epidural	45:48	1.4	9.1	7.7	31.2*	22.1**	32.0*	0.8	33.5*	1.5
Out-of-hospital birth	9:84	8.0	21.3	13.3	57.7**	36.4**	63.8**	6.1	67.4**	3.6
C-section	17:76	12.1	27.5	15.4	36.4*	8.9*	36.6*	0.2	40.3*	3.7
Assisted vag. delivery	14:62	2.5	21.5	19.0	22.6	1.1	24.3	1.7	27.3	3.0
	n	$R(1)^2$	$R(2)^2$	$\Delta R(2)^2$	$R(3)^2$	$\Delta R(3)^2$	$R(4)^2$	$\Delta R(4)^2$	$R(5)^2$	$\Delta R(5)^2$
						in percent				
Duration[1]	94	3.2	15.2	12.0	16.2	1.0	16.6	.03	16.6	0.1

Note. **p-value < 0.01. *p-value < 0.05. Formula for calculating ΔNR^2: $\Delta NR(y)^2 = [NR(y)^2 - NR(x)^2]$.

SUMMARY

The results of the first validation study provide initial evidence suggesting that the MBQ is a theoretically valid and psychometrically sound measure. The intercorrelations of the MBQ subscales provide evidence for convergent validity, and the weaker correlations between the MBQ and the scales for assessing personality traits provide evidence for discriminant validity. The MBQ correlated meaningfully with the birth variables (criterion validity) and showed incremental validity over and above the assessed personality traits. However, the indirect measures showed very little incremental validity over the MBQ. Their reliabilities were also not sufficient. I therefore consider the used indirect measures to be less suitable than the MBQ for measuring the birth-related mindset. However, since Study 1 was an initial and exploratory investigation that focused on the development of the MBQ (and the indirect measures), replication and expansion of the findings is warranted to determine whether findings are robust.

In the interest of brevity and low participant burden, I did not investigate all personality variables in the second study. Though there were significant AUCs for the variables extraversion and promotion focus, I did not include these two variables in the following studies, because I originally calculated correlations (they were conducted and first analyzed before the publication of Babchishin & Helmus, 2016) and the correlations were not significant.

STUDY 2

The primary purpose of Study 2 was to utilize the newly developed MBQ with a new sample of mothers. In particular, a goal of Study 2 was to recruit a sample that was more diverse with respect to several variables of interest so that I could test whether results from Study 1 could be replicated. For example, in the previous study the majority of mothers had birthed in hospitals. In Study 2, mothers who had birthed outside of hospitals were specifically recruited. In addition, women who had given birth more than once and women who had had known prenatal risk factors were also included.

An additional purpose of Study 2 was to expand on previous findings. Additional external criteria were assessed (e.g., cervical dilation in centimeters at the time of the initial examination at the hospital) and 10 questions addressing the mother's appraisal of her subjective birth experience (evaluation of the birth) were included to test the hypotheses that the process of birth differently impacts the birth experience. In particular, based on previous research C-sections are expected

to be related to a more negative birth experience on average (e.g., DiMatteo et al., 1996). I also wanted to test whether this relationship, if replicated, would be moderated by the birth-related mindset. Since the indirect assessment methods used in Study 1 showed almost no significant AUCs and accounted for little incremental variance with respect to the MBQ, I developed a new SC-IAT task (using five SC-IATs) as indirect measures for this study.

METHOD

Participants

In the second online study 206 women (mean age = 31.2 years, *SD* = 4.69) took part. As in Study 1, participants were either recruited through direct contact (toddler groups) or online, e.g., via Facebook. In order to address women with out-of-hospital births, I recruited in online groups that explicitly dealt with this topic. The age of the children ranged from several days to five years (*M* = 16.88 months, *SD* = 11.73). Except for two women, all participants had given birth in Germany. All analyses were conducted with and without those two participants. Results did not differ substantially, so the two participants were retained for the study. As intended, the out-of-hospital rate was relatively high: 14.6% of the women had given birth in a midwife-led birthing center, 25.2% had given birth at home, and the remaining 60.2% had delivered in a hospital. The vaginal birth rate was 75.2%, 6.8% of the women had an assisted vaginal birth, and 18% had given birth by C-section. Almost half of the participants (45.6%) had a prenatal risk or a premature (< 37 weeks) or late (> 43 weeks) delivery. The most frequent prenatal risks were obesity (14.1%), premature labor or incompetent cervix (9.7%), and previous surgery on the uterus (9.7%). The previous C-section rate was 7.3%. A total of 23.3% of the participants had an epidural and 49% had one-on-one support from a midwife during labor and birth.

Measures

Similar to Study 1, birth-related mindset, self-efficacy, and neuroticism were assessed. In order to shorten the test-battery, self-esteem, extraversion, trait anxiety, and regulatory focus were not assessed and the SC-IAT and IRAP from Study 2 were replaced by five newly developed SC-IATs.

SC-IATs

Participants were instructed to complete five SC-IATs in which different birth-related attributes were presented together with neutral attributes. The basic idea was adapted from a study by

Thush and Wiers (2007) measuring alcohol-related cognitions. I reasoned that persons might hold ambivalent birth-related mindset parts, e.g., birth could be considered natural but at the same time frightening. Therefore, I wanted the attributes not to contradict but rather to complement each other. Hence, the birth-related attributes were always paired with the category *neutral*. In doing so, the birth-related concepts *positive*, *natural*, *medical*, *frightening*, and *embarrassing* were paired with words representing the concept *neutral*. Those attributes had to be combined with the target concept *birth*. All words used can be found in Table 5. In the study they were presented in German. Participants either began in the order described above (starting with the positive SC-IAT) or in the reverse order (starting with embarrassing SC-IAT). Each SC-IAT consisted of four blocks. In the first and third blocks (with reversed key combination), participants learned to discriminate between the different attributes with 10 trials each. Block 2 and Block 4 were the critical blocks in which the attributes of the birth-related and neutral concepts were paired with the target concept *birth* (4 practice trials and 76 test trials each). The same ST-IAT protocol was used as in Study 1. The cutoff for exclusion due to error rates was again set at 25%, but no participants reached this error rate. Reliabilities varied between .40 and .70 (see Table 6). For the positive and natural SC-IATs higher scores indicate a more natural and less medical mindset compared to neutral and for the medical, frightening, and embarrassing SC-IATs higher scores indicate a more medical mindset compared to neutral.

Birth variables

All items used in Study 1 were retained for Study 2. Two items were added: cervical dilation in centimeters at the time of the initial examination at the hospital and the amount of pain experienced during labor and birth on a 10-point Likert scale ranging from 1 = *no pain* to 10 = *extreme pain*.

Table 5

Schematic representation of the procedures and items (attributes, target) of the SC- IATs used in Study 2

	Attributes		Block 1	Block 2	Block 3	Block 4
Positive SC-IAT	Positive positive, good, valuable, love, peace	Neutral neutral, literal, notebook, box, room	positive—neutral	birth positive—neutral	neutral—positive	birth neutral—positive
Natural SC-IAT	Natural natural, natur, primal, genuine, organic	Neutral neutral, magnifier, square, document, shop	natural—neutral	birth natural —neutral	neutral— natural	birth neutral— natural
Medical SC-IAT	Medical medical, drug, medicine, surgery, anesthesia	Neutral neutral, course, center, address, sample	medical—neutral	birth medical —neutral	neutral— medical	birth neutral— medical
Frightening SC-IAT	Frightening frightening, risky, anxiety, danger, threat	Neutral neutral, number, mug, material, table	frightening—neutral	birth frightening—neutral	neutral—frightening	birth neutral—frightening
Embarrassing SC-IAT	Embarrassing embarrassing, degrading, awkward, humiliation, shame	Neutral neutral, additional, examples, carpet, pitch	awkward—neutral	birth awkward—neutral	neutral—awkward	birth neutral—awkward
Target: Birth birth, childbirth, delivery, deliver, give birth						

Birth experience

The birth experience was assessed with 10 items (originally 11 items, see below) constructed by the author to measure general satisfaction with the birth experience. Although there are some existing instruments for measuring the birth experience (e.g., Childbirth Experience Questionnaire: Dencker et al., 2010; The Wijma Delivery Expectancy/Experience Questionnaire version B: Wijma et al., 1998; Salmon's Item List: Salmon & Drew, 1992), I decided to develop a new questionnaire that would be brief, assess the construct of birth experience one-dimensionally (without subfactors or facets), and that would be evaluative. The items of the questionnaire, shown in Table 9, were constructed according to face validity. The answer scale was a six-point Likert scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*.

Control variables

Mother's age, baby's birth weight, baby's age at the time of data collection, and the woman's prenatal risk were treated as control variables. The questions for measuring prenatal risk were based on the German maternity guidelines. They included, amongst other things, previous C-sections, preterm birth, fetal malposition, and health status of the mother. Participants answered the questions with *yes* or *no* to indicate presence or absence of the risk factor. If one or more risks were present, the variable risk was calculated for the participant.

Procedure

Participants first gave informed consent to participate in the online study and answered demographic questions. They then completed the SC-IATs, the MBQ, the self-efficacy scale, the neuroticism scale, questions for measuring birth characteristics, the prenatal risk assessment, and the birth experience questionnaire. The participants completed the SC-IATs before the questionnaires because we assumed that the indirect measure would have less influence on the direct measures than the reverse. I chose to present the birth experience questionnaire last in order to have mothers complete the questionnaire after the experience was (at least potentially) emotionally activated through the previous questions about the process and outcomes of the birth.

Table 6

Descriptive statistics and zero-order correlations of control variables and measures in Study 2

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Overall score			(.89)	.70**	.87**	.61**	.78**	.21**	.23**	-.11	-.07	-.05	-.00	-.03	.20**
2. Midwives				(.85)	.56**	.23**	.34**	.16*	.19**	-.05	-.09	.11	.08	-.10	-.17*
3. Drug					(.85)	.29**	.62**	.19**	.16*	-.14*	-.08	-.06	-.01	.02	.14*
4. Shame & Disgust						(.81)	.34**	.12	.10	-.05	-.09	-.11	-.01	-..09	-.20**
5. Vaginal							(.84)	.16*	.23**	-.07	.06	-.08	-.06	.05	.09
6. Positive SC-IAT								(.70)	.30**	-.02	.01	-.04	-.06	.06	.12
7. Natural SC-IAT									(.60)	.03	.15*	.17*	-.09	.03	.15*
8. Medical SC-IAT										(.40)	.19**	.26**	.08	-.04	.06
9. Frightening SC-IAT											(.59)	.26**	.02	-.02	.04
10. Embarrassing SC-IAT												(.64)	.08	.01	.11
11. Self-efficacy													(.92)	-.59**	.27**
12. Neuroticism														(.82)	-.18*
13. Experience															(.95)
Age of mother	29.9	4.33	-.22**	-.07	-.24**	-.07	-.25**	-.09	-.12	.09	.00	.09	.04	-.10	.08
Baby's birth weight (in gram)	3470	532	.20**	.22**	.18*	.09	.13	-.05	.06	-.11	.07	-.07	.02	.06	.21**
Risk[1]	-	-	-.17*	-.17*	-.13	-.08	-.12	-.02	-.01	.07	-.01	-.04	.00	.07	-.24**
Age of child (in months)	16.9	11.73	.03	-.03	.08	-.01	.01	-.17*	.01	-.16*	-.04	-.04	-.11	.03	-.11

Note. $N = 206$. $^{**}p$ – value < 0.01. $^{*}p$ – value < 0.05. [1]Higher values indicate risk. Variable labels: Midwives = trust in midwives. Drug = negative view of drug support. Shame & Disgust = low birth-related shame and disgust sensitivity. Vaginal = positive view of vaginal birth. Experience = subjective appraisal of the birth experience. Reliabilities (Cronbach's α) in brackets.

Table 7

Model fit indices for cross validation confirmatory factor analysis (Study 2)

Model	χ^2	df	χ^2 / df	RMSEA	CI_{RMSEA} (90%)	SRMR	AIC	CFI	TLI/NNFI
1: One factor	934.84**	135	6.92	.170	[.159; .180]	.129	10518.32	.57	.52
2: Four factors correlated	272.14**	129	2.11	.073	[.061; .086]	.077	9867.62	.92	.91
3: Second-order factor	280.78**	131	2.14	.075	[.062; .087]	.083	9872.26	.92	.91

Note. $N = 206$. $^{**}p < .001$. RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean Square Residual, AIC = Akaike Information Criterion, CFI = incremental fit indices, TLI/ NNFI = Tucker-Lewis index.

RESULTS AND DISCUSSION

Descriptive statistics and intercorrelations

Descriptive statistics, intercorrelations, and reliabilities of the measures are presented in Table 6. The intercorrelations of the overall score with its subfactors were similar to those in Study 1. The overall score correlated with the positive and natural SC-IAT, as well as with birth experience. It did not correlate with self-efficacy or neuroticism.

Mindset and Birth Questionnaire

Internal consistencies of the overall scale and subscales of the MBQ were satisfactory ($.81 \leq \alpha \leq .89$; see Table 6). In order to test the robustness of the four-factor structure of the MBQ obtained in Study 1, a confirmatory factor analysis (CFA) was conducted. Due to the existing inter-correlations between the MBQ and its subscales, the fit of (1) a one-factor model, (2) a four-factor solution with correlated factors, and (3) a four-factor model with a second-order factor were tested.

The CFA showed a significant χ^2 for all tested models. Due to limitations that occur by using χ^2 as a criterion (Schermelleh-Engel, Moosbrugger, & Muller, 2003), descriptive coefficients were also taken into account. Both Model 2 (four factors correlated) and 3 (second-order factor) showed acceptable RMSEA and SRMR values (< .10) and comparable Akaike Information Criterion

(AIC), incremental fit indices (CFI), and Tucker-Lewis (TLI) values. Thus, both models showed an adequate model fit (see Table 7). For Model 2 the factor loadings of the subscale *trust in midwives* ranged from .57 to .85, for *negative drug support* from .62 to .92, for *birth-related shame and disgust sensitivity* from .63 to .81, and for *positive view of vaginal birth* from .66 to .88. For Model 3 the factor loadings for *trust in midwives* ranged from .57 to .85, for *negative drug support* from .62 to .92, for *birth-related shame and disgust sensitivity* from .62 to .81, and for *positive view of vaginal birth* from .66 to .88. Thus, similar factor loadings emerged for both models, with all $p < .001$. In summary, the results confirm the factor structure of the MBQ found in Study 1.

AUCs and correlations with birth characteristics

As predicted, the MBQ was associated with decisions made before birth and with birth variables, replicating the results of Study 1. All results are presented in Table 8. The reported results in the text refer to the overall score. Again, the midwifery-related variables and out-of-hospital birth settings (AUCs ≥ .75) were associated with a more natural mindset as assessed on the MBQ. Epidurals (*AUC* = .22) and C-sections (*AUC* = .29) were associated with a more medical mindset. Furthermore, a positive correlation between the birth-related mindset and cervical dilation occurred ($r = .38$; meaning women who tended to be more dilated when they were initially examined by a medical professional when giving birth had higher scores on the MBQ) and, again, duration of labor and birth did not correlate with the overall score on the MBQ. The AUC for the variable assisted vaginal delivery did not reach significance for the overall score but for the subscale trust in midwives (*AUC* = .30, $p < .05$). The pain rating also was not significantly correlated with scores on the MBQ. The reported AUCs represent almost all large effects (Babchishin & Helmus, 2016).

SC-IATS

The positive SC-IAT and the natural SC-IAT were expected to be positively related to variables that measure the natural aspect of birth and negatively related to variables that measure the medical aspect of birth. For the medical, frightening, and embarrassing SC-IATs I expected reverse associations. Except for an association between the frightening SC-IAT and assisted vaginal delivery, the expectations were confirmed by the results. The positive SC-IAT showed the most significant relationships with three significant AUCs and also a significant correlation with birth duration ($r = -.14$, $p < .05$). The embarrassing SC-IAT did not yield significant AUCs. All results are presented in Table 8.

Table 8

AUCs and partial and zero order correlations for / between the external criteria measuring decisions made before birth and birth variables with the birth-related mindset (MBQ and SC-IATs), the subjective appraisal of the birth experience, self-efficacy, neuroticism, and prenatal risk in Study 2

	MBQ					SC-IATs				Traits		Exp	Control variables			
	Overall	Mid	Drug	S&D	Vag	Pos	Nat	Med	Fri	Emb	Efficacy	N		Age	Weight	Risk	Date
	(.89)	(.85)	(.85)	(.81)	(.84)	(.70)	(.60)	(.40)	(.59)	(.64)	(.92)	(.82)	(.95)				
Check-ups midwife	.82**	.80**	.77**	.63**	.68**	.59*	.56	.39**	.45	.44	.53	.51	-	.37**	.60*	.43	.50
Check-ups in alternation	.50	.51	.51	.51	.53	.50	.54	.52	.50	.53	.54	.49	-	.58	.49	.51	.53
1:1 support	.75**	.76**	.71**	.59*	.63**	.54	.53	.44	.47	.49	.59*	.47	.75**	.45	.59*	.40*	.51
Cervical dilation[r]	.38**	.28**	.38**	.17*	.28**	.07	-.05	.02	.01	-.00	.01	.02	.40**	-.07	.17*	-.22**	-.05
Duration[r]	-.05	-.01	-.03	-.14*	.04	-.14*	-.09	-.06	.01	-.03	-.06	-.04	-.35**	-.10	.06	-.04	.06
Pain rating[r]	.14	.16*	.11	-.01	.17*	-.08	-.05	.02	-.08	-.04	.10	-.05	.03	-.06	.16*	-.12	.06
Epidural	.22**	.28**	.20**	.43	.34**	.38**	.42	.55	.51	.45	.50	.48	.23**	.56	.48	.61*	.47
Out-of-hospital-birth	.82**	.82**	.79**	.61**	.67**	.58*	.54	.42*	.46	.51	.53	.52	.81**	.45	.64**	.36**	.52
C-section	.29**	.33**	.29**	.38*	.39*	.43	.37*	.48	.54	.47	.44	.55	.15**	.54	.40	.71**	.52
Assisted vaginal delivery	.38	.30*	.40	.57	.43	.45	.41	.42	.27**	.40	.36	.59	.22**	.57	.62	.52	.44

Note. $N = 206$. Except for cervical dilation: $n = 155$ and assisted vaginal delivery: $n = 169$. **p-value < 0.01. *p-value < 0.05. Higher scores of the mindset indicate a natural mindset. [r] Correlation coefficient, all other variables are AUCs. Variable labels: Mid = trust in midwives. Drug = negative view of drug support. S&D = low birth-related shame and disgust sensitivity. Vaginal = positive view of vaginal birth. Pos = positive SC-IAT. Nat = natural SC-IAT. Med = medical SC-IAT. Fri = frightening SC-IAT. Emb = embarrassing SC-IAT. Efficacy = self-efficacy. N = Neuroticism. Exp = subjective appraisal of the birth experience. Age = mother's age at birth. Weight = baby's weight at birth. Date = time of data collection. Check-ups in alternation = check-ups were performed alternately by obstetricians and midwives. Reliabilities (Cronbach's α) in brackets.

Table 9

Rotated factor matrix for explorative principal axis factoring for the birth experience questionnaire in Study 2

Cronbach's α = .95			
Items	R_{it-i}	O'^2	Factor loadings
		65.73	
All in all, the birth of my child was a beautiful experience.	.86		.88
I would wish for another birth like this.	.84		.86
In retrospect, I am satisfied with my child's labor and birth.	.84		.86
I wish the birth of my child had gone differently. (r)	.83		-.85
I'm happy that my child was born, but the birth itself was a terrible experience. (r)	.81		-.84
The birth experience made me proud and strong.	.80		.83
I felt safe and secure while giving birth.	.79		.81
I felt abandoned during the birth of my child. (r)	.71		-.73
I had the feeling to be patronized during the birth. (r)	.71		-.72
If I could experience the birth of my child again, I would do many things differently. (r)	.67		-.69

Note. N = 206. R_{it-i} = Corrected Item-Total Correlation. O'^2 = explained variance in percent. Extraction method: PAF (Principal Axis Factoring). Rotation: Oblimin with Kaiser Normalization. Items that have to be recoded are marked with (r). In the original questionnaire items were presented in German.

Self-efficacy and neuroticism

Self-efficacy was positively associated with one-on-one support during birth (*AUC* = .59, $p < .05$). There were no significant AUCs with neuroticism (Table 8).

Birth experience

For exploring the factor structure of the birth experience scale, I followed the same logic as in Study 1 for the MBQ. I performed a principal axis factoring with oblimin rotation over all 11 items (see Table 9). The scree plot suggested the extraction of one factor, which was in line with my intention to develop a single-factor questionnaire. In addition to the principal axis factoring, item-total correlations were taken into account. One item was removed from the scale because its item-total correlations were lower than .47 and removal of the item was not associated with decreased scale reliability (removed item: "During birth I was afraid about my child"). The first

factor explained 66% of the variance in responses to the birth experience scale, and Cronbach's α was .95. (For comparison, when all 11 items were retained, 64.84% of variance was explained and Cronbach's α was .94).

AUCs and correlations with birth characteristics

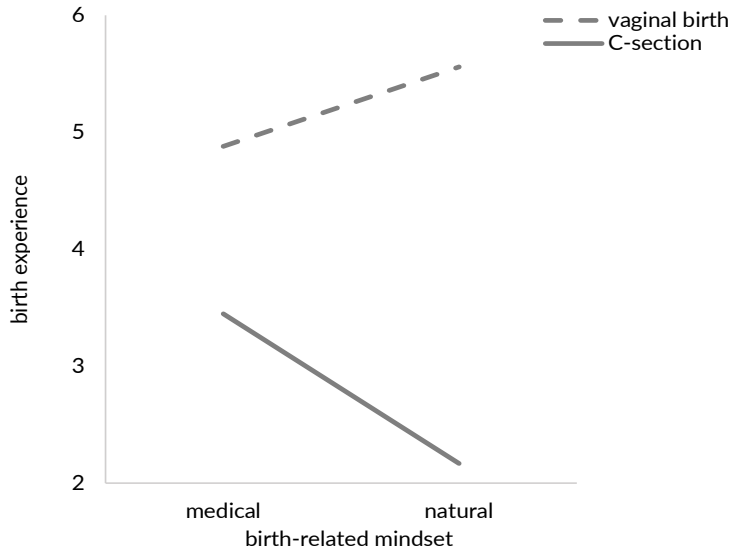
Results indicated that the birth variables (e.g., birthplace, performed interventions) were related to the birth experience as assessed by the birth experience scale. Although one-on-one support during labor and birth (*AUC* = .75) and out-of-hospital settings (*AUC* = .81) were associated with more satisfying birth experiences, an assisted vaginal delivery (*AUC* = .22, $p < .05$), a long duration of labor (r = -.35), and particularly C-sections (*AUC* = .15) were associated with more negative birth experiences. The amount of experienced pain did not correlate with ratings of birth experience and having an epidural was negatively associated with the birth experience (*AUC* = .23). It is possible that women who had an epidural had more painful or more complicated births and therefore needed the epidural, or that the epidural and its consequences were perceived more negatively than unmedicated childbirth, or both explanations could be correct. All results are presented in Table 8.

Moderation effects

To test whether the birth-related mindset (evaluated with the MBQ) moderated the relationship between the mode of birth and the birth experience (evaluated with the new questionnaire), I conducted moderation analysis using the PROCESS macro by Hayes (2017). The model (y = birth experience, x = mode of birth [-1 = vaginal birth, 1 = C-section], w = overall score of the MBQ) of variance explained due to the interaction (ΔR^2 = .11, $p < .001$). Both C-section (β = -1.21, *SE* = .10, $p < .001$) and the MBQ scores (β = .22, *SE* = .11, $p = .039$) had main effects on the birth experience. The interaction term of the two predictors was significant (β = -.67, *SE* = .11, $p < .001$). Thus, the MBQ scores moderated the relationship between having a C-section and the birth experience ratings. Conditional effects of the focal predictor were significant for low (b = -.72, *SE* = .11, $p < .001$) and high (b = -1.66, *SE* = .15, $p < .001$) values of the moderator (MBQ scores). Examination of the interaction plot (Figure 2) revealed that independent of the women's mindset orientation, a C-section was rated more negatively than a vaginal birth. However, women with a more medical mindset (less natural mindset) at the time of data collection rated a vaginal birth less positively and a C-section less negatively than women with a more natural mindset rated them. The moderation effect suggests that the evaluation of the experience of the different

Figure 2

Moderation analysis: Birth experience as a function of the birth-related mindset measured with the MBQ and the mode of birth in Study 2



birth modes interact with the mindset orientation and, thus, the evaluation of different birth modes cannot simply be classified into 'good' or 'bad'; they also depend on the individual views of the evaluator.

Control variables

In contrast to results from Study 1, in Study 2 there were some significant correlations between the control and birth variables. Although age of the mother and the time of data collection had only weak or no significant correlations with the birth variables, prenatal risk was e.g., related to the place of birth and birth mode (*AUC* = .71 for risk; see Table 8).

Incremental validity

In order to check the incremental validity of the different measures, logistic regressions were calculated. The regressions were conducted as in Study 1 but with the addition of birth experience as a predictor variable. That is, first the control variables, second the traits, third the MBQ, fourth the SC-IATs, and in a final fifth step the birth experience was added to the regression. As in Study 1, the personality traits did not result in any significant increase in ΔR^2 or ΔNR^2 over the control variables. Furthermore, the results suggest that the MBQ did not account for additional variance over the control variables and traits for the following variables: check-ups in alternation (check-ups were performed alternately by obstetricians and midwives), assisted vaginal delivery, birth duration, and the experienced amount of pain. For all other variables the MBQ showed a significant increase in ΔR^2 or ΔNR^2 ($9.7 \leq \Delta R^2$ or $\Delta NR^2 \leq 29.3$). The SC-IATS showed a significant increase in ΔNR^2 (= 15.5, $p < .05$) only for assisted vaginal delivery. The birth

Table 10

Logistic and linear multiple regression analyses for testing incremental validity of the control variables, personality traits, birth-related mindsets (MBQ and SC-IATs), and birth experience in Study 2

Birth variable	Freq. of categories	Control variables	Traits		MBQ		SC-IATs		Birth experience	
		$NR(1)^2$	$NR(2)^2$	$\Delta NR(2)^2$	$NR(3)^2$	$\Delta NR(3)^2$	$NR(4)^2$	$\Delta NR(4)^2$	$NR(5)^2$	$\Delta NR(5)^2$
						in percent				
Check-ups midwife	69:137	12.3**	13.1**	0.8	40.0**	26.8**	43.2**	3.3	-	-
Check-ups in alternation	48:158	2.6	2.9	0.3	3.9	1.0	4.6	0.7	-	-
1:1 support	101:105	8.7**	12.1**	3.3	30.3**	18.2**	31.1**	0.8	41.9**	10.8**
Epidural	48:158	5.8	6.0	0.1	27.8**	21.8**	29.9**	2.1	47.6**	17.7**
Out-of-hospital birth	82:124	15.9**	17.3**	1.4	46.8**	29.5**	48.5**	1.7	63.0**	14.5**
C-section	37:169	20.9**	21.7**	0.7	30.8**	9.1**	34.3**	3.5	58.7**	24.5**
Assisted vag. delivery	14:155	5.1	11.1	6.0	13.3	2.2	28.7	15.4*	37.3**	8.6*
	N	$R(1)^2$	$R(2)^2$	$\Delta R(2)^2$	$R(3)^2$	$\Delta R(3)^2$	$R(4)^2$	$\Delta R(4)^2$	$R(5)^2$	$\Delta R(5)^2$
						in percent				
Cervical dilation	155	8.0*	8.1*	0.1	18.6**	10.5**	20.7**	2.1	30.1**	9.4**
Duration	204	1.6	2.9	1.3	3.9	0.9	6.1	2.2	18.3**	12.2**
Pain rating	207	3.9	5.1	1.1	5.8	0.7	7.8	2.1	8.0	0.2

Note. **p-value < 0.01. *p-value < 0.05. Formula for calculating ΔNR^2: $\Delta NR(y)^2 = [NR(y)^2 - NR(x)^2]$.

experience, however, showed a significant increase in ΔR^2 or ΔNR^2 for all variables except for the pain rating ($8.5 \leq \Delta R^2$ or $\Delta NR^2 \leq 24.4$; for all results see Table 10). The results of the regression also suggest that mindset and birth experience are different constructs – even though both can result from the experiences women had during labor and birth. As with the indirect measures from the first study, the SC-IATs did not show any significant increase in ΔNR^2 over the MBQ for most of the birth variables. Therefore, I decided to develop two further indirect measures in the third study.

STUDY 3

Study 3 was conducted to explore two additional IATs for measuring the birth-related mindset. In Study 1 and Study 2, different indirect measures (SC-IATs and IRAP) were used, but none of the measures showed satisfactory psychometric quality or predictive value over the MBQ. SC-IATs were utilized in the first two studies because there is no direct opposite to the concept of birth. However, since the SC-IATs did not perform well, I used a classic double-target IAT in Study 3. Following my theory of the birth-related mindset, I used the concepts of natural and medicalized birth as object or attribute dimension. I examined two different kinds of IAT: a birth attitude IAT (natural birth—medical birth; positive—negative) and a birth self-concept/idiographic IAT (natural birth—medical birth; self—other). In addition, I assessed additional birth-related variables to retrospectively evaluate the course of pregnancy and birth in more detail.

In the previous studies the indirect measures were presented in a within-participant design. In Study 3 a between-participant design was chosen to shorten the duration of the study and to reduce the cognitive strain on the participants. Study 3 also aimed to replicate the moderation effect of the MBQ found in Study 2, as well as to replicate the factor structure of the Birth experience scale with a CFA.

METHOD

Participants

In the third study, 192 mothers (mean age = 32.57 years, *SD* = 5.97) took part. As in the first two studies, participants were recruited online or in person. The age of the children varied between zero and seven years (*M* = 17.87 months, *SD* = 15.48). Except for three women, all participants had given birth in Germany. All analyses were conducted with and without the three participants.

Results did not differ substantially with and without the participants, so the participants were not excluded from the study. In the present study, 6.7% of the women had given birth at home (1% without a midwife), 5.2% in a midwife-led birthing center, and 87.5% in a hospital. The vaginal birth rate was 69.8%, 8.3% of the women had an assisted vaginal birth, 21.9% had given birth by C-section. More than half of the participants (59.4%) had at least one prenatal risk. The most frequent prenatal risks were premature contractions or incompetent cervix (16.1%), and previous surgery on the uterus (12.5 %). The previous C-section rate was 8.9%. A total of 36.5% of the participants had an epidural and 25.5% had one-on-one support from a midwife during labor and birth.

Measures

Similar to Study 2, the birth-related mindset, neuroticism, prenatal risk, and the birth experience were assessed. From the personality variables, neuroticism was retained because in my initial correlation analyses that I conducted for the first two studies, neuroticism seemed to be the trait with the strongest potential for being related to the birth variables. Instead of the five SC-IATs used in Study 2, I used two IATs in Study 3 to explore indirect measures of the birth-related mindset.

IATs

For the birth attitude IAT I used six *positive* (positive, good, peace, happy, laughter, love) and six *negative* words (negative, bad, war, terrible, horrible, awful) for the attribute dimension and six pictures each representing the target concepts *natural birth* (e.g., a woman laboring at home) or *medicalized birth* (e.g., a woman laboring in a hospital; the stimulus materials can be obtained from the authors) for the object dimension. For the idiographic IAT the attribute dimension featured six words presenting either the self (*I*; first name, birthday, profession, hometown, hobby, favorite food) or others. As in the attribute IAT, the object dimension was composed of the 12 pictures with half representing a natural birth and half a medicalized birth. The words for the category "Others" had to been chosen out of five given options (e.g., a neutral hobby out of the options: reading, watching TV, do do-it-yourself, do handicrafts, play chess). All words were presented in German. Both IATs consisted of three training blocks (1, 2, and 4; 24 trials each) and two critical blocks (3 and 5; composed of 4 practice trials and 96 trials each). Incorrect responses were followed by a red X for 1,000 ms, but no correct response had to be given. The inter-trial interval was 250 ms. For the IAT scoring, as in Study 1 and Study 2, the D-index was used (Greenwald et al., 2003). Participants with an error rate higher than 25% were excluded (two in each IAT condition). To determine Cronbach's α for the IATs, both the compatible block and the

incompatible block were divided block-wise into two test halves that were used as items for the reliability analyses (attitude IAT α = .73; self-concept IAT α = .82). In the present study, higher IAT values indicated a more natural mindset.

Birth and control variables

For the birth variables, all items of Study 2 were used again. Additionally it was assessed which prenatal tests women had performed (amniocentesis, nuchal translucency testing), whether a birth preparation course was attended, whether an epidural was planned before labor, which interventions during labor and birth were performed (augmentation of labor, Kristeller maneuver), the amount of fear experienced during labor and birth on a 10-point Likert scale ranging from 1 = *no fear* to 10 = *extreme fear*, and the length of hospital stay. As in the first two studies, mother's age, baby's birth weight, baby's age at the time of data collection, and prenatal risk were assessed as control variables.

Procedure

Again, participants gave informed consent to participate in the online study. They then answered demographic questions, filled in the MBQ, answered pregnancy-related questions and questions measuring the prenatal risk, reported birth characteristics, and completed the scale assessing birth experience. Next, they completed one of the (randomly assigned) IATs. The study ended with the neuroticism scale. In Study 3 the IATs were placed near the end of the study to use the processing of the MBQ items and the birth-related external criteria to activate the implicit birth-related mindset to maximize the validity of the IATs (see Perugini & Prestwich, 2007).

RESULTS AND DISCUSSION

Between-participant design

A total of 102 participants were randomly assigned to the birth self-concept IAT condition and 90 to the birth attitude IAT condition. The difference in sample size resulted from the random allocation and dropouts during the data collection. The two groups did not differ in relevant demographic or birth-related variables ($F < 3.1$) with the exception of the variable risk ($F = 6.31$, $p = .01$), which was controlled for in the regression analyses. In the birth self-concept IAT condition more women had a prenatal risk ($n = 69$; attitude IAT: $n = 45$).

Table 11

Descriptive statistics and zero-order correlations of control variables and measures in Study 3

	M	*SD*	1	2	3	4	5	6	7	8	9
1. Overall score			(.87)	.71**	.80**	.59**	.76**	.47**	.38**	-.25**	.23**
2. Midwives				(.85)	.42**	.22*	.32**	.37**	.26*	-.15*	.06
3. Drug					(.81)	.28**	.55**	.48**	.35**	-.19*	.22
4. Shame & Disgust						(.81)	.31**	.02	.13	-.18*	.16
5. Vaginal							(.75)	.40**	.34**	-.19*	.22*
6. Attitude IAT								(.73)	-	-.09	.17
7. Self-concept IAT									(.82)	-.11	.08
8. Neuroticism										(.83)	-.29**
9. Experience											(.93)
Age mother	31.64	4.36	-.15*	-.09	-.12	-.13	-.11	-.08	-.05	.10	.02
Baby's birth weight (in gram)	3456	491	.08	.05	.16*	.01	.01	.02	-.03	-.05	.05
Risk[1]	-	-	-.08	-.07	-.03	-.02	-.11	-.03	-.03	.04	-.13
Age child	17.87	15.47	.08	.01	.10	-.09	.18*	.07	.15	.14	.13

Note. N = 192, except for Attitude IAT: n = 88 and Self-concept IAT: n = 100. **p-value < 0.01. *p-value < 0.05. [1]Higher values indicate risk. Variable labels: Midwives = trust in midwives. Drug = negative view of drug support. Shame & Disgust = low birth-related shame and disgust sensitivity. Vaginal = positive view of vaginal birth. Experience = subjective appraisal of the birth experience. Reliabilities (Cronbach's α) in brackets.

Descriptive statistics and intercorrelations

Descriptive statistics, intercorrelations, and reliabilities of the utilized questionnaires and IATs are presented in Table 11. The intercorrelations of the MBQ were similar to those in the two previous studies. The overall MBQ score also correlated with both IATs, and in contrast to the previous studies the MBQ also correlated with neuroticism and the birth experience.

Birth-related mindset

As in the first two studies, the birth-related decisions made before birth and birth variables were associated with the birth-related mindset as assessed with the MBQ (Table 12). The results replicated the results of the first two studies. The midwifery-related variables and out-of-hospital birth settings were associated with a higher score on the MBQ, or a more natural mindset (AUCs ≥ .67). In contrast, having had an epidural (*AUC* = .31), an assisted vaginal delivery (*AUC* = .33, $p < .05$), and a C-section (*AUC* = .36) were associated with a more medical mindset (or lower score on the MBQ). With regard to the additional variables collected, AUCs suggested that a more natural mindset was also associated with leaving the hospital a few hours after birth (*AUC* = .71), and a more medical mindset with an extended hospital stay (*AUC* = .37). Having a nuchal scan performed during pregnancy, a planned epidural before labor, augmentation of labor, or undergoing the Kristeller maneuver (*AUCs* ≤ .40) were all associated with a more medical mindset.

Results for both IATs indicated that the midwifery-related variables, out-of-hospital birth settings, and an ambulant delivery (leaving the hospital within the first 24 hours after birth) were related to a more natural mindset (*AUC*s ≥ .68). The variables measuring medicalized aspects of pregnancy and birth were associated with a more medical mindset (*AUC*s ≤ .34). The birth attitude IAT was also associated with C-section (*AUC* = .33, $p < .05$). For both IAT conditions, all results (shown in Table 12) confirmed the hypotheses.

Neuroticism

In contrast to the first two studies, neuroticism was associated with some of the birth variables. Having an epidural or augmentation during labor and birth (*AUCs* ≥ .62) were associated with higher neuroticism scores, out-of-hospital birth settings and ambulant births (*AUCs* ≤ .33) with lower neuroticism scores. Neuroticism also positively correlated with perceived fear during labor and birth ($r = .25$). For all other results see Table 12.

Table 12

AUCs, partial, and zero-order correlations for/between the external criteria measuring the birth variables with the control variables, MBQ, the IATs, neuroticism, and the birth experience in Study 3

	MBQ					IATs		N	Exp.				
	Overall (.87)	Mid (.85)	Drug (.81)	S&D (.81)	Vaginal (.75)	Attitude[3] (.73)	S-C[4] (.82)	(.83)	(.93)	Age	Weight	Risk	Date
Check-ups midwife	.75**	.87**	.73**	.52	.60	.84**	.45	.35	-	.37	.64	.43	.48
Check-ups in alternation	.67**	.62**	.66**	.61*	.56	.60	.68**	.49	-	.50	.51	.51	.49
Prenatal class	.45	.48	.41	.48	.43	.49	.52	.60*	.40*	.47	.50	.43	.33**
Nuchal scan	.38**	.37**	.41	.50	.41*	.44	.36*	.53	-	.63**	.58	.50	.50
Amniotic fluid analysis	.26	.41	.21*	.43	.27	.42	.17	.60	-	.90**	.35	.50	.75
1:1 support	.75**	.80**	.70**	.60*	.60*	.76**	.65*	.46	.68**	.50	.52	.48	.49
Cervical dilation[1r]	.15*	-.04	.12	.11	.14	.06	.16	.05	.00	.08	.11	-.06	-.16*
Duration[r]	.04	.10	-.03	-.02	.05	-.11	.00	.17*	-.39**	.11	.14	.03	-.02
Pain rating[r]	-.06	-.08	-.05	-.10	.07	.10	-.02	.05	.05	-.01	.09	-.17*	-.06
Fear rating[r]	-.21**	-.10	-.17*	-.19**	-.17*	-.12	-.09	.25**	-.50**	-.07	-.09	.16*	-.02
Planned epidural	.21**	.23**	.23**	.43	.33**	.25**	.38	.62*	-	.59	.39*	.53	.45
Epidural	.31**	.41*	.23**	.43	.42	.29**	.34**	.64**	.26**	.49	.45	.54	.48
Augmentation	.40*	.45	.36**	.44	.45	.32**	.42	.62**	.27**	.51	.52	.58*	.44
Kristeller maneuver	.38*	.38*	.36**	.52	.42	.31*	.42	.48	.45	.44	.51	.47	.37*
Out-of-hospital birth	.84**	.91**	.78**	.58	.71**	.77**	.76*	.33**	.82**	.42	.59	.36*	.52
Hospital stay: < 24h[2]	.71**	.63*	.67**	.61	.68**	.73*	.53	.26**	.76**	.59	.51	.52	.57
Hospital stay: > 3d[2]	.37**	.41	.39*	.47	.38*	.36	.48	.62*	.30**	.56	.47	.50	.46
C-section	.36**	.46	.35**	.50	.30**	.33*	.40	.62*	.14**	.56	.45	.61*	.47
Assisted vag. del.[2]	.33*	.41	.32*	.49	.32*	.38	.31	.48	.22**	.56	.52	.54	.36

Note. N = 192, except for 1: n = 132, 2: n = 150, 3: n = 88, 4: n = 100. **p-value < 0.01. *p-value < 0.05. For all analyses except for the variable risk, the mother's age at birth, the baby's age, prenatal risk, and the baby's weight were controlled. Higher scores on the MBQ and the IATs indicate a more natural mindset. [r]Correlation coefficient, all other variables are AUCs. Variable labels: Mid = trust in midwives. Drug = negative view of drug support. S&D = low birth-related shame and disgust sensitivity. Vaginal = positive view of vaginal birth. S-C = self-concept. N = neuroticism. Exp. = subjective appraisal of the birth experience. Assisted vag. del. = assisted vaginal delivery. Age = mother's age at birth. Weight = baby's weight at birth. Date = time of data collection. Check-ups in alternation = check-ups were performed alternately by obstetricians and midwives. Reliabilities (Cronbach's α) in brackets.

Birth experience

Model test

Cronbach's α for the Birth experience scale was .93. In order to validate the one-factor structure found in Study 2 a CFA was conducted using the 10-item version. For birth experience, the congeneric measurement model with uncorrelated errors did not show an acceptable fit according to the conventional thresholds (χ^2 = 276.877, *df* = 35, RMSEA = 0.190, CFI = 0.827, SRMR = 0.069). A sufficient fit of the model could be achieved by releasing five error covariances (χ^2 = 67.376, *df* = 30, RMSEA = 0.081, CFI = 0.973, SRMR = 0.038). The reliability estimate omega (Raykov, 2004) corrected for the error covariances resulted in a value of .89 for this model (instead of ω = .93 for a model with uncorrelated errors).

AUCs and correlations with birth characteristics

As in Study 2, findings in Study 3 indicated that the results from the Birth experience scale were related to the retrospectively reported process of labor and birth. Although the variables associated with a natural birth were associated with a positive birth experience, the rather medicalized aspects (e.g., interventions) were negatively associated with a positive birth experience, and this relationship was especially strong for C-sections (*AUC* = .14). Again, a long labor duration was negatively associated with birth experience (*r* = -.39), as was experiencing a large amount of fear while giving birth (*r* = -50). As in Study 2, pain ratings and birth experience were uncorrelated. It may be that women forgot the extent of experienced pain or that birth pain is part of a birth, and also the evaluation of the birth may be more strongly shaped by other factors (e.g., support during labor and birth, performed interventions). On the scale from 1 = *no pain* to 10 = *extreme pain*, the mean was 7.46, which at least suggests that the women have not completely forgotten the pain.

Moderation effects

In order to test whether I could replicate the finding that the birth-related mindset as assessed with the MBQ moderated the relationship between the mode of birth and the birth experience, I conducted moderation analysis using the PROCESS macro (Hayes, 2017; y = birth experience, x = mode of birth [-1 = vaginal birth, 1 = C-section], w = overall score of the MBQ). The model summary indicated a significant model (R^2 = .44, $F(3, 188)$ = 49.92, p <.001) and a significant increase in the amount of variance explained due to the interaction (ΔR^2 = .11, p < .001). Both C-section (β = -.97, *SE* = .09, p < .001) and the overall score of the MBQ (β = .24, *SE* = .09, p < .001) had a main effect on the birth experience. The interaction term of the two variables was also significant (β = -.64, *SE* = .1, p < .001). Conditional effects of the focal predictor were

significant for low (*b* = -.46, *SE* = .11, *p* < .001) and high (*b* = -1.48, *SE* = .14, *p* < .001) values of the moderator (MBQ). Results of Study 3 replicated the results of Study 2 for the role of the directly measured birth-related mindset (Figure 3).

I also ran moderation analyses for the indirectly measured birth-related mindset as assessed using the IATs (y = birth experience, x = mode of birth [-1 = vaginal birth, 1 = C-section], w = either one of the IATs). For the birth attitude IAT, no significant interaction was found (β = -.65, *SE* = .42, *p* = .123). Thus, contrary to expectations, the birth attitude IAT did not moderate the correlation between having a C-section and the birth experience. For the birth self-concept IAT the model summary indicated a significant main effect (R^2 = .34, *F*(3, 96) = 16.64, *p* <. 001), and the amount of variance explained due to the interaction was also increased (ΔR^2 = .04, *p* = .015). C-section had a significant main effect (β = -.93, *SE* = .13, *p* < .001), the birth self-concept IAT did not (β = -.06, *SE* = .28, *p* = .836). The interaction effect was significant (β = -.96, *SE* = .39, *p* = .015). Conditional effects of the focal predictor were significant for low (*b* = -.56, *SE* = .18, *p* = .003) and high (*b* = -1.29, *SE* = .22, *p* < .001) values of the moderator (self-concept IAT). With regards to content, the moderation effect of the birth self-concept IAT (Figure 4) was similar to the moderation effects of

Figure 3

Moderation analysis: Birth experience as a function of the birth-related mindset measured with the MBQ and the mode of birth in Study 3

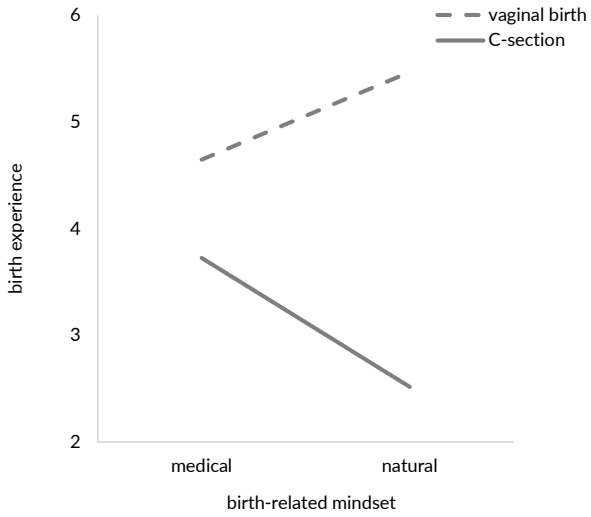
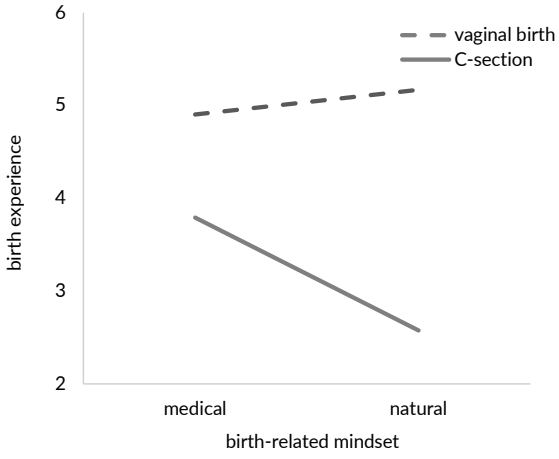


Figure 4

Moderation analysis: Birth experience as a function of the birth-related mindset measured with the birth self-concept IAT and the mode of birth in Study 3



the MBQ found in both Study 2 and in the current study: Vaginal birth was associated with a more satisfying birth experience than birth by C-section for women with both low

and high natural mindset. In particular women with a more natural mindset at the time of data collection rated a birth more positively in case of a vaginal birth as compared to a birth by C-section.

Control variables

As in the two previous studies, the control variables were associated with some of the birth variables. The effect sizes were, however, rather small. For all results see Table 12.

Incremental validity

Logistic and linear regression were conducted to test the incremental validity of the utilized measures. The variables were included in the regression in the same order as in Study 1 and Study 2. The regressions were calculated separately for the two IAT groups. Neuroticism showed a significant increase in ΔR^2 or $\Delta(N)R^2$ for some of the birth variables ($4.3 \leq \Delta R^2$ or $\Delta NR^2 \leq 26.2$, $p < .05$). The significant increase of explained variance differed in the two IAT groups. The MBQ showed a significant increase in ΔNR^2 for slightly more than half of the variables in both IAT groups ($5.8 \leq \Delta NR^2 \leq 30.9$, $p < .05$). In opposition to the previous two studies, the MBQ did not account for significant additional variance in C-section. The birth attitude IAT showed a significant ($p < .05$) increase in ΔNR^2 for the following variables: check-ups with midwife (15.4%), one-on-one support (9.3%), augmentation of labor (5.8%), out-of-hospital birth setting (7.9%), and C-section (6.4%). The birth self-concept IAT did account for a significant increase in ΔNR^2 for the variables check-up balanced and nuchal scan (both 6.6%). Based on these results, the birth attitude IAT appears to have a greater added value to the MBQ than the birth self-concept IAT. The birth experience, again, showed a significant increase in ΔR^2 or ΔNR^2 for the majority of the birth variables in both IAT groups ($5.3 \leq \Delta R^2$ or $\Delta NR^2 \leq 35.5$, $p < .05$). Thus, Study 3 replicated the findings of Study 2, suggesting that the birth-related mindset and the birth experience represent two separate constructs. For all results see Table 13.

INTEGRATION OF THE RESULTS

Given that the three studies presented above were developed sequentially and each builds on the last in terms of both methods and data accumulated, their results of the AUCs and regression analyses are best examined not individually, but rather by looking at the consistencies across them. In all three studies, the birth variables were meaningfully related to the MBQ: Medical aspects of birth correlated with a more medical mindset and the natural aspects of birth with a more natural mindset. The birth variable vaginal assisted birth did not correlate with mindset in

Table 13

Logistic and linear multiple regression analyses for testing incremental validity of the control variables, personality traits, birth-related mindset (MBQ and IATs), and birth experience in Study 3

Birth variables	Freq. of categories	Control variables	Neuroticism		MBQ		Attitude IAT		Self-concept IAT		Birth experience	
		$NR(1)^2$	$NR(2)^2$	$\Delta NR(2)^2$	$NR(3)^2$	$\Delta NR(3)^2$	$NR(4)^2$	$\Delta NR(4)^2$	$NR(5)^2$	$\Delta NR(5)^2$	$NR(6)^2$	$\Delta NR(6)^2$
		in percent										
Check-ups midwife	8:79	14.6	15.7	1.1	33.8*	18.1**	49.2**	15.4**	-	-	-	-
	7:91	4.3	17.1	12.8*	18.4	1.3	-	-	18.8	0.4	-	-
Check-ups in alternation	26:61	3.2	3.7	0.5	12.7	8.9*	13.3	0.7	-	-	-	-
	35:63	0.9	1.2	0.3	9.0	7.8*	-	-	15.6	6.6*	-	-
Prenatal class	58:29	22.6	26.9**	4.3*	27.1**	0.2	27.3**	0.2	-	-	28.7*	1.4
	68:30	14.1*	19.6**	5.5*	19.8*	0.2	-	-	21.4*	1.6	21.5*	0.1
Nuchal scan	25:62	16.1*	16.4	0.3	24.3*	7.9*	25.1*	0.8	-	-	-	-
	34:64	10.7	11.6	0.9	12.2	0.6	-	-	18.8*	6.6*	-	-
1:1 support	21:66	3.2	3.5	0.3	21.7*	18.2**	31.0**	9.3*	-	-	36.3**	5.3*
	28:68	1.8	4.0	2.2	29.2**	25.2**	-	-	30.8**	5.6	36.5**	5.7*
Planned epidural	20:67	9.4	10.1	0.7	41.0**	30.9**	43.9**	2.9	-	-	45.5**	1.6
	16:80	17.3*	28.6**	11.3**	37.8**	9.2*	-	-	39.3**	1.5	39.6**	0.3
Epidural	28:59	4.8	17.9*	13.1**	31.5**	13.6**	35.1**	3.6	-	-	50.8**	15.7**
	38:60	6.3	9.0	2.7	15.4*	6.4*	-	-	17.9	2.5	25.1*	7.2*
Augmentation	34:51	5.9	17.2*	11.3**	23.9*	6.6*	29.7**	5.8*	-	-	40.3**	10.6**
	43:53	7.6	10.4	2.8	10.5	0.1	-	-	10.7	0.2	17.6	6.9*
Kristeller maneuver	13:71	12.9	19.6	6.7	23.3	3.7	26.7*	3.4	-	-	26.8	0.1
	22:69	16.7*	20.2*	9.3	26.0**	5.8*	-	-	27.1**	1.1	27.4*	0.3
Out-of-hospital birth	15:71	10.5	12.8	2.3	39.1**	26.3**	47.0**	7.9*	-	-	63.2**	16.2**
	8:90	8.3	31.5*	23.2**	44.2**	12.7*	-	-	50.9**	6.7	63.5**	12.6**

Table continues on the next page

Table 13, continued.

Birth variables	Freq. of categories	Control variables	Neuroticism		MBQ		Attitude IAT		Self-concept IAT		Birth experience	
		$NR(1)^2$	$NR(2)^2$	$\Delta NR(2)^2$	$NR(3)^2$	$\Delta NR(3)^2$	$NR(4)^2$	$\Delta NR(4)^2$	$NR(5)^2$	$\Delta NR(5)^2$	$NR(6)^2$	$\Delta NR(6)^2$
		in percent										
Hospital stay: < 24h	12:59	2.1	28.3*	26.2**	43.9**	15.6**	49.6**	5.6	-	-	58.3**	8.8*
	14:76	9.7	28.8**	19.1**	43.9**	15.1**	-	-	44.9**	1.0	49.1**	4.2
Hospital stay: > 3d	22:49	1.5	5.1	3.6	7.3	2.2	9.8	2.5	-	-	17.5	7.7*
	33:57	10.2	15.1	4.9	20.0*	4.9	-	-	20.4*	0.4	27.0*	6.6*
C-section	20:67	12.5	14.6	2.1	19.6	5.0	26.1*	6.4*	-	-	56.6**	30.5**
	20:78	9.2	12.0	2.8	12.3	0.3	-	-	12.7	0.4	48.2**	35.5**
Assisted vag. delivery	5:62	9.0	12.7	3.8	13.3	0.6	17.1	3.8	-	-	43.8	26.8**
	10:68	15.7	20.1	4.4	33.5*	13.4*	-	-	39.2*	5.7	45.0**	5.7
	n	$R(1)^2$	$R(2)^2$	$\Delta R(2)^2$	$R(3)^2$	$\Delta R(3)^2$	$R(4)^2$	$\Delta R(4)^2$	$R(5)^2$	$\Delta R(5)^2$	$R(6)^2$	$\Delta R(6)^2$
		in percent										
Cervical dilation	65	4.6	4.8	0.3	6.1	1.1	0.6	0.1	-	-	.07	.01
	66	5.4	5.4	0.0	8.7	3.3	-	-	15.1*	1.9	9.1	0.4
Duration	85	5.0	7.3	2.3	8.0	0.7	11.0	3.0	-	-	28.9**	17.9**
	98	6.9	9.3	2.5	9.6	0.3	-	-	9.7	0.0	18.9**	9.2**
Pain rating	87	4.7	5.0	0.3	7.2	2.2	10.7	3.5	-	-	14.4	3.6
	98	1.8	1.9	0.1	2.0	0.1	-	-	2.1	.00	2.3	.03
Fear rating	87	10.8	13.7*	2.9	13.8	0.2	15.0	1.2	-	-	26.7**	11.7**
	98	2.2	12.2*	10.0**	14.9*	2.6	-	-	14.9*	0.0	33.4**	18.5**

Note. $^{**}p$-value < 0.01. $^{*}p$-value < 0.05. Formula for calculating ΔNR^2: $\Delta NR(y)^2 = [NR(y)^2 - NR(x)^2]$. For the birth variable amniotic fluid analyses, I did not perform logistic regression analyses as the frequency of the rarer category was only two in both IAT groups.

the first two studies, but in the third study I found significant moderate effects. It may be that the birth-related mindset is not associated with vaginal assisted deliveries, but it is noteworthy that this variable results in a smaller sample size as well as a general small number of assisted vaginal births. Variables such as one-to-one support, out-of-hospital birth settings, having an epidural, and C-section were associated with the MBQ in all three studies. Thus, the associations between the birth criteria and the birth-related mindset reveal a consistent pattern across the three studies and suggest that the mindset is associated meaningfully with the birth process. In the first two studies, the indirectly measured birth-related mindsets and the personality traits were not or only weakly correlated with the birth variables. In the third study, on the contrary, both the indirectly measured birth-related mindset and neuroticism (as the only measured trait) displayed some meaningful correlations. Due to the inconsistency of the results, however, it remains unclear to what extent personality is associated with labor and birth and also to what extent indirect measures are useful to assess the birth-related mindset (see also below). However, the studies do demonstrate that mothers' evaluative ratings of their birth experiences are significantly correlated with characteristics and events of labor and birth. In Studies 2 and 3, in which these variables were measured, meaningful correlations emerged. For variables for which no significant correlations were observed (e.g., in the case of perceived birth pain), this was consistent across both studies.

The regression analyses to test incremental validity of the different measures for the assessed birth variables also uncovered a consistent pattern. In all three studies, the control variables and personality traits accounted for rather small amounts of variance, the birth-related mindset (directly measured, MBQ) and the birth experience (Study 2 and Study 3) for relatively large proportions. The indirectly measured birth-related mindset did not account for a substantial proportion of additional variance in Study 1 or Study 2, but the birth attitude IAT used in Study 3 appeared to have more predictive utility. However, since the birth attitude IAT was only developed and initially used in Study 3, replication of this finding is required (see interim conclusion).

These consistencies notwithstanding, there are also inconsistencies that suggest sampling effects (i.e., related to differences with regard to risk factors and out-of-hospital birth rates). The small differences between the AUCs or correlations and the performed logistic or linear regression analyses illustrate once again that statistical results also depend on which variables were controlled for (see also Simmons et al., 2011). The control variables were selected on the basis of theoretical considerations. In order to keep the researcher's degrees of freedom as small as possible, I used the

same analysis strategy across all three studies and did not adapt the selection of control variables to fit each of the analyses.

INTERIM CONCLUSION

In the validation studies I first investigated the idea that decisions women make during their pregnancies (e.g., decision for hiring a freelancing midwife for a one-on-one support) and outcomes of labor and birth (e.g., birth mode) are related to a birth-related mindset. In order to empirically explore this relationship, a questionnaire for measuring the birth-related mindset, the MBQ, was developed and tested in a first exploratory study (Study 1). In two further studies the factor structure (Study 2) and the relationships between variables found in the initial exploratory study were replicated with new samples (Study 2 and Study 3). All in all, the results of all three studies provided converging evidence supporting the hypothesis that characteristics of labor and birth are related to the postulated birth-related mindset measured with the MBQ.

Developing a suitable indirect measure of the birth mindset proved difficult. The two IATs (attitude IAT and self-concept IAT) used in Study 3 were the most promising. Particularly the birth attitude IAT correlated meaningfully with the external criteria and explained additional variance for some of the assessed birth characteristics. However, the birth attitude IAT differs from the questionnaire not only in method (direct versus indirect) but also in its content, as the birth attitude IAT taps into an automatic evaluation of birth. Thus, it is possible that participants simply evaluated birth and that the incremental validity is not based on implicit aspects but rather on this added valence.[4] Based on the data of the three validation studies, it was not possible to determine whether the IAT measured a birth-related mindset or the birth experience. In addition, the results of the IATs in Study 3 can only be considered as explorative because, unlike the questionnaire measures, they have not yet been replicated. One aim of the following prospective longitudinal study was to resolve these open research questions concerning the IATs.

Birth experience

In addition to the MBQ, I developed a comprehensive 10-item questionnaire for measuring the birth experience. The validity of this scale was tested with both explorative (Study 2) and confirmatory

[4] I thank Juliane Degner for this very thoughtful suggestion.

(Study 3) factor analysis. The validation studies replicated existing research indicating that the process of labor and birth shape the evaluation of birth (e.g., DiMatteo et al., 1996). The results also suggested, however, that although the birth-related mindset and the birth experience seem to be two distinct constructs, they are also related. Moderator analyses in Studies 2 and 3 suggested that the birth-related mindset moderated the relationship between the mode of birth and the birth experience. C-sections were generally rated more negatively than vaginal births, but this was especially true for women with a more natural mindset.

Personality

Alongside birth-related mindset and the birth experience, I have assessed different personality traits. However, the results indicated that broad personality traits – at least the constructs I have explored – were only weakly related to the investigated birth factors. These results are consistent with existing research, which has indicated pregnancy anxiety to be distinct from general anxiety (e.g., Huizink et al., 2004). Nevertheless, in the following longitudinal study I aimed to replicate these results to rule out the possibility of a prospective influence of personality traits on labor and birth. The potential role of personality traits in predicting experiences after birth was also explored.

Limitations and open research questions

Causality

As displayed above, the validation studies used a cross-sectional design with retrospective assessment of birth variables. This is the major limitation of the three studies. On the basis of this retrospective data, one cannot conclude whether the mindset was influenced by birth, whether the mindset influenced birth itself, or whether birth and mindset mutually influenced each other. It cannot be excluded that the birth-related mindset was formed by the woman's birth experience. Women who experienced a birth without medical interventions, possibly accompanied by a freelancing midwife, perhaps even out of hospital, may have developed a more natural mindset because they have learned that birth can be mastered in this way, especially if this experience was positive. In contrast, woman who experienced a lot of interventions because the birth was difficult or even dangerous may have developed a more medical mindset. The mindset would then reflect the experience of birth, which in turn may have been primarily determined by personality and medical or biological factors.

Studies from other research disciplines have investigated whether emotions such as fear or birth-related attitudes may have a causal impact on birth outcomes. Although some studies found correlations between fear and birth outcomes (Ryding et al., 1998; Beck et al., 1980), others did not (Littleton et al., 2007; Johnson & Slade, 2002). Investigating attitudes and their influence on the birthing process, Beck et al. (1980) found a correlation between birth-related attitudes and labor and birth pains. A more recent study (Haines et al., 2012) showed that birth-related attitudes (e.g., safety concerns, personal impact) and fear predicted labor and birth outcomes. Thus, previous (related) research corroborated causal effects of emotions and attitudes (and mindsets) on the birth process but were not conclusive. For a better understanding of the construct of the birth-related mindset, I therefore conducted the following prospective longitudinal study, which aimed to clarify the question of causality.

Is psychological well-being affected by the birth experience?

Another open research question that could not be answered with the three validation studies presented above concerns the birth experience and its importance for psychological well-being. Birth researchers and practitioners all over the world state that it does matter how women give birth and that a positive outcome of birth includes not only a healthy child, but also a satisfying experience for the mother and the whole family (e.g., WHO, 2018). Evidence from the validation studies suggest that interventions during birth – or the problems that cause the interventions – lead to a less satisfying birth experience. Epidurals and C-sections were related to more negative evaluations of the birth experience than births without these interventions (Study 2 and Study 3). In the case of C-sections, this was especially the case for women with a more natural mindset. Previous psychological studies have shown that the mode of birth (DiMatteo et al., 1996) and particularly the appraisal of the birth experience (Durik et al., 2000) impact the mother-child interaction, at least in the first few months, clearly indicating the importance of the birth experience for psychological well-being. But the study by Durik et al. (2000) and the moderator effects of my studies also suggest that birth processes and birth outcomes cannot be simply evaluated as *good* or *bad*. Even if on average there is a tendency for certain circumstances to have a more negative influence on the birth experience than other circumstances have, this effect can be moderated by characteristics of the

mothers such as the birth-related mindset. The longitudinal study should therefore not only examine the potential causal effect of the mindset, but also the role of labor and birth and especially the (subjective) birth experience on the parents' and infant's short- and long-term psychological well-being.

LONGITUDINAL STUDY

The three validation studies demonstrate that our mental representation about birth, the birth-related mindset, is associated with retrospectively assessed aspects of labor and birth (e.g., place of birth, mode of delivery). Furthermore, the studies showed that different courses of labor and birth are associated with the subjective birth experience with the tendency for births rich in interventions to be perceived more negatively. Due to the retrospective design of the validation studies it was not evident whether the birth-related mindset can have a causal influence on labor and birth. As already outlined in the introduction of this thesis it is a basic assumption of social cognition theory that mental representations are based on experience, and causally influence decisions, experience, and behavior. This should also apply to the birth-related mindset, especially as the topic of birth is of great importance for the people involved. Furthermore, research suggests that birth-related fears can occur even before being pregnant or having children (Stoll et al., 2015).[5] The central hypothesis of the longitudinal study is that in addition to medical factors the birth-related mindset has a causal influence on labor and birth. A more natural mindset should increase the probability of a birth with fewer interventions. The birth-related mindset is assessed using the MBQ and the birth attitude IAT from Study 3.

As described above in the validation studies, interventions were associated with a more negative birth experience, providing evidence for the assumption that birth influences psychological factors. These results confirmed existing studies (Bell & Andersson, 2016; DiMatteo et al., 1996; Durik et al., 2000). For the longitudinal study I predicted that labor and birth would have an impact on the (subjective) birth experience and that the birth experience in turn affects psychological well-being in the first few weeks after birth, which was assessed using Ecological Momentary Assessment (EMA; Stone & Shiffmann, 1994) in order to provide a comprehensive insight into this potentially stressful and emotionally charged period. Psychological well-being after birth includes emotional and for women also physical components such as breastfeeding and wound healing. Since some studies suggest that the birth experience can influence the development of psychopathological symptoms, I assumed that the postpartum adjustment, which itself is affected by the birth experience, promotes the development of postpartum depression

[5] Unpublished data from my own previous research also suggested that students' birth-related mindset is correlated with external birth-related criteria, e.g., students who themselves were born by C-section were less likely to have a natural mindset than students who were born vaginally ($AUC = .37$, $p < .001$, $N = 342$).

and post-traumatic stress symptoms as possible outcomes of childbirth (e.g., Bell & Andersson, 2016; Slade, 2006). Postpartum depression and post-traumatic stress are measured eight weeks and six months after birth. Psychological studies also suggest that negative birth experiences affect the mother-infant attachment after birth (DiMatteo et al., 1996; Durik et al., 2000). Therefore, I also assessed parent-infant attachment six months after birth, anticipating less attachment for participants who had poorer psychological well-being after birth.

Thus, for female participants (mothers) my aim was to replicate the results of the validation studies and test the causal impact of the birth-related mindset on labor and birth longitudinally. I also wanted to explore the relevance of the birth experience on short- and long-term psychological well-being. Male participants (fathers) were also part of the longitudinal study. I aimed to examine whether the birth-related mindset would also show up in men, whether it had an effect on labor and birth, and whether birth in turn would affect the men's birth experience and psychological well-being after birth the same way I expected for female participants. Because there is scarcely any psychological research on men and childbirth, and fathers were not part of the validation studies, the results for male participants are exploratory.

The longitudinal study is divided into three sub-studies: In Study 4 results of the validation studies are replicated for female participants and in Study 5 for the male sample. In Study 6, I will examine the potential effect of relationship quality on birth and transition to parenthood. The data from each of the sub-studies refers to the same sample and measurement points.

Measurement times and data treatment

The longitudinal study consisted of five measurement times and, additionally, an EMA (see below) during the first weeks after birth.[6] T1 measures were obtained in the first third of pregnancy, t2 was conducted six to four weeks before the baby's due date, t3a (subjective experience) and t3b (performed interventions) within the first week after birth, t4 eight weeks after birth, and t5 six month after birth. The EMA was assessed within the first six weeks after birth.

As in the three validation studies, the dichotomous variables were effect coded (1 = the event did apply, -1 = the event did not apply) and AUCs were calculated as an estimation of the

[6] An event-based sampling EMA was also carried out during pregnancy after the routine check-ups but its results are not presented in the present thesis.

relationship to other dichotomous or continuous variables. Again, if not stated otherwise, I set the critical *p*-value to .01 for all reported results.

STUDY 4: WOMEN

Model assumptions

Previous studies focused on single aspects of birth or birth experiences. Thus, they either explored whether psychological factors influence birth (e.g., Haines et al., 2012) or whether aversively experienced births influence psychological factors (DiMatteo et al., 1996; Durik et al., 2000). However, pregnancy, birth, and the postpartum period are sequential phases that merge into each other and therefore I aimed to develop a comprehensive model. I expected a process-like course, which is characterized by time sequence: The birth-related mindset influences labor and birth, labor and birth influence the birth experience, and the birth experience influences postpartum psychological well-being, which then influences the development of psychopathological symptoms and the mother-infant attachment. For testing these assumptions, I conducted a fixed-reliability Single indicator model (SI model; see below).

METHOD

Participants

The sample size was subject to minor fluctuations depending on the time of measurement (t1: *n* = 311, t2: *n* = 293, t3a: *n* = 297, t3b: *n* = 292, t4: *n* = 297, and t5: *n* = 134). The mean age for the 311 participants at t1 was 30.31 years (*SD* = 3.97), the week of pregnancy at the first measurement time varied between the 6th (0.6%) and the 26th (0.3%) week, the mode being the 16th pregnancy week (11.6%). The rate of married women was 61.7%. About half of the participants were first-time mothers (primiparous; 54%) and 45.4% of the women had one or more prenatal risks. The three most frequent prenatal risks were previous C-sections (21.3%), obesity (10.3%), and gestational diabetes (8.2%). Most of the women gave birth at a hospital (83.4%), but 4.4% gave birth in a midwife-led birthing center, and 11.8% at home. The vaginal birth rate was 73%, and 7.4% of the women had an assisted vaginal delivery, and 19.6% had a C-section. Both the relatively high out of hospital birth rate and the low C-section rate are not representative of the German population. Explanations could be the exclusion of certain risk factors for study participation (e.g., twin pregnancies) and self-selection (e.g., in favor of a more

natural birth-related mindset). A minority of women (31.6%) had one-on-one support from a freelancing midwife during labor and birth. The epidural rate was 24.3%.

Excluding criteria and recruiting

Before participating in the study, interested women were asked to complete a screening questionnaire. The aim was to exclude women from participation if they e.g., were expected to have a very complicated pregnancy, could be unnecessarily burdened by the study, or did not fulfill the technical requirements for the online study. Specifically, potential participants were excluded on the basis of the following criteria: lack of mobile internet access (needed for EMA, see below), women being pregnant with more than one child, artificial insemination, more than one abortion and/or more than one stillborn in the past, participants without a partner, participants younger than 18 years and women older than 38 years, and participants using psychotropic drugs. Participants were recruited in two different ways. They were either approached via a flyer by participating midwives and gynecologists or, alternatively, in Facebook groups or via a Facebook advertisement. Participating women received 100 euros for full participation in the study, except for t5 for which no incentive was paid. The compensation was paid pro rata for incomplete participation.

Measures

This part of the dissertation is part of a longitudinal study that had different objectives and measured a variety of variables. For reasons of readability, only the variables relevant for this thesis are described here. A complete list of all variables can be found in the Appendix.

Birth-related mindset

The birth-related mindset was assessed using both the MBQ developed in the previous validation studies as well as the birth attitude IAT from Study 3, which displayed the most promising results of all indirect measures. For the IAT participants with an error rate higher than 25% were excluded from the analyses. This was the case for six participants at t1 and three at t4. The birth-related mindset – both directly and indirectly measured – was assessed at the following measurement times: first third of pregnancy (t1; MBQ: α = .89; IAT α = .78), six to four weeks before due date (t2; MBQ: α = .88; IAT: α = .74), eight weeks after birth (t4; MBQ: α = .89; IAT α = .67), and six months after birth (t5; MBQ: α = .91; IAT α = .73).

Personality traits

In the longitudinal study I assessed the personality traits neuroticism (α = .82), trait anxiety (α = .91), self-esteem (α = .87), and self-efficacy (α = .88). All items of the four scales were presented in a fixed randomized order. For all questionnaires the response format of the MBQ was used (6-point Likert scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*). The personality trait questionnaires were administered at measurement time t1, in the first third of pregnancy.

Birth variables

To test the possible influence of the women's birth-related mindset on labor and birth, various birth characteristics were assessed. Some of the characteristics are not relevant to the present study (e.g., intimate shave by the medical staff) as I did not suspect that they are related to the birth-related mindset, and I therefore did not analyze them in this context. For the present part of this thesis the following characteristics were statistically analysed: duration of birth, one-on-one support by a freelancing midwife hired by the women, use of an epidural, augmentation of labor before labor had started or during labor, use of the Kristeller maneuver, whether an episiotomy was performed, the amount of pain experienced on a 10-point Likert scale (1 = *no pain* to 10 = *extreme pain*), mode of birth (vaginal delivery, assisted vaginal delivery, C-section), and place of birth (hospital, out-of-hospital). These birth variables were assessed within the first week after birth (t3; amount of experienced pain at t3a, all other variables at t3b).

Low-intervention birth

To meaningfully summarize the birth variables for the fixed-reliability SI model I used the pre-defined *normal birth index* (Werkmeister et al., 2008). According to this index a birth counts as *normal* when the following criteria are met (percentage frequency of interventions are indicated in parentheses): labor was not induced (19.6%) or augmented (33.2%), no local anesthesia was used (24.3%), no episiotomy was performed (13.7%), no assisted vaginal delivery was performed (7.4%), and no C-section was performed (19.6%). Note, to avoid underlying normative connotations associated with the term 'normal,' I use the term low-intervention birth instead of normal birth (see also general discussion for a more detailed discussion on the different terms). The low-intervention birth rate was 40.2%.

Control variables

As in the previous validation studies, baby's birth weight and prenatal risk are treated as control variables. The variable primiparous, which indicates whether the women have given birth before (due to the retrospective design of the previous studies, this was not relevant before), was also

treated as a control variable. The variable prenatal risk included all possible risk factors reported by the participants (e.g., prior C-sections, obesity, possible illnesses of the baby, early or late delivery). As in the previous studies the variable risk was calculated for participants if one or more risks were present. Risk factors were assessed both in the screening study prior to the main study as well as at the second data collection point after the birth (t3b), and to a large extent they were based on the German maternity guidelines. The variable can be regarded as a rather strict indicator of a (pre)birth risk and can therefore be assumed to be a rather conservative test. These variables were assessed as part of the screening study prior to participation and again within first week after birth (t3b).

Birth experience

The birth experience was assessed with the birth experience questionnaire developed in the second validation study (Study 2). The birth experience questionnaire was administered within the first week after birth (t3a; α = .90), eight weeks after birth (t4; α = .91), and six months after birth (t5; α = .94).

Postpartum adjustment

The postpartum adjustment within the first six weeks after birth was assessed using EMA (Stone & Shiffmann, 1994). EMA describes a variety of methods that aim to obtain repeated measured data about current emotional states or behavior in the natural environment of the participants (Shiffman et al., 2008). Since the time after birth is characterized by emotional and physical changes and challenges, EMA seemed to be an appropriate method of assessment to capture a comprehensive overview of postpartum adjustment. Furthermore, advantages of EMA are the reduction of memory errors and increased ecological validity (Shiffman et al., 2008).

The procedure used for administering the EMA in the present study was as follows: In the first two weeks after birth participants were asked daily and then weekly for about another four weeks (due to the random allocation of measurement days, there were slight differences in the exact number of weeks for each participant), about their emotional and physical well-being, breastfeeding, and the perceived infant's well-being. Using time-based sampling (Shiffmann et al., 2008), participants received a link to an online questionnaire on their mobile phones at a random time of the day. The EMA questionnaire comprised 12 items measuring emotional well-being, taken from the Quality of Life Profile for Chronically Ill Patients (Siegrist et al., 1996; α = .93): three items measuring how pain-free, healthy/fit and resilient participants felt (scale general well-being; α = .87); three items measuring wound healing (α = .90); three items measuring ease

of breastfeeding; and ten items measuring the perceived infant's well-being (e.g., sleeping behavior, perceived satisfaction). The scales emotional well-being and general well-being were answered on a six-point Likert scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*. For the scales wound healing, ease of breastfeeding, and perceived infant's well-being, I used a semantic differential (six points). All items were coded such that higher values indicate a higher/more positive postpartum adjustment. For determining Cronbach's α, the different measuring times were divided into split halves (odd-even).

Before I used the scales for the analyses, I conducted reliability analysis to determine whether the internal consistency (Cronbach's α) of the scales could be improved by omitting items. In the case of the scale ease of breastfeeding this led to the exclusion of one item measuring the amount of experienced pain during breastfeeding, so that the scale ultimately comprised two items (item 1: today breastfeeding was [very problematic/not problematic at all]; item 2: today breastfeeding was [very exhausting/not exhausting at all]; α = .91). For the scale baby's well-being four items (e.g., a question about gassiness) were omitted. The final scale consisted of six items measuring how much the baby cried and slept, how satisfied it was, how exhausted how quiet, and how easy to comfort (α = .95). For the SI model the variable postpartum adjustment was built from the scales emotional well-being, general well-being, wound healing, breastfeeding, and perceived infant's well-being. The reliability of the overall postpartum adjustment scale was .94.

(Postpartum) Depression

For assessing (postpartum) depression, the 10-item Edinburg Postnatal Depression Scale was used (Cox et al., 1987). The scale has been validated for use in pregnancy (Bergink et al., 2011) and captures potential depressive symptoms over the seven days prior to completion of the questionnaire (e.g., experienced joy or feelings of guilt). To obtain an initial value before birth, the scale was also applied at the first time of measurement (t1). In the SI model, depression at t1 was included in the latent factor personality (see below). The answer format of the original scale was altered to the response format of the MBQ (6-point Likert scale ranging from 1 = *strongly disagree* to 6 = *strongly agree*). Symptoms of postpartum depression were assessed in the first third of pregnancy (t1; α = .84), eight weeks after birth (t4; α = .87), and six months after birth (t5; α = .89).

Post-traumatic Stress

For measuring post-traumatic stress symptoms eight weeks and six months after birth I used the German version (Hofmann et al., 2002) of the Trauma Screening Questionnaire (TSQ; Brewin et al., 2002). The TSQ consist of 10 items measuring whether participants show trauma-associated reactions (e.g., upsetting thoughts, bodily reactions such as sweating or increased heartbeat) after a stressful event. To ensure the reference to labor and birth, I have adapted the questionnaire so that the items refer specially to birth. For example, for the item "Upsetting thoughts or memories about the event that come into your mind against your will" the term "event" was changed to "birth". The answer format of the original scale was again modified to adopt the six-point Likert scale (1 = *strongly disagree* to 6 = *strongly agree*) participants have used elsewhere in this study. These assessments of post-traumatic stress were administered to participants at eight weeks after birth (t4; α =.76) and six months after birth (t5; α =.76).

Attachment to the infant

I used my own translation of the postpartum bonding instrument (Brockington et al., 2001) to assess the mother's attachment to the infant six months after birth. The original scale comprises 25 items but due to ethical considerations I excluded two items measuring danger of abuse. Furthermore, the item "I wish my baby would somehow go away" was answered with 1 (*strongly disagree*) by all participants and was therefore, due to lack of variance, also excluded from the scale. Thus, the scale used for the analyses consisted of 22 items. The answer format was also a six-point Likert scale (1 = *strongly disagree* to 6 = *strongly agree*). Attachment to the infant was measured at six months after birth (t5; α =.89).

Procedure

The order of the questionnaires differed depending on the time of measurement. In general, however, I first obtained demographic data, followed by the Birth experience scale (t3a, t4, t5), the MBQ and the attitude IAT (t1, t2, t4, t5), personality traits (t1, t4), depression (t1, t4, t5), post-traumatic stress symptoms (t4, t5), and attachment to the infant (t5). The exact order of the questionnaires and items can be found in the method/questionnaire list in the Appendix.

RESULTS AND DISCUSSION

Descriptive statistics and intercorrelations

In Table 14 zero-order correlations of the MBQ and its measurement points (.78 ≤ *r* ≤ .92) as well as with its subscales (.67 ≤ *r* ≤ .83) are displayed. Intercorrelations of the subfactors (within

Table 14

Zero-order correlations of the MBQ and its measurement points and subscales

	Overall score			
	t1	t2	t4	t5
Overall score				
t1: < 26th week	(.89)	.86**	.82**	.78**
t2: 6-4 weeks before due date		(.88)	.85**	.87**
t4: 8 weeks after birth			(.89)	.92**
t5: 6 months after birth				(.91)
Subscale				
Trust in midwives	.80**	.79**	.73**	.83**
Negative view drug support	.76**	.76**	.80**	.81**
Low birth-related shame and disgust sensitivity	.68**	.70**	.67**	.73**
Positive view of vaginal birth	.73**	.70**	.77**	.75**

Note. t1: n = 311, t2 : n = 293, t4: n = 297, t5: n = 134. **p-value < 0.01. *p-value < 0.05. Reliability (Cronbach's α) in brackets.

Table 15

Zero-order correlations of the birth attitude IAT and its measurement points

	t1	t2	t4	t5
t1: < 26th week	(.78)	.48**	.35**	.38**
t2: 6-4 weeks before due date		(.74)	.48**	.48**
t4: 8 weeks after birth			(.67)	.45**
t5: 6 months after birth				(.73)

Note. t1: n = 305, t2 : n = 293, t4: n = 294, t5: n = 134. **p-value < 0.01. *p-value < 0.05. Reliability (Cronbach's α) in brackets.

a measurement point) ranged from .25 to .54. Reliabilities (Cronbach's α) of the subfactors were all ≥ .79. Intercorrelations of measurement points of the birth attitude IAT are displayed in Table 15. Cronbach's α was > .70 for all measurement points except for t4, assessed eight weeks after birth. Intercorrelations between the explicit and implicit birth-related mindset were small to medium (t1: r = .25, t2: r = .25, t4: r = .24, t5: r = .22, with p < .05). Means and standard deviations for the repeated measures can be found in Table 21. Zero-order correlations for the non-birth-related measures (e.g., personality) are displayed in Table 16, indicating high intercorrelations between the traits as well as small to medium correlations between the traits and the constructs assessed after birth. All correlations were consistent with the hypotheses.

Table 16

Zero-order correlations of the non-birth-related measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
t1: < 26th week															
1. Neuroticim	(.82)	.80**	-.62**	-.55**	.60**	-.27**	-.38**	-.27**	-.15*	-.30**	.41**	.29**	.50**	.35**	-.25**
2. Trait anxiety		(.91)	-.77**	-.64**	.72**	-.30**	-.42**	-.26**	-.17*	-.32**	.47**	.26**	.47**	.26**	-.23**
3. Self-esteem			(.87)	.66**	-.59**	.21**	.33**	.15**	.14*	.28**	-.45**	-.21**	-.44**	-.20*	.17*
4. Self-efficacy				(.88)	-.49**	.22**	.25**	.20**	.09	.28**	-.30**	-.16**	-.35**	-.19*	.10
5. Depression					(.84)	-.24**	-.35**	-.25**	-.13	-.21**	.38**	.26**	.33**	.23**	-.10
EMA postpartum															
6. General well-being						(.87)	.68**	.50**	.69**	.42**	-.38**	-.44**	-.37**	-.37**	.37**
7. Emotional well-being							(.93)	.52**	.36**	.52**	-.54**	-.45**	-.41**	-.33**	.44**
8. Breastfeeding								(.91)	.40**	.63**	-.25**	-.34**	-.24**	-.24**	.32**
9. Wound healing									(.90)	.26**	-.18**	-.32**	-.26*	-.37**	.35**
10. Infant's well-being										(.95)	-.31**	-.26**	-.28**	-.24**	.29**
t4: 8 weeks after birth															
11. Post. Depression											(.87)	.42**	.51**	.22**	-.35**
12. Post-traumatic stress												(.76)	.33**	.52**	-.25**
t5: 6 months after birth															
13. Post. Depression													(.89)	.60**	-.45**
14. Post-traumatic stress														(.76)	-.44**
15. Attachment															(.89)

Note. t1: n = 311, t4: n = 297, t5: n = 134. **p-value < 0.01. *p-value < 0.05. Reliability (Cronbach's α) in brackets.

Table 17

Zero-order correlations between the explicit and implicit birth-related mindset and the non-birth-related variables and birth experience

	Explicit Mindset				Implicit Mindset			
	t1	t2	t4	t5	t1	t2	t4	t5
t1: < 26th week								
Neuroticim	-.10	-.08	-.09	-.05	.09	.05	-.01	-.03
Trait anxiety	-.15**	-.13**	-.16**	-.09	.08	-.01	-.08	-.03
Self-esteem	.11	.09	.12*	.05	-.05	.02	.06	-.00
Self-efficacy	.13*	.14*	.14*	.10	-.12*	-.05	.00	-.10
Depression	-.09	-.07	-.10	-.03	.06	.02	-.06	.01
t3a: within first week after birth								
Birth experience	.25**	.16**	.33**	.27**	.06	.03	.03	.05
EMA postpartum								
General well-being	.13*	.12*	.25**	.24**	.01	.00	.06	.08
Emotional well-being	.20**	.18**	.26**	.29**	.04	.12*	.14*	.20*
Breastfeeding	.28**	.22**	.30**	.37**	-.01	.14	.12*	.05
Wound healing	.28**	.19**	.35**	.25*	.08	.11	.10	.18
Infant's well-being	.19**	.14*	.21**	.20*	.02	.04	.05	.05
t4: 8 weeks after birth								
Birth experience	.21**	.16**	.32**	.26**	.04	-.01	.05	.06
Post. depression	-.08	-.07	-.13*	-.16	.04	-.01	-.01	-.06
Post-traumatic stress	-.12*	-.09	-.14*	-.11	.02	.01	-.01	-.04
t5: 6 months after birth								
Birth experience	.14	.14	.33**	.30**	.01	-.03	.08	.08
Post. depression	-.08	-.06	-.12	-.06	.10	-.05	.01	-.07
Post-traumatic stress	-.14	-.14	-.19*	-.12	-.13	-.09	-.03	-.11
Attachment	.25**	.21*	.31**	.22*	.06	.10	.13	.15

Note. t1: n = 311, IAT: n = 304, t3a: n = 293, t4: n = 297, IAT: n = 294, t5: n = 134. **p-value < 0.01. *p-value < 0.05.

In Table 17 correlations between the explicit and implicit birth-related mindset and the non-birth-related variables as well as birth experience are shown. Results indicated no or very small ($r < |.16|$) correlations between the birth-related mindset and the personality traits. Small to medium correlations were observed between the explicit birth-related mindset and the variables measured after birth. The IAT only correlated with emotional well-being after birth and breastfeeding. However, correlation coefficients were low.

The periods before, during, and immediately after birth

Control variables

The prospective results of the longitudinal study confirmed the retrospective results of the three validation studies (see Table 18). As expected, labor and birth variables were – partially – associated with the control variables mother's age, baby's weight at birth, and prenatal medical risk, the last of which was primarily related to C-section (*AUC* = .70). Thus, women with one or more medical risks were more likely to have a C-section. However, the strongest effects emerged for being primiparous (*AUCs* ≤ .36 and *AUCs* ≥ .60). Women who gave birth for the first time during this study were more likely to experience a birth that included medical intervention than were women who had given birth before. This was the case for all variables except C-section. Altogether being primiparous decreased the probability of having a low-intervention birth (*AUC* = .29).

Mindset

As displayed in Table 18 the explicit birth-related mindset assessed during pregnancy predicted interventions during labor and birth, midwife care during birth, and place of birth (*AUCs* ≤ .37 and *AUCs* ≥ .69). Overall, a more natural mindset increased the probability of the more natural aspects of labor and birth, and a more medical mindset increased the probability of interventions such as epidurals or C-sections. Accordingly, a more natural mindset increased the probability of having a low-intervention birth (*AUCs* ≥ .69). Mirroring the previous results, the birth-related mindset was not associated with having an assisted vaginal delivery, and only very slightly correlated with the duration of birth. A more natural mindset tended to prolong labor; possibly partly due to a lack of interventions to speed up labor. Results for the birth attitude IAT indicated that overall the IAT predicted the birth less adequately than the MBQ did. However, participants with an implicitly more natural mindset had a higher probability of having a low-intervention birth (*AUCs* ≥ .58, $p < .05$).

Personality

The results for the personality traits were also similar to those of the validation studies. Sporadic– but hypothesis confirming – correlations occurred. Women higher in neuroticism had an increased probability of augmentation of labor and a decreased probability of out-of-hospital births. Women higher in trait anxiety were more likely to have a episiotomy and less likely to have an out-of-hospital birth (both $p < .05$). Women with higher depression scores had a decreased probability of one-on-one-support and out-of-hospital births. Self-esteem and self-

Table 18

AUCs and partial correlations for/between the birth variables and the control variables, birth-related mindset, personality traits, and birth experience

	Low-i. birth	1:1	Induc-tion	Epidural	Augmen-tation	Kristeller manouver	Episio-tomy	Out-of-hospital	Duration[r]	Pain rating[r]	Assisted vag. delivery	C-section
Mother's age (t1)	.58*	.51	.55	.45	.40**	.42*	.40	.60*	-.20**	-.13*	.38	.50
Baby's weight at birth (t3b)	.58*	.61**	.43	.45	.48	.38**	.43	.65**	.06	.11	.51	.48
Risk	.40*	.44	.54	.52	.47	.50	.48	.39*	-.04	-.16**	.49	.70**
Primiparous	.29**	.36**	.60*	.70**	.74**	.72**	.70**	.28**	.35**	.18**	.72**	.55
T1: < 26th week												
Explicit mindset	.73**	.80**	.43	.29**	.34**	.29**	.37*	.92**	.07	-.06	.46	.31**
Implicit mindset	.59*	.59*	.49	.48	.46	.41*	.40*	.58	.09	.05	.47	.45
Neuroticism	.43	.45	.55	.58	.61**	.52	.58	.37**	.10	.16**	.58	.46
Trait anxiety	.44	.44	.56	.55	.57	.52	.60*	.40*	.05	.10	.53	.52
Self-esteem	.53	.56	.48	.44	.47	.50	.46	.56	-.01	-.07	.50	.48
Self-efficacy	.50	.52	.48	.47	.51	.49	.54	.56	-.02	-.08	.50	.49
Depression	.48	.42*	.55	.55	.54	.52	.56	.37**	.05	.08	.56	.49
T2: 6-4 weeks before due date												
Explicit mindset	.69**	.75**	.45	.32**	.37**	.32**	.41	.86**	.14*	.02	.48	.30**
Implicit mindset	.58*	.54	.54	.48	.49	.40*	.42	.62**	.07	.10	.60	.44
Birth experience												
t3a: 1st week after birth	.75**	.66**	.42	.32**	.34**	.39*	.33**	.78**	-.23**	-.19**	.27**	.25**
t4: 8 weeks after birth	.75**	.63**	.42	.34**	.36**	.40*	.38*	.76**	-.24**	-.12*	.29**	.21**
t5: 6 months after birth	.74**	.64*	.46	.39	.36**	.42	.38	.79**	-.24**	-.07	.26**	.24**

Note. t1: n = 311 (except for IAT: n = 305), t2: n = 293, t3a: n = 293, t4: n = 297, t5: n = 134. **p-value < 0.01. *p-value < 0.05. Higher scores of the explicit and implicit birth-related mindset indicate a more natural mindset. [r] Correlation coefficient, all other variables are AUCs.

efficacy did not predict any of the birth variables. Overall, the influence of personality on labor and birth appears to be rather small and none of the personality traits predicted the index low-intervention birth.

Birth experience

The observed patterns associated with birth experience also support the results from the validations studies (Studies 1, 2, and 3, above). Interventions during labor and birth led to a more negative birth experience measured within the first week after birth (*AUC* ≤ .39), with the only exception being induction of labor, which was not associated with having a positive or negative birth experience. One-to-one support during labor and birth, out-of-hospital birth settings, and having a low-intervention birth increased the probability of a positive birth experience. For all results see Table 18.

Birth and postpartum period

As shown in Table 19 results of the EMA assessment revealed that women who had a low-intervention birth and a more positive birth experience had an increased probability of greater well-being, good physical adjustment, and to report having a satisfied and calm infant in the first six weeks after birth. Particularly the body-related variables (breastfeeding and wound healing) were positively related to low-intervention birth. Birth experience was associated with both the body-related and psychological variables. A positive birth experience decreased the probability of postpartum depression and post-traumatic stress symptoms and increased the probability of more secure mother-infant attachment six months after birth ($r \geq |.25|$).

Low-intervention birth and birth experience also predicted the (explicit) birth-related mindset and birth experience assessed after the birth. Women who had a low-intervention birth and a more positive birth experience were more likely to have a more natural mindset and a more positive birth experience eight weeks and six months after birth. However, these findings as well as the below-reported results from the SI model are mute to possible changes of the mindset or birth experience (see paragraph *Changes between the different measurement times*).

Single indicator model

I aimed to integrate the assessed variables into one comprehensive model. As outlined above, I expected a process-like course, characterized by time sequence and a serial influence of the variables (see paragraph *Model assumptions*). Since the birth attitude IAT revealed only a small

Table 19

AUCs and partial correlations for/between low-intervention birth and birth experience at t3a and the variables assessed postpartum

	α	Low-i. birth[A]	Birth exp. at t3a[r]
EMA postpartum			
General well-being	.87	.58*	.38**
Emotional well-being	.93	.57*	.32**
Breastfeeding	.91	.63**	.31**
Wound healing	.90	.68**	.45**
Infant's well-being	.95	.58*	.25**
Postpartum Depression			
t4: 8 weeks after birth	.87	.47	-.20**
t5: months after birth	.89	.45	-.17
Post-traumatic stress			
t4: 8 weeks after birth	.76	.47	-.39**
t5: months after birth	.76	.42	-.27**
Mother-infant attachment 6 month after birth	.89	.57	.25**
Birth experience			
t4: 8 weeks after birth	.91	.75**	.86**
t5: 6 months after birth	.95	.74**	.83**
Explicit mindset			
t4: 8 weeks after birth	.89	.76**	.33**
t5: 6 months after birth	.91	.73**	.27**
Implicit mindset			
t4: 8 weeks after birth	.67	.59*	.03
t5: 6 months after birth	.73	.56	.05

Note. t3a: n = 293, t4: n = 297 (except for IAT: n = 294), t5: n = 134. **p-value < 0.01. *p-value < 0.05. Higher scores of the explicit and implicit birth-related mindset indicate a more natural mindset. [A]AUCs. [r]Correlation coefficient.

association with low-intervention birth, an analysis without IAT was conducted (Model 1), that was then compared with an extended model with IAT (Model 2). Due to the rather small sample size, the complexity of the model, and the large number of indicators per factor, I estimated a fixed-reliability SI model instead of a conventional multiple-indicator structural equation model (SEM), as suggested by Savalei (2018). The reliabilities of the scores used as indicators were set to plausible values on the basis of the estimates from the three validation studies as well from the present study. For the post-traumatic stress scores, the reliability was fixed to .75, for all other indicators, to .90. WLSMV (weighted least squares mean and variance-adjusted) was chosen as the estimator because of the dichotomous dependent variable low-intervention birth.

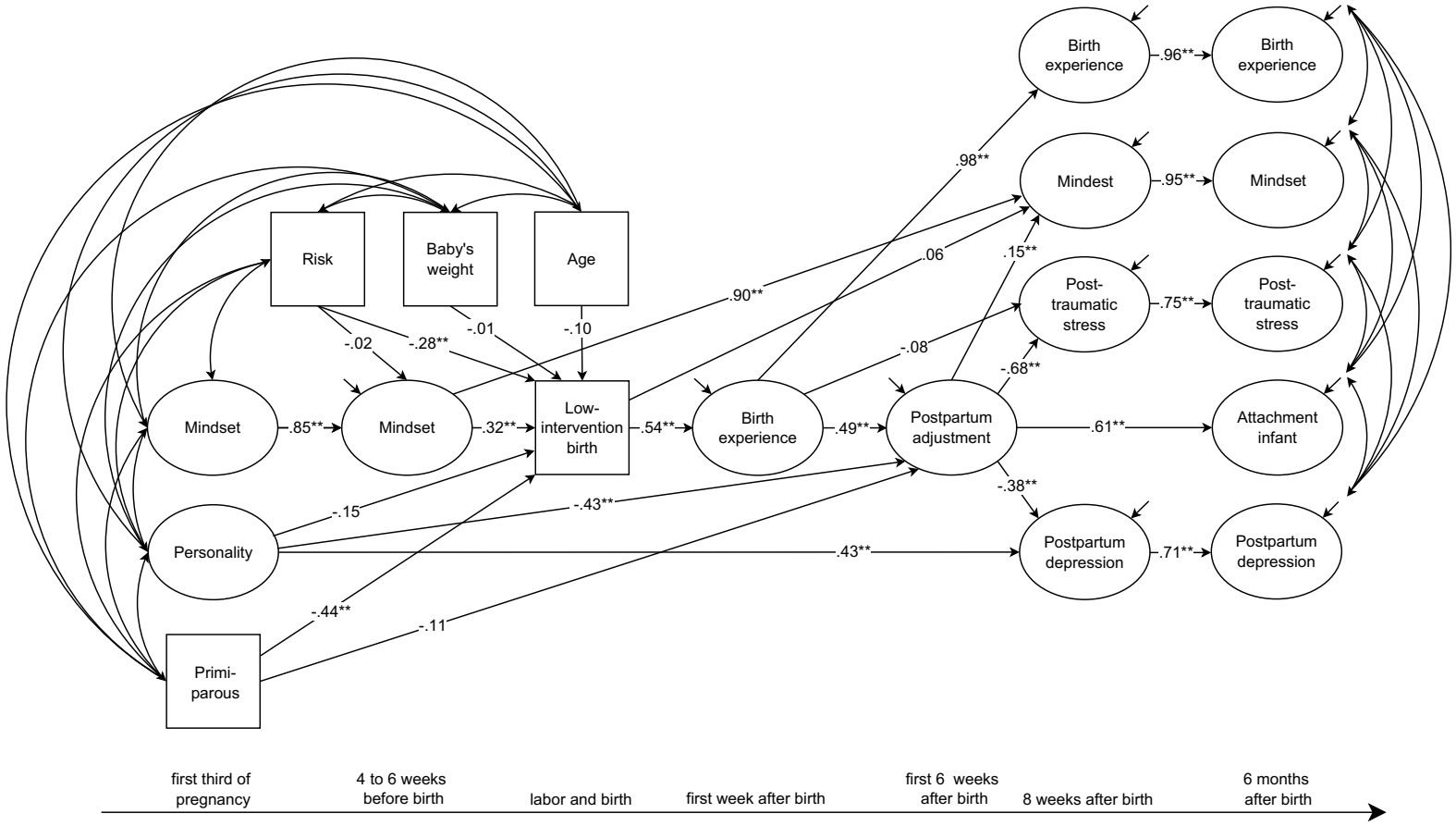
The analysis was performed in Mplus 7.4 (Muthén & Muthén, 1998-2015) using the default convergence criteria and the default processing of missing values. Both the covariances of all exogenous variables and the covariances between the residuals of the endogenous variables were freely estimated. The model fit was assessed using the χ^2-test ($\alpha = .05$). With the necessary caution towards the established handling of fit indices (e.g., Marsh et al., 2004; Ropovik, 2015; Yuan, 2005), the model fit was also assessed with the RMSEA (≤ 0.05), the CFI (≥ 0.96), and the WRMR (≤ 1.00), applying the cutoff values in parentheses as recommended by Yu (2002).

Figure 5 displays the linear structure of the latent (displayed as circles) and manifest (displayed as rectangles) variables of the SI model with the standardized weights. The χ^2-test of model fit was significant ($\chi^2 = 178.918$, $df = 121$, $p < .001$). However, the approximate fit indices (RMSEA = 0.039, CFI = 0.947, WRMR = 0.731) supported the fit of the model according to the conventional cutoffs mentioned above (Yu, 2002). The established model was explored in more detail using sensitivity analyses (Model 1b). However, because I decided to maintain the initial theory-based model (see paragraph *Sensitivity analyses* for reasoning), I first describe the model with regard to content.

The model displays three significant predictors of low-intervention birth: the prenatal risk (-.29), giving birth for the first time (primiparous: -.41), and the birth-related mindset at t2 (.32), which in turn was predicted by the birth-related mindset at t1 (.86). Thus, women with a medical risk and women who gave birth for the first time were less likely to have a low-intervention birth, whereas a more natural mindset increased the probability of a low-intervention birth. Neither the mother's personality nor the baby's weight had an impact on likelihood of a low-intervention birth. The model further reveals that labor and birth impacted psychological well-being after birth by initiating a serial process: Labor and birth had an impact on the birth experience (.54), i.e., a low-intervention birth led to a more positive birth experience. A positive birth experience in turn had a positive influence on postpartum adjustment (.48), and thus a positive influence on the mother's and child's well-being, on breastfeeding, and on wound healing. Personality (-.41; high scores in neuroticism, general anxiety, and depression, low scores in self-esteem and self-efficacy), and being a first-time mother (-.13, $p < .05$) negatively impacted the postpartum adjustment. For the variable primiparous the effect was small. A positive postpartum adjustment led to fewer symptoms of post-traumatic stress (-.67) and postpartum depression (-.38) eight weeks after birth. The latter was also predicted by the women's personality (.43). The post-traumatic stress and postpartum depression symptoms eight weeks after birth predicted the

Figure 5

Linear structure of the latent (displayed as circles) and manifest (displayed as rectangles) variables with the standardized weights of the SI model



symptoms assessed six months after birth (.75 and .72). It was further shown that a postpartum adjustment led to more positive affect towards the infant six months postpartum. The birth-related mindset and birth experience assessed eight weeks after birth were each predicted by their previous assessments (mindset t4 on mindset t2: .90; birth experience t4 on birth experience t3: .98) and predicted the corresponding score six months after birth (.96 in both cases). The birth-related mindset assessed eight weeks after birth was also slightly positively predicted by a positive postpartum adjustment (.15). In summary, the results of the SI model confirmed my hypothesis: the birth-related mindset partly influences labor and birth, and the experienced birth influences the mother's and child's psychological well-being up to six months later.

Sensitivity analysis

A comparable result was also found by a sensitivity analysis, which is particularly indicated for small samples (Pek & MacCallum, 2011). Figure 6 displays the influence of each individual case on overall model fit, i.e., the differences $\Delta\chi^2_i = \chi^2 - \chi^2_{(i)}$ of the model test statistic χ^2 based on all cases and the test statistic $\chi^2_{(i)}$ obtained by excluding the *i*th case. Three cases proved to be particularly relevant for the overall fit, first one so-called good case (case 156), whose exclusion leads to a worsening of the fit, and second two bad cases (cases 180, 285), whose exclusion leads to an improvement of the overall fit. To assess the overall impact of these three cases, the model was estimated without these influential cases, using the remaining *n* = 308 cases. Results revealed a better fit than for the whole sample (χ^2 = 150.656, *df* = 121, *p* = .035; RMSEA = 0.028, CFI = 0.969, WRMR = 0.659), but the influence of these cases on the path coefficients of interest was negligible, except for low-intervention birth significantly predicting the birth-related

Figure 6

Sensitivity analysis for the mindset model

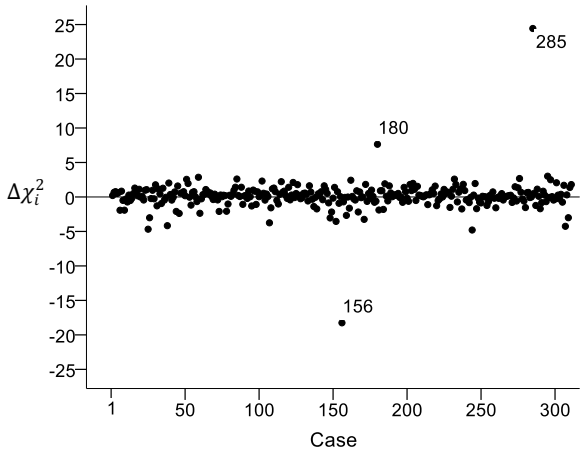


Table 20

Standardized results of the two model variants (without and with IAT) Study 4

	Model 1a		Model 1b		Model 2 (with IAT)	
Coefficients	Est.	*p*	Est.	*p*	Est.	*p*
Explicit mindset t2 on						
explicit mindset t1	.851	<.001	.850	< .001	.891	< .001
risk	-.018	.613	.002	.954	-.023	.528
Implicit mindset t2						
implicit mindset t1	-	-	-	-	.756	< .001
risk	-	-	-	-	-.005	.937
Low-intervention birth on						
risk	-.283	< .001	-.282	< .001	-.286	< .001
baby's weight	-.013	.854	-.025	.735	-.010	.888
mother's age	-.096	.168	-.088	.214	-.096	.175
primiparous	-.441	< .001	.476	< .001	-.043	< .001
explicit mindset t2	.318	< .001	.266	< .001	.343	< .001
implicit mindset t2	-	-	-	-	-.034	.681
personality	-.149	.072	-.124	.097	-.145	.086
Birth experience t3a on						
low-intervention birth	.538	< .001	.515	< .001	.519	< .001
Postpartum adjustment on						
birth experience t3a	.490	< .001	.426	< .001	.496	< .001
personality	-.433	< .001	-.466	< .001	-.429	< .001
primiparous	-.113	.069	-.109	.101	-.124	.045
Postpartum depression t4 on						
postpartum adjustment	-.378	< .001	-.393	< .001	-.375	< .001
personality	.428	< .001	.383	< .001	.433	< .001
Postpartum depression t5 on						
postpartum depression t4	.709	< .001	.643	< .001	.709	< .001
Post-traumatic stress t4 on						
postpartum adjustment	-.680	< .001	-.622	< .001	-.680	< .001
birth experience t3b	-.077	.279	-.141	.032	-.072	.325
Post-traumatic stress t5 on						
post-traumatic stress t4 on	.709	< .001	.684	< .001	.757	< .001
Attachment to infant						
postpartum adjustment	.607	< .001	.507	< .001	.616	< .001
Explicit mindset t4 on						
postpartum adjustment	.148	.002	.091	.052	.148	.002
low-intervention birth	.064	.353	.130	.039	.075	.280
explicit mindset t2	.904	< .001	.888	< .001	.877	< .001
Implicit mindset t4 on						
postpartum adjustment	-	-	-	-	.055	.428
low-intervention birth	-	-	-	-	.160	.043
implicit mindset t2	-	-	-	-	.719	< .001
Explicit mindset t5 on						
explicit mindset t4	.953	< .001	.951	< .001	.958	< .001
Implicit mindset t5 on						
implicit mindset t4	-	-	-	-	.773	< .001
Birth experience t4 on						
birth experience t3a	.976	< .001	1.008	< .001	.967	< .001
Birth experience t5 on						
birth experience t4	.963	< .001	.942	< .001	.965	< .001

Note. For Model 1a and Model 2: n = 311, for Model 1b: n = 308.

mindset assessed eight weeks after birth (.13, p = .039; Table 20). But overall, the sensitivity analysis indicated the robustness of the path coefficients. Thus, taking the results of the sensitivity analyses and the sufficiently good model fit of the initial model into account, I decided to maintain the theory-based model using the whole sample (Figure 5).

Single indicator model with IAT

I used the same procedure for the fixed-reliability SI model with IAT as in Model 1a. For post-traumatic stress and the IAT, reliabilities were fixed to .75; for all other indicators, reliability were again fixed to .90. The model was estimated with WLSMV, using Mplus 7.4 default convergence and default processing of missing values, the covariances of all exogenous variables and covariances between the residuals of endogenous were freely estimated. In addition to the variables of Model 1a, the birth attitude IAT was included in Model 2, having the same paths as the birth-related mindset measured with the MBQ. Standardized results of the coefficients are displayed in Table 20. Results indicated a slightly better fit (χ^2 = 18.972, df = 23, p = .703, RMSEA = 0.000, CFI = 1.000, WRMR = 0.336) of Model 2 compared to Model 1a (without IAT). However, the IAT mainly predicted itself at its different measurement points, although low-intervention birth predicted the IAT assessed eight weeks after birth (.16, p = .043). Though, the effect was relatively small, it may support the hypothesis that the present positive - negative IAT measures the evaluation of birth rather than an implicit birth-related mindset (see *Interim conclusion* of the validation studies). At least in the present sample, the IAT did not add any value to the prediction of low-intervention birth compared to the MBQ. I therefore consider Model 1a as a sufficiently good representation of the data, also considering that the coefficients of Model 1a and 2 did not differ substantially.

Additional analyses

Changes between the different measurement times

As became evident in the SI model, when measures were repeated, scores on the assessment at one time predicted scores on the assessment at a later measurement time. However, no conclusion can be drawn about stability or changes. Table 21 displays means and standard deviations for the repeated measures as well as additionally performed paired t-tests. For each construct, means of the different measurement times that do not share the same index are statistically different from each other. Note, however, for the measurement time six months after birth (t5) the sample size was reduced, which led to less significant differences. Since I had no a priori hypotheses about possible changes, these results are to be understood only as exploratory,

Table 21

Means and standard deviations for the repeated measures

	M	*SD*
Explicit mindset		
t1: first third of pregnancy	4.55	.79
t2: 6-4 weeks before due date	4.71_{A}	.78
t4: 8 weeks after birth	4.76_{B}	.79
t5: 6 months after birth	4.83_{AB}	.83
Implicit mindset		
t1: first third of pregnancy	0.79_{A}	.40
t2: 6-4 weeks before due date	0.74_{AB}	.37
t4: 8 weeks after birth	0.72_{B}	.37
t5: 6 months after birth	0.71_{A}	.39
Birth experience		
t3a: first week after birth	4.81_{A}	1.01
t4: 8 weeks after birth	4.86_{B}	1.06
t5: 6 months after birth	4.86_{AB}	1.50
(Postpartum) depression		
t1: first third of pregnancy	1.87_{A}	.69
t4: 8 weeks after birth	1.82_{A}	.73
t5: 6 months after birth	1.87_{A}	.80
Post-traumatic stress		
t4: 8 weeks after birth	2.07	.74
t5: 6 months after birth	1.87	.66

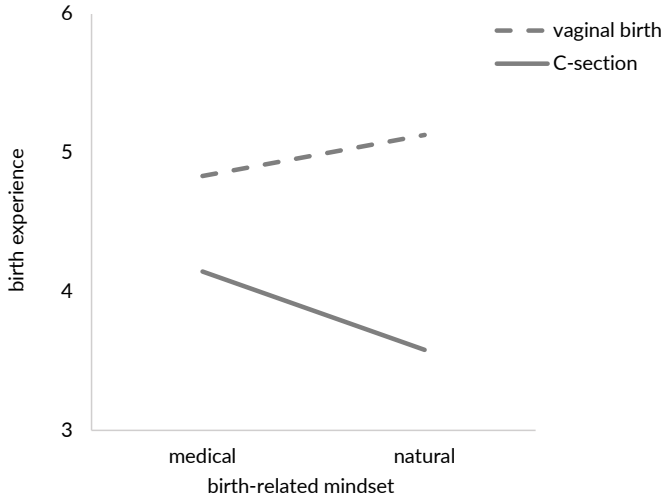
Note. t1: n = 311 (expect for IAT n = 306), t2: n = 293, t3a: n = 297, t4: n = 297 (except for IAT: n = 294), t5: n = 134 (except for IAT: n = 117). For each construct, means of the measurement times that do not share the same index are statistically different from each other. *p-value < 0.05.

but they can serve to inform hypotheses for subsequent research. The explicit birth-related mindset became slightly more natural over time, and t1 differed significantly from the three subsequent measuring points. This trend also continued after birth, which was in contrast to studies indicating birth beliefs become more medical after birth (Preis et al., 2018). The trend for the IAT showed the development towards a more medical mindset. Here, however, a decrease was already observed during pregnancy and the times t2 and t4 did not differ significantly. The birth experience was slightly more positive eight weeks and six months after birth than measured within the first week after birth; the difference between t3a and t4 was significant. Depression symptoms appeared to be relatively stable over all three measurement times, and no significant

differences could be found. Post-traumatic stress symptoms decreased from eight weeks to six months after birth, and this difference was significant.

Figure 7

Moderation analysis: Birth experience as a function of the birth-related mindset measured with the MBQ and the mode of birth



Moderation

In the second and third validation studies, moderation analyses suggested that the evaluation of different birth modes (C-section versus vaginal birth) also depended on the mindset orientation. In the longitudinal study I aimed to replicate and expand the findings by using the birth-related mindset assessed before birth (t2) as a moderator and low-intervention birth as a predictor. However, no significant interaction of low-intervention birth and mindset (β = .11, *SE* = .08, *p* = .154) was found. I therefore conducted the same moderation analyses with C-section instead of low-intervention birth (y = birth experience t3, x = mode of birth [-1 = vaginal birth, 1 = C-section], w = overall score of the MBQ at t2). The model summary indicated a significant model (R^2 = .17, $F(3, 283)$ = 19.23, p < .001) and a significant increase in the amount of variance explained due to the interaction (ΔR^2 = .03, p = .004). Although C-section (β = -.56, *SE* = .08, p < .001) had a main effect on birth experience, the overall score of the MBQ at t2 (β = .08, *SE* = .07, p = .276) did not. But the interaction term of the two variables was significant (β = -.26, *SE* = .09, p = .004). Conditional effects of the focal predictor were significant for low (b = -.34, *SE* = .08, p < .001) and high (b = -.774, *SE* = .13, p < .001) values of the moderator (MBQ at t2). Thus, for C-section moderation effects of the validation studies could be replicated, indicating that the evaluation of the birth mode (C-section versus vaginal birth) partly depended on the mindset orientation. C-sections were rated more negatively than vaginal births, however the rating depended also on the mindset. Participants with a more natural mindset rated C-sections more negatively than participants with a more medical mindset (see Figure 7). However, this pattern of results was not observed for the variable low-intervention birth.

I also conducted moderation analyses for the birth attitude IAT as a moderator between low-intervention birth and birth experience (y = birth experience t3, x = low-intervention birth, w = attitude IAT at t2) and as a moderator between C-section and birth experience (y = birth experience t3, x = mode of birth [-1 = vaginal birth, 1 = C-section], w = attitude IAT at t2). In both cases, the interaction was not significant (low-intervention birth: β = -.12, *SE* = .160, *p* = .473; C-section: β = .02, *SE* = .19, *p* = .904). Thus, as in the Study 3 the birth attitude IAT did not moderate the effect between mode of birth and birth experience.

Pain

The subject of pain takes on a special role in the context of birth. As revealed in Table 18 pain rating was not associated with the birth-related mindset; there were small, negative correlations between pain ratings and mother's age and risk; and there were small, positive correlations between pain ratings and being primiparous and high neuroticism. The negative association with the birth experience measured within the first week after birth was only *r* = -.19, with decreasing tendency over time (t4: *r* = .12, *p* < .05; t5: *r* = -.07, *p* > .05). Thus, six months after the birth, birth experience was not affected by the perceived labor and birth pain. This is also mirrored by the non-significant findings between perceived pain and birth experience in the validation studies, where birth experience was measured weeks or months after birth. Additional analyses revealed that the pain rating was associated with some of the performed interventions. Augmentation during labor (*AUC* = .62), the Kristeller maneuver (*AUC* = .68), and assisted vaginal delivery (*AUC* = .72) were associated with an increase in the perceived pain. C-section (*AUC* = .26) with decreased perceived pain. Small effects with *p* < .05 could be found for epidural (*AUC* = .58), episiotomy (*AUC* = .40), and duration of birth (*r* = .15). However, since the pain rating does not seem to have a long-term negative effect on the birth experience, the impact of interventions on the birth experience might be of more importance than the impact of interventions on the pain rating. Most notably, the associations between interventions and birth experience remained relatively constant across the different measurement points (see Table 18).

One-on-one support during labor and birth

Research indicates a positive effect of one-on-one-support for labor and birth (Sandall et al., 2013). Both in the validation studies and in the longitudinal study, AUCs revealed that one-on-one support was positively associated with birth experience (see e.g., Table 18). To test whether one-on-one support had a positive impact on labor and birth (operationalized with the birth index *low-intervention birth*) when controlling for the control variables risk, mother's age, and baby's weight), I conducted logistic regression analyses. First control variables and second one-on-one

support were entered into the regression. Results indicated a significant NR^2 = .09 (p < .001) for the control variables. Entering one-on-one support into the regression revealed a significant increase of ΔNR^2 of 9% (p < .001). This finding supports the hypothesis that one-on-one support has a positive influence on low-intervention birth. To explore whether one-on-one support positively affected the birth experience above and beyond the course of labor and birth, I conducted a multiple linear regression analysis, entering low-intervention birth in a first step and one-on-one support in a second step into the regression. Results revealed a significant prediction for low-intervention birth (R^2 = .16, p < .001) and a small increase of ΔR^2 = .02 (p = .018) for one-on-one support. Thus, above and beyond the birth outcome, one-on-one support had a positive effect on the birth experience. However, the effect was rather small.

One can argue, it is necessary to also include the two predictors birth-related mindset (t2) and primiparous into the logistic regression. Due to the intercorrelations of one-on-one support with the birth-related mindset (r = .39) and being primiparous (r = -.20), and the similarly high correlations of the birth-related mindset (r = .30) and being primiparous (r = -.42) with low-intervention birth, entering primiparous and the birth-related mindset alongside the control variables into the logistic regression led to a redundancy effect. Accordingly, the increase of variance explained due to one-on-one support decreased to ΔNR^2 = 1.4% (p = .049). However, both statistically and in terms of content, it is difficult to separate the three variables. A natural mindset increases and being primiparous decreases the probability of choosing one-on-one support and, in addition, even a mutual influence of the factors is highly likely with one-on-one support strengthening the already more natural mindset. From a psychological perspective, it seems reasonable that a social component as continuous support positively affects a stressful event and its appraisal. However, since women with a more natural mindset are more likely to choose one-on-one-support, it cannot be ruled out that the mindset is the more decisive factor. It is also possible that women with a more medical mindset in particular would benefit from one-on-one-support but do not choose to have a midwife present for one-on-one support because it does not seem relevant or necessary to them. Thus, further research in this area is necessary with a random allocation to one-on-one support to e.g., exclude covarying effects such as the birth-related mindset and being primiparous as explanations. It also would be necessary to include quality of one-on-one support since differences can also be expected in this respect.

The mindset's mode of action

As outlined in the prologue, I assume women and also couples can make reflective decisions about labor and birth both in advance and during the process, such as planning or deciding

whether to have an out-of-hospital birth, an elective C-section, or an epidural. These decisions could be explained by rational choice theories or the central postulate of Ajzen's *Theory of planned behavior* that posits behavior follows primarily from intentions to behave in a certain way (e.g., Ajzen, 1991). Outcomes of labor and birth, however, may also include aspects that are not intended and out of the women's (or couples') control. Conceivably, the mindset and its associated cognitions and emotions could influence the course of the birth, e.g., in the sense of a self-fulfilling prophecy. Thus, a more medical mindset could cause the women to be tense during labor, implicitly expecting things to go wrong. Such tension could interfere with the natural hormone release, increasing the probability of complications that then need to be solved with interventions such as the Kristeller maneuver, episiotomy, vaginal assisted birth, or unplanned/emergency C-section. Results of the AUC analyses (Table 18) indicated that the mindset influenced both type of variables: those that tend to be rather decision-driven and those that tend not to be subject to conscious decision (except for assisted vaginal delivery). The effects were stronger for the decision-driven variables. However, the distinction between decision and uncontrolled outcome cannot be made in every case. Some of the assessed birth variables may represent both decision and outcome. For example, women may decide and plan to have an out-of-hospital birth before going into labor, but during labor and delivery complications may occur that make a transfer necessary. Women may also object to an epidural before birth, but a lack of relaxation during childbirth may make an epidural necessary. Even a C-section, which may become necessary during the birth process, sometimes involves a conscious decision.

Nevertheless, C-sections in particular may provide important evidence for the exploration of the birth-related mindset's mode of action. It could be argued that planned C-sections are rather decision-based and non-planned C-sections are rather uncontrollable outcomes. Since the C-section rate was rather low in the longitudinal sample (19.6%, n = 58), I did not distinguish between planned (n = 21) and unplanned (n = 33) C-sections in the AUC analyses. For this specific question, I tested whether the birth-related mindset differed in regard to the different birth modes (vaginal, assisted vaginal delivery, unplanned C-section, planned C-section) by performing an univariat ANOVA with the birth-related mindset assessed six to four weeks before the due date[7] as the dependent variable and the birth mode as the independent variable. Results

[7] It could be argued that women with planned C-sections know six to four weeks before the due date that they are going to have a planned C-section and *adjust* their mindset with regard to this decision. However, the results do not differ substantially when using the first measurement date at the beginning of pregnancy (t1).

Table 22

Descriptive statistics and multiple comparisons of the post-hoc test for the performed univariate ANOVA

Mode of birth (i)	*n*	*M*	*SD*	Mode of birth (j)	Mean difference (i-j)	Std. Error	*p*	CI (95%)	
1. vaginal birth	213	4.84	.73	2	.19	.17	1.000	-.254	.636
				3	.80	.17	< .001	.346	1.255
				4	.45	.14	.008	.080	.823
2. assisted vag. birth	22	4.65	.80	1	-.19	.17	1.000	-.636	.254
				3	.61	.23	.048	.004	1.215
				4	.26	.21	1.000	-.286	.808
3. planned C-section	21	4.04	.87	1	-.80	.17	< .001	-1.255	-.346
				2	-.61	.23	.048	-1.215	-.004
				4	-.35	.21	.576	-.903	.206
4. unplanned C-section	33	4.39	.77	1	-.45	.14	.008	-.823	-.080
				2	-.26	.21	1.000	-.808	.286
				3	.35	.21	.576	-.206	.903

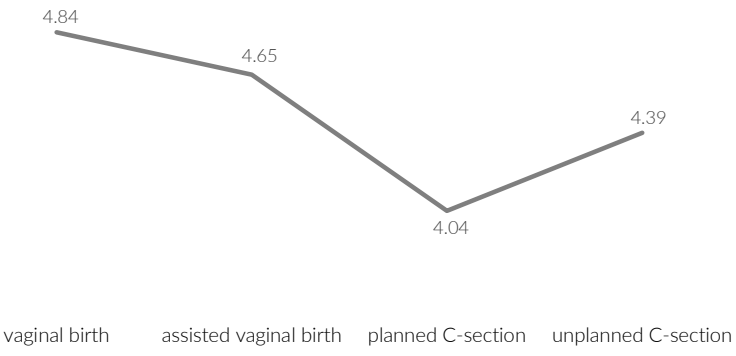
Note. N = 289.

revealed a significant main effect of the birth mode ($F(3, 285) = 9.852$, $p < .001$, $\eta_p^2 = .094$). As displayed in Table 22, the subsequent post-hoc test (Bonferroni corrected) indicated no significant difference in the birth-related mindset between planned and unplanned C-sections. However, only three women had an elective C-section; all other planned C-sections were performed due to medical reasons (e.g., breech position of the baby). Although a planned C-section with medical indication is not the same as *wanting* to give birth by C-section, the birth-related mindset could have played a role in weighting potential risks. In fact, the most common reason for a C-section was breech presentation of the baby (3.5%), where the birth mode is controversially discussed (e.g., Berhan & Haileamlak, 2016). Descriptively, the mean values point to the expected direction, namely planned C-sections were associated with a more medical mindset than unplanned C-sections (see Table 22 and Figure 8). However, the following result is even more potentially elucidating of the mindset's mode of action: Women who had a vaginal birth had a significantly more natural mind-set than both women

who had a planned or unplanned C-section. This might indicate that the birth-related mindset did not only impact birth-related decisions before birth, but also aspects during labor and birth. Thus, the mindset might influence the course of the birth in a more subtle and uncontrollable way.

Figure 8

Estimated marginal means of the birth-related mindset for the different modes of birth



SUMMARY

The aim of the first part (Study 4) of the longitudinal study was to replicate and expand the results of the validation studies using a prospective design, thus testing causal effects of the birth-related mindset on labor and birth and its relevance to short- and long-term psychological well-being. The longitudinal design replicated the results of the validation studies and the findings could be integrated into a single-indicator model. Results revealed that the birth-related mindset assessed during pregnancy impacted labor and birth: women with a more natural mindset had a higher probability of having a low-intervention birth. This in turn had a positive effect on the birth experience, which led to greater general, emotional, and physical well-being in the first six weeks after birth. Breastfeeding and the well-being and (perceived) behavior of the infant were also positively affected. These short-term positive effects in turn influenced longer-term psychological well-being up to six months after the birth, operationalized as postpartum depression, post-traumatic stress symptoms, and mother-infant attachment. These results are crucial as depression in mothers does affect both mother and child. Research suggests maternal depression can affect the mother's caregiving ability (Priel et al., 2019), and children's stress response and physical health such as the function of the immune system (Ulmer-Yaniv et al., 2018). Furthermore, parent-infant relationship research indicates that secure attachment buffers cortisol release in infants while being exposed to a stressor, thus, having a positive effect on the infant (Gunnar & Hostinar, 2015).

The birth attitude IAT resulted in promising results in Study 3. In the longitudinal study, there were small effects in the AUCs. In the SI model, however, the IAT did not predict labor and birth related variables. Low-intervention birth did predict the birth attitude IAT eight weeks after birth (t4), but the effect was only small (.16, p = .043). This could be an indication that the IAT measures birth experience. However, due to the small effect this result should not be overestimated. Thus, whether the IAT measures an implicit birth-related mindset or rather a positive versus negative evaluation of the birth experience (see *Interim conclusion* of the validation studies) cannot be answered by the results of the longitudinal study. In the general discussion potential reasons for the non-predictive value of the IAT are discussed.

A strong factor affecting low-intervention birth was being primiparous. Women giving birth for the first time had a high probability of interventions during labor and birth. Considering the results presented above, which highlight the relevance of low-intervention birth and the birth experience for both short- and long-term psychological well-being, further studies should explore potential reasons for the higher rate of interventions for first-time mothers. In the general discussion (see below), I will briefly discuss some hypotheses for future research. The results of the validation studies also revealed that personality does not strongly influence labor and birth. The birth-related mindset, thus, is not the same as anxiety. Personality, however, had an influence on well-being during the first six weeks after birth. The effect was positive for a rather non-anxious and self-confident personality and is in line with previous studies indicating associations between personality and well-being (Diener et al., 1999).

STUDY 5: MEN

The results of the first part of the longitudinal study revealed a causal impact of the female birth-related mindset on labor and birth and its effect on subsequent psychological factors such as the evaluation of the birth (birth experience) and short- and long-term well-being. Qualitative research suggests prenatal anxiety (Eriksson et al., 2007; Eriksson et al., 2005) and postpartum depression also occur in men (Scarff, 2019). This suggests that for men, too, birth and its outcomes may be related to psychological factors. Studies indicated hostile sexism in men to be associated with the assumption that men have the right to object to women's pregnancy-related and birth-related decisions (Petterson & Sutton, 2018). It follows that men – at least under certain conditions – do not consider themselves uninvolved when it comes to birth. Furthermore, surveys with gynecologists revealed men do hold elaborate attitudes towards labor and birth

(Klein et al., 2009). There is no reason to assume that men do not have mental representations about birth. Although of course the question arises to what extent these are similar to the mental representations women have and whether men's mental representations can have an effect on childbirth. In the following section, I will therefore explore whether the results found for women can be transferred to the male sample. For this purpose, I conducted CFAs for the birth-related questionnaires (MBQ and Birth experience scale), and, analogous to the previous studies, calculated correlations and AUCs and integrated the results into a SI model.

METHOD

Participants

Fluctuations in the sample size occurred depending on the time of measurement (t1: *n* = 304, t2: *n* = 289, t3a: *n* = 285, t4: *n* = 292, and t5: *n* = 92). The mean age for the 304 participants at t1 was 32.58 years (*SD* = 4.51), and 61.7% were married. About half of the participants were first-time fathers (51.8%), and 2.8% were not present at labor and birth (e.g., because no care could be found for the older child or because birth went unexpectedly quickly).

Measures

Again only those measures relevant to the present research questions are presented here. A complete list of the measures used in the larger longitudinal study can be found in the Appendix.

As in Study 4, the following variables regarding the mothers were used for analyses: low-intervention birth, primiparous, medical risk, and birth-related mindset assessed six to four weeks before the due date (t2). In addition, I assessed the men's personality in the first third of pregnancy (t1; α = .90); birth-related mindset six to four weeks before the due date (t2; MBQ: α = .85, IAT: .76); birth experience within the first week after birth (t3a; α = .85), eight weeks after birth (t4; α = .88), and six months after birth (t5; α = .87); postpartum depression eight weeks (t4; α = .85) and six months after birth (t5; α = .84); and attachment to the infant six months after birth (t5; α = .84) using the same questionnaires as for female participants described in Study 4. I did not assess post-traumatic stress symptoms for male participants. For the birth attitude IAT participants with an error rate > .25 were excluded from the analyses. This was the case for six participants at t1 and t4 each, one at t3, and two at t5.

Postpartum adjustment

The postpartum adjustment assessment for male participants was slightly different from that for women. I again used EMA (Stone & Shiffmann, 1994) with time-based sampling (Shiffmann et al., 2008), meaning male participants received a link to the online questionnaire on their mobile phones at a random time of a day daily in week one and two, and weekly for the following four weeks. But men only answered questions about their general well-being (without the item measuring current pain), emotional well-being, and the perceived infant's well-being, not the items measuring breastfeeding issues and wound healing. The response format, direction of coding (higher values indicate a higher/more positive adjustment), and calculation of Cronbach's α (.94) were identical to the procedure used to analyze women's responses.

RESULTS AND DISCUSSION

Psychometric properties of the birth-related measures

Mindset and Birth Questionnaire

Means and standard deviations for the measures used in the SI model (see below) are shown in Table 23. In Table 24 zero-order correlations of the MBQ and its measurement points (.67 ≤ *r* ≤ .89). and with its subscales for all four measurement points (.51 ≤ *r* ≤ .86) are displayed. Intercorrelations of the subfactors (within a measurement point) ranged from .12 (*p* < .05) to .58, whereby the weakest correlations consistently occurred for shame and disgust sensitivity. Reliabilities (Cronbach's α) of the subfactors were all ≥ .72.

Table 23

Means and standard deviations for the measures used in the SI model

	M	*SD*
t1: < 26th week		
1. Neuroticim	2.42	.94
2. Trait anxiety	2.38	.66
3. Self-esteem	5.04	.65
4. Self-efficacy	4.67	.62
5. Depression	1.65	.59
t2: 6-4 weeks before due date		
6. Explicit mindset	4.39	.71
7. Implicit mindset	.59	.42
t3: 1st week after birth	4.73	.82
8. Birth experience	5.21	.76
EMA postpartum		
9. General well-being	4.73	.82
10. Emotional well-being	5.30	.50
11. Infant's well-being	4.74	.59
t4: 8 weeks after birth		
12. Postpartum Depression	1.56	.58
t5: 6 months after birth		
13. Postpartum Depression	1.73	.61
14. Attachment	5.49	.37

Note. t1: *n* = 304, t2: *n* = 289 (except for IAT: *n* = 297), t3a: *n* = 285, t4: *n* = 292, t5: *n* = 93.

Table 24

Zero-order correlations of the MBQ and its measurement points and subscales

	Overall score			
	t1	t2	t4	t5
Overall score				
t1: < 26th week	(.86)	.78**	.73**	.67**
t2: 6-4 weeks before due date		(.84)	.80**	.80**
t4: 8 weeks after birth			(.88)	.89**
t5: 6 months after birth				(.87)
Subscale				
Trust in midwives	.77**	.75**	.78**	.69**
Negative view drug support	.75**	.72**	.76**	.72**
Low birth-related shame and disgust sensitivity	.52**	.52**	.51**	.52**
Positive view of vaginal birth	.77**	.75**	.81**	.86**

Note. t1: *n* = 304, t2 : *n* = 289, t4: *n* = 292, t5: *n* = 92. **p-value < 0.01. *p-value < 0.05. Reliability (Cronbach's α) in brackets.

I conducted CFA for the men's mindset at t2 (because this measurement point was used for the SI model displayed below), analogous to that of female participants in Study 2. Thus, I again tested a one-factor model (Model 1), a four-factor correlated solution (Model 2), and a second-order factor model (Model 3). As for female participants, the CFA indicated a significant χ^2 for all three models. However, again, both Model 2 and Model 3 showed acceptable RMSEA and SRMR values (< .10) and comparable AIC, CFI, and TLI values (Table 25). The fit indices were slightly inferior to those associated with the data from female participants (see Table 6). For Model 2 the factor loadings of the subscale *trust in midwives* ranged from .62 to .78, for *negative drug support* from .47 to .93, for *birth-related shame and disgust sensitivity* from .56 to .85, and for *positive view of vaginal birth* from .52 to .81. For Model 3 the factor loadings for *trust in midwives* ranged from .62 to .77, for *negative drug support* from .48 to .92, for *birth-related shame and disgust sensitivity* from .56 to .85, and for *positive view of vaginal birth* from .52 to .81. For both models $p < .001$. Thus, similar factor loadings emerged for Model 2 and Model 3. These model loadings were slightly lower than the CFA factor loadings for female participants in Study 2. Nevertheless, the MBQ seemed to be applicable for men. I therefore refrained from improving the fit by e.g., reducing items to maintain comparability with the women's mindset.

Birth attitude IAT

For male participants the same birth attitude IAT as for female participants was used. For all measurement points, reliabilities were sufficiently high (α ≥ .76). Intercorrelations between the different measurement points are displayed in Table 26.

Table 25

Model fit indices for cross validation confirmatory factor analysis for the male mindset at t2

Model	χ^2	*df*	χ^2 / *df*	RMSEA	CI_{RMSEA} (90%)	SRMR	AIC	CFI	TLI/NNFI
1: One factor	1185.33**	135	8.78	.164	[.156; .173]	.131	16698.21	.47	.40
2: Four factors correlated	320.83**	129	2.49	.072	[.062; .082]	.081	15845.70	.90	.87
3: Second-order factor	335.42**	131	2.56	.073	[.064; .083]	.085	15856.30	.90	.88

Note. N = 206. **p < .001. RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean Square Residual, AIC = Akaike Information Criterion, CFI = incremental fit indices, TLI/ NNFI = Tucker-Lewis index.

Birth experience scale

For female participants a one-factor solution was found for the Birth experience scale (see Study 2 for EFA and Study 3 for CFA). For the male version I aimed to determine whether the one-factor model would be replicated. Again, the model fit of the congeneric measurement model with uncorrelated errors (χ^2 = 107.536, *df* = 35, RMSEA = 0.120, CFI = 0.855, SRMR = 0.072) could be improved by releasing three error covariances (χ^2 = 55.528, *df* = 32, RMSEA = 0.072, CFI = 0.953, SRMR = 0.055). Omega (Raykov, 2004) corrected for the error covariances resulted in a value of .79 for the model with correlated errors. For the model with uncorrelated errors omega was .83. On the basis of this acceptable fit, I considered the Birth experience scale as suitable for male participants and used it for further analyses. Correlations between birth experience measured within the first week after birth and birth experience eight weeks (t4) and six months after birth (t5) can be found in Table 27.

Intercorrelations between male and female variables

Both the men's birth-related mindset and birth experience were correlated with the women's birth-related mindset and birth experience. For the explicit mindset, correlations ranged from .59 to .68, and for the Birth experience scale from .60 to .76. Thus, intercorrelations were relatively high, indicating similarity between men and women. Correlations for the birth attitude IAT were not significant for the measurement points first third of pregnancy to eight weeks after birth (t1-t4; ranging from .01 at t4 to .08 at t1). Six months after birth (t5) the birth attitude IATs correlated significantly (r = .26, p < .05).

Table 26

Zero-order correlations of the birth attitude IAT and its measurement points

	t1	t2	t4	t5
t1: < 26th week	(.78)	.48**	.40**	.23*
t2: 6-4 weeks before due date		(.76)	.60**	.53**
t4: 8 weeks after birth			(.80)	.61**
t5: 6 months after birth				(.76)

Note. t1: *n* = 298, t2 : *n* = 284, t4: *n* = 281, t5: *n* = 90. **p-value < 0.01. *p-value < 0.05. Reliability (Cronbach's α) in brackets.

Intercorrelations of the used measurements

In Table 28 zero-order correlations for the measurements used in the SI model (see below) are presented. The traits were highly correlated with each other and also to all variables measured after birth (well-being, postpartum depression, attachment to the infant), which were in turn moderately to highly correlated with each other as well. Neither the traits nor the variables assessed postpartum were associated with the explicit or implicit birth-related mindset assessed six to four weeks before the due date. Exceptions were trait anxiety, the birth experience, and perceived infant's well-being, which showed only small correlations to the explicit birth-related mindset ($r \geq |.12|$, $p < .05$). The correlation between the explicit and implicit birth-related mindset was $r = .31$. All results were theoretically reasonable.

The periods before, during, and immediately after birth

To reasonably limit the number of possible analyses, I calculated AUCs only for the low-intervention birth index and birth experience assessed in the first week after birth (see Table 27). Results were similar to those for female participants. If men had a more natural mindset six to four weeks before the due date, this increased the probability that the woman gave birth with fewer interventions (for IAT: $p < .05$). The AUC for the MBQ (at t2) was slightly higher than for women (men: .74, women: .69). Except for self-efficacy ($p < .05$), none of the personality traits were related to low-intervention birth. As for women, low-intervention birth resulted in a more positive birth experience.

Table 27

AUCs and partial correlations for/between low-intervention birth and birth experience at t3a and the variables assessed during pregnancy and postpartum

	α	Low- i. birth[A]	Birth exp. at t3a[r]
T1: < 26th week			
Explicit mindset	.86	.73**	.17**
Implicit mindset	.78	.52	.10
Neuroticism	.75	.53	-.08
Trait anxiety	.89	.54	-.10
Self-esteem	.82	.46	.09
Self-efficacy	.86	.43*	.07
Depression	.84	.56	-.13*
T2: 6-4 weeks before due date			
Explicit mindset	.84	.74**	.13*
Implicit mindset	.76	.58*	.10
T3a: 1st week after birth			
Birth experience	.85	.67**	-
EMA postpartum			
General well-being	.95	.46	.18**
Emotional well-being	.96	.52	.24**
Infant's well-being	.86	.59*	.19**
Postpartum Depression			
t4: 8 weeks after birth	.85	.54	-.04
t5: months after birth	.84	.48	.04
Father-infant attachment 6 month after birth	.84	.55	-.01
Birth experience			
t4: 8 weeks after birth	.86	.72**	.57**
t5: 6 months after birth	.84	.74**	.50**
Explicit mindset			
t4: 8 weeks after birth	.88	.78**	.34**
t5: 6 months after birth	.87	.70**	.10
Implicit mindset			
t4: 8 weeks after birth	.80	.56	.06
t5: 6 months after birth	.76	.53	.07

Note. t1: n = 304 (except for IAT: n = 298), t2: n = 289 (except for IAT: n = 297), t3a: n = 285, t4: n = 292 (except for IAT: n = 286), t5: n = 93 (except for IAT: n = 91). **p-value < 0.01. *p-value < 0.05. Higher scores of the explicit and implicit birth-related mindset indicate a more natural mindset. [A]AUCs. [r]Correlation coefficient.

Table 28

Zero-order correlations of the measures used in the SI model

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
t1: < 26th week														
1. Neuroticim	(.75)	.82**	-.61**	-.58**	.62**	-.08	.00	-.08	-.35**	-.33**	-.14*	.42**	.38**	-.36**
2. Trait anxiety		(.89)	-.73**	-.66**	.73**	-.12*	-.03	-.10	-.42**	-.45**	-.20**	.48**	.55**	-.44**
3. Self-esteem			(.82)	.64**	-.62**	.07	.04	.09	.37**	.39**	.19**	-.42**	-.28**	.22*
4. Self-efficacy				(.86)	-.51**	.04	-.01	-.07	.35**	.34**	.19**	-.33**	-.31**	.33**
5. Depression					(.84)	-.08	-.05	-.13**	-.40**	-.43**	-.16**	.51**	.53**	-.39**
t2: 6-4 weeks before due date														
6. Explicit mindset						(.84)	.31**	.13*	-.01	.10	.14*	-.05	.03	.08
7. Implicit mindset							(.76)	.10	.08	.11	.09	-.05	.08	-.01
t3: 1st week after birth														
8. Birth experience								(.85)	.26**	.32**	.30**	-.09	-.01	.09
EMA postpartum														
9. General well-being									(.95)	.75**	.38**	-.41**	-.30**	.28**
10. Emotional well-being										(.96)	.37**	-.59**	-.45**	.48**
11. Infant's well-being											(.86)	-.22**	-.09	.29**
t4: 8 weeks after birth														
12. Postpartum Depression												(.85)	.53**	-.47**
t5: 6 months after birth														
13. Postpartum Depression													(.84)	-.52**
14. Attachment														(.84)

Note. t1: *n* = 304, t2: *n* = 289 (except for IAT: *n* = 297), t3a: *n* = 285, t4: *n* = 292, t5: *n* = 93. ***p*-value < 0.01. **p*-value < 0.05. Reliability (Cronbach's α) in brackets.

Birth and postpartum period

In contrast to findings for female participants, low-intervention birth was not associated with men's general or emotional well-being in the first six weeks after birth. A low association was found between low-intervention birth and men's reports of the perceived infant's well-being, which might hint to the possibility that labor and birth impacted the infant. However, also for the male participants, a positive birth experience increased the men's general and emotional well-being as well as the (perceived) infant's well-being ($r \geq .18$) in the first six weeks after birth. That the objective aspects of labor and birth did not influence the father's well-being appears reasonable. For women, there were mainly associations with the physical aspects of postpartum adjustment, which men do not experience first-hand. The decisive factor again was the evaluation of birth. In contrast to findings for female participants, neither postpartum depression, nor father-child attachment was associated with low-intervention birth or the birth experience. All results are displayed in Table 27.

Single indicator model

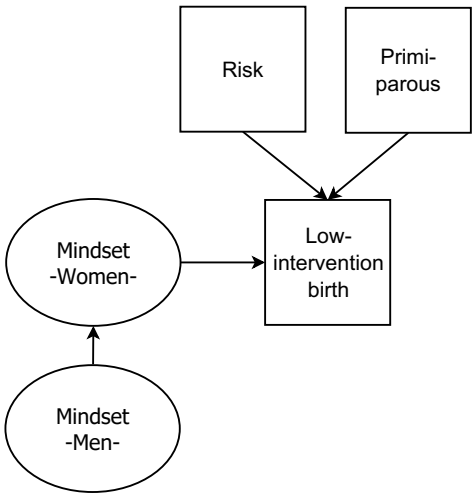
Due to the reasons outlined above for female participants (e.g., the rather small sample size; Savalei, 2018), I again estimated a fixed-reliability SI model. To simplify the model by reducing the number of (latent) factors, only the birth-related mindsets (men and women) six to four weeks before the due date (t2) were used. For the same reason, only the central paths of the women's model were included in the men's model (the other paths were not analyzed). The reliabilities of the scores used as indicators was fixed to .90 for all variables. WLSMV was used as an estimator the default options of Mplus were not changed. Covariances of all exogenous variables and covariances between the residuals of the endogenous variables were freely estimated. Model fit was assessed by using χ^2-test ($\alpha = .05$) as well as the fit indices RMSEA (≤ 0.05), CFI (≥ 0.96), and WRMR (≤ 1.00) with reference to the cutoff values in parentheses (Yu, 2002).

In principle the men's birth-related mindset could influence labor and birth in two different ways: indirectly, by influencing the women's mindset (Figure 9: Panel A), and via a direct path (Panel B) on low-intervention birth. I modeled the direct path because the AUCs between low-intervention birth and the birth-related mindset were approximately as high for male participants as for female participants and the correlation between the two birth-related mindsets was also relatively strong. However, with the available data it was not possible to separate influence from correlation, thus, even if the male birth-related mindset statistically predicted the female mindset, it was not evident whether the prediction represented the male's impact on the woman or rather a mutual influence, thus a correlation. Due to the high intercorrelations of the male and female

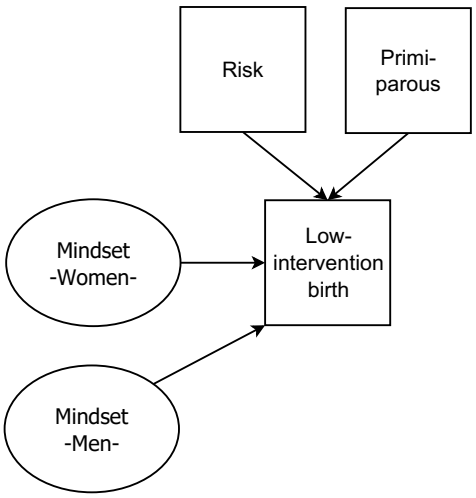
Figure 9

Possible indirect influence of the men's birth-related mindset: Panel A and B

A



B



mindset (r = .59, p < .001), and the slightly higher correlation of the men's mindset to low-intervention birth, the inclusion of both mindsets in the model led to a redundancy effect so that the women's mindset no longer predicted low-intervention birth (see Model 3, Table 29). However, since in terms of content this seemed unlikely, the influence of the two predictors was kept constant in the model.

Figure 10 displays the linear structure of the latent (displayed as circles) and manifest (displayed as rectangles) variables of the SI model with the standardized weights for the model with constant predictors. In Table 29 the standardized weights for the same model without constant predictors are displayed (Model 3; χ^2 = 36.200, df = 33, p = .322, RMSEA = 0.018, CFI = 0.993, WRMR = 0.581), as well as for the model using the male mindset as an indirect path (Model 4; χ^2 = 48.130, df = 37, p = .104, RMSEA = 0.031, CFI = 0.977, WRMR = 0.680). In both cases, the other coefficients were similar to the coefficients in the chosen model, which I describe below.

The χ^2-test of model fit was not significant (χ^2 = 38.703, df = 34, p = .266) and the approximate fit indices (RMSEA = 0.021, CFI = 0.990, WRMR = 0.600) also supported the good fit of the model (Yu, 2002). Analogous to the model of women's data in Study 4, the

Figure 10

Linear structure of the latent (displayed as circles) and manifest (displayed as rectangles) variables with the standardized weights of the SI model for male participants

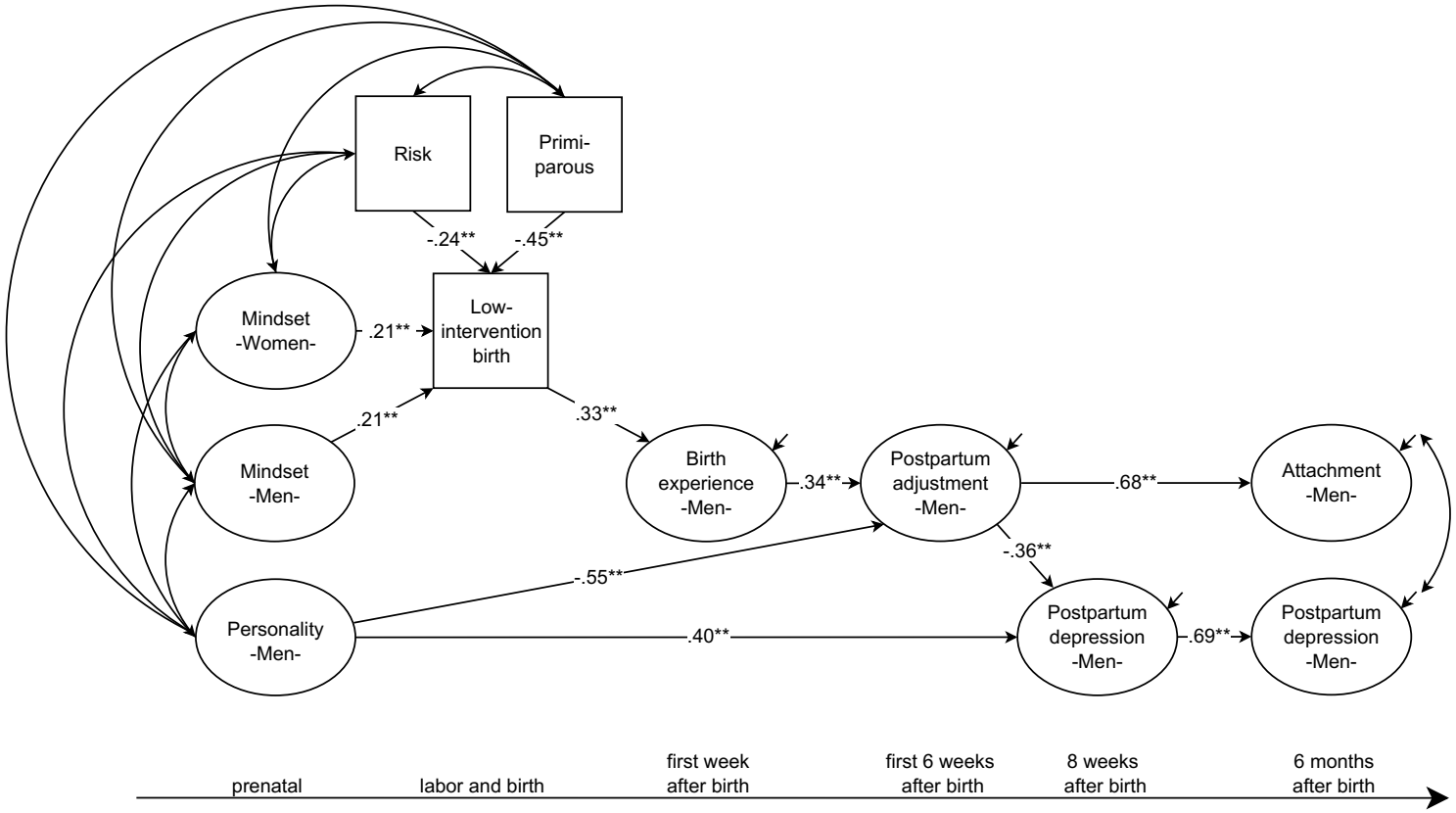


Table 29

Standardized results of the four model variants for the male SI model

	Model 1		Model 2 (with IAT)		Model 3 (no equal weighting)		Model 4 (indirect path)	
Coefficients	Est.	*p*	Est.	*p*	Est.	*p*	Est.	*p*
Explicit mindset – women –								
explicit mindset – men –	-	-	-	-	-	-	.743	< .001
Low-intervention birth on								
risk	-.244	< .001	-.243	< .001	-.238	< .001	-.260	< .001
primiparous	-.451	< .001	-.450	< .001	-.469	< .001	-.477	< .001
explicit mindset – women –	.207	< .001	.191	< .001	-.002	.985	.377	< .001
explicit mindset – men –	.213	< .001	.196	< .001	.418	< .001	-	-
implicit mindset – women –	-	-	.048	.434	-	-	-	-
implicit mindset – men –	-	-	.048	.435	-	-	-	-
Birth experience on								
low-intervention birth	.327	< .001	.324	< .001	.329	< .001	.327	< .001
Postpartum adjustment on								
birth experience	.337	< .001	.345	< .001	.334	< .001	.336	< .001
personality	-.545	< .001	-.545	< .001	-.544	< .001	-.547	< .001
Postpartum depression t4 on								
postpartum adjustment	-.363	< .001	-.363	< .001	-.362	< .001	-.362	< .001
personality	.405	< .001	.402	< .001	.405	< .001	.405	< .001
Postpartum depression t5 on								
postpartum depression t4	.688	< .001	.686	< .001	.689	< .001	.688	< .001
Attachment to infant								
postpartum adjustment	.676	< .001	.674	< .001	.676	< .001	.677	< .001

Note. $N = 304$.

men's model indicated that the prenatal risk (-.24) and being primiparous (-.45) decreased the probability of a low-intervention birth, whereas both the female and male birth-related mindset increased the probability of low-intervention birth (.21; with equal weighting). For male participants a low-intervention birth predicted a more positive birth experience (.33), which in turn lead to a more positive postpartum adjustment (.34), which was also negatively predicted by the male's personality (-.55). That is men with higher scores in neuroticism, trait anxiety, and depression, and with a lower self-esteem and self-efficacy were less likely to have a positive postpartum adjustment, and they were more likely to develop symptoms of postpartum depression eight weeks after birth (.40). Furthermore, a positive postpartum adjustment decreased the probability of postpartum depression symptoms eight weeks after birth (-.36), which in turn predicted symptoms six months after birth (.69). A positive postpartum adjustment was also positively related to a more secure child attachment six month after birth (.68). Taken together, the results indicated that the men's model basically replicated the women's model. Paths and coefficients were similar in both models, the most notable difference was in the prediction from low-intervention birth to birth experience, which was stronger among women (.54 versus .33), mirroring the rather active (women) versus rather passive (men) roles during labor and birth. The birth-related mindset influenced labor and birth, which in turn impacted short-term (birth experience and postpartum adjustment) and long-term (postpartum depression and attachment to the infant) psychological well-being.

Single indicator model with IAT

For the SI model with the birth attitude IAT, I applied the same procedure as for Model 1 (equal weighting of birth-related mindset). Results indicated a comparable model fit: $\chi^2 = 49.942$, $df = 45$, $p = .283$, RMSEA = 0.019, CFI = 0.991, WRMR = 0.590. The standardized estimates did not differ substantially from those of the same model without the IAT. The IAT, however, did not predict low-intervention birth significantly and therefore did not provide additional benefit to the MBQ. All results are shown in Table 29.

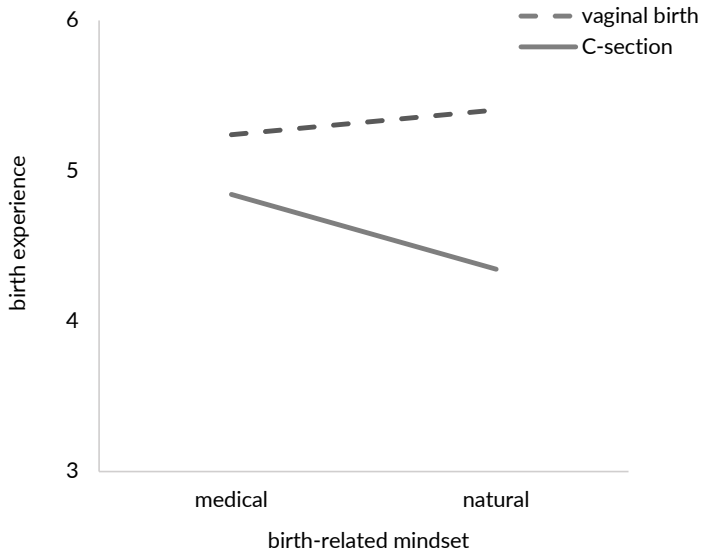
Moderation

For exploring moderation effects for male participants, I ran the same moderation analyses as for female participants, using the PROCESS macro (Hayes, 2017). Results indicated no significant interaction of low-intervention birth and male mindset (y = male birth experience t3, x = low-intervention birth, w = male mindset at t2; β = .07, *SE* = .07, *p* = .311) on birth experience, but a significant interaction of C-section and male mindset (x = mode of birth [-1 = vaginal birth, 1 = C-section]; β = -.24, *SE* = .09, *p* = .011), displayed in Figure 11. For the birth attitude IAT results,

no significant interaction term was found for low-intervention birth and birth attitude IAT (y = male birth experience t3, x = low-intervention birth, w = male birth attitude IAT at t2; β = -.10, *SE* = .12, *p* = .398), nor for C-section and birth attitude IAT (x = mode of birth [-1 = vaginal birth, 1 = C-section]; β = -.06, *SE* = .12, *p* = .610). Thus, similar to the results for women, for male participants the relationship between low-intervention birth and birth experience was not moderated by the birth-related mindset assessed before birth, but it moderated the correlation between C-section and birth experience.

Figure 11

Moderation analysis: Birth experience as a function of the birth-related mindset measured with the MBQ and the mode of birth



SUMMARY

I explored the role of men for birth and the postpartum period up to six months after the birth. I conducted CFAs for both the MBQ and the Birth experience scale in order to test their application for a male sample. Although the model fit was slightly worse than for women, the questionnaires seem generally suitable for men. To ensure comparability between female and male participants in the present thesis, I therefore did not further adapt or modify the questionnaires developed for women.

Results of the AUCS, the moderation analyses, and the SI model for the male sample replicated the results of the female sample. This indicated that the male mindset can potentially impact labor and birth. For men, labor and birth seem to be a crucial life event as well, impacting subsequent short- and long-term psychological well-being. Considering the limited research that exists on men and birth, the longitudinal study provides important initial results. However, in the presented SI model, the influence of the men's and women's mindset had to be held constant

due to redundancy effects. As this might constitute a limitation of the present analyses, replications and extended research questions with different operationalizations to solve this problem should follow.

In Study 6, discussed below, I examined the role of men for labor and birth and the first weeks after the birth a bit further. More specifically, I investigated the role of the couple relationship and its potential positive effect on stressful life events, in this case childbirth and the transition to parenthood.

STUDY 6: RELATIONSHIP QUALITY

Childbirth and the transition to parenthood are processes of change that include physical and psychological challenges, such as fatigue, processing of labor and birth, and adjustment to the new situation and routines. If relationship quality is high and couples (emotionally) support each other, this could reduce potential stress, functioning as a buffer. Reviews and meta-analytic studies have indicated marital quality to be related to personal well-being (Proulx et al., 2007), life satisfaction (Diener et al., 1999), and physical health (Robles et al., 2014). Concepts such as dyadic coping (reciprocal stress reaction management) is associated to relationship quality and stability (Bodenmann, 2008a; Bodenmann & Cina, 2006). More specific in relation to stress, research has indicated positive attitudes towards the partner to positively effect well-being during stressful life events such as complications in pregnancies (Banse & Kowalick, 2007). Attachment theories postulate secure attachment to be a resource in stressful life events (e.g., Mikulincer & Shaver, 2003) because a securely attached primary attachment figure can help to reduce stress in perceived threatening situations. Though adult attachment is not the same as the experienced attachment in childhood (Hazan & Shaver, 1987), the transition to parenthood might stimulate memories of attachment experiences, leading to an activation of attachment processes (Bowlby, 1988; Iles et al., 2011; Simpson & Rholes, 2018). Accordingly, studies on attachment style and transition to parenthood have indicated associations between adult attachment style and parenting stress (Mazzeschi et al., 2015), empathy during the postpartum period (Kazmierczak, 2014), depressive symptoms (Iles et al., 2011; Simpson & Rholes, 2018), and men's trauma symptoms (Iles et al., 2011). In the context of labor and birth, attachment style has been found to be associated with perceived birth pain (Quinn et al., 2015) and to birth experience (Reisz et al., 2019).

Thus, previous research indicated that relationship quality can be a protective factor for stressful life conditions. The aim of Study 6 was to examine whether findings could be replicated in the present sample for the stressful events birth and transition to parenthood (in the first few weeks after birth). Relationship quality did not cover only one aspect of the relationship, which has been common in the majority of previous studies, but instead consisted of relationship satisfaction, attitude towards the partner, dyadic coping, and attachment to the partner. Banse and Kowalick (2007) found positive effects of both explicit and implicit measures, and so I also assessed the implicit partner attitude using a partner IAT. By selecting different aspects of the couple relationship, I hoped to get a more realistic and comprehensive understanding of the construct of relationship quality than would be possible when considering just one single aspect. The operationalizations of the potentially stressful life events were the labor and birth process, birth experience, and the postpartum period until six weeks after the birth, thus, the transition to parenthood. Furthermore, I aimed to replicate the findings from Banse and Kowalick (2007), which showed the IAT can explain incremental variance over the explicitly measured relationship quality.

Model assumptions

As in the previous studies, I aimed to integrate the results into an SI model. I predicted that for women a higher relationship quality would positively affect both the process of labor and birth, leading to a higher probability of a low-intervention birth, and the birth experience, leading to a more positive birth experience, regardless of whether birth proceeded without intervention. Based on the previous studies, the women's birth-related mindset, medical risk, and being primiparous were also integrated into the model. Furthermore, I assumed that in addition to the birth experience, relationship quality would have a positive influence on the potentially stressful phase after birth (assessed with EMA) for both women and men.

METHOD

Participants

For Study 6, 304 dyads were used. As in the previous two studies, minor fluctuations in the sample size occurred depending on the time of measurement (t1: n = 304, t3a for females: n = 293, t3a for males: n = 279). At t1 the mean age for the 304 female participants was 30.30 years (*SD* = 3.99) and for male participants was 32.58 years (*SD* = 4.51). The majority of couples were married (62.2%). Only 3.6% indicated a length of relationship of less than a year, and the length of relationship for the remaining sample varied between one year (3.9%) and 20 (1%) years with a mode of six years (9.2%). The vast majority of fathers were present at the birth (97.2%).

Measures

As in the Study 4 and 5, the variables primiparous, medical risk, the woman's birth-related mindset during first third of pregnancy (t1),[8] female and male birth experience, and postpartum adjustment were included in the model. For better comparability with the male participants, female postpartum adjustment only included the variables general and emotional well-being, and the baby's well-being and behavior; the variables breastfeeding and wound healing that were included in Study 4 were thus excluded from the model in the present study.

Relationship attachment

I used the partner specific (Banse, 2004) German version (Doll et al., 1995) of the Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991) to assess relationship attachment. The scale contains one prototype description for each of the four attachment styles (secure, anxious, preoccupied, dismissing), and participants responded to each description to what degree it describes themselves on a six-point Likert scale ranging from 1 = *strongly disagree* to 6 = *strongly agree* (the original answer format was changed for the present study). The responses to the insecure attachment descriptions were recoded and aggregated with secure attachment such that a high score of relationship attachment indicates secure attachment. Cronbach's α was .60 for female participants and .59 for male participants. Relationship attachment was assessed in the first third of pregnancy (t1).

Attitudes towards romantic partner

For measuring (explicit) attitude towards the romantic partner, I used the scale developed by Banse and Kowalick (2007). Participants were asked to answer 15 items about their partner (e.g., *I feel good when I am close to my partner*) on a six-point Likert scale ranging from 1 = *strongly disagree* to 6 = *strongly agree* (the original answer format was changed for the present study). Cronbach's α was .83 for both female and male participants. Attitude towards the romantic partner was assessed in the first third of pregnancy (t1).

Relationship satisfaction

The German version (Sander & Böcker, 1993) of the Relationship Assessment Scale (RAS; Hendrick, 1988) was used to assess relationship satisfaction. The scale consists of seven items

[8] I chose t1 because relationship quality was also assessed at t1.

(e.g., *In general, how satisfied are you with your relationship?*) that participants answered on a six-point Likert scale. The scale's endpoint labeling depended on the particular question. Cronbach's α was .87 for female and .82 for male participants. Relationship satisfaction was assessed in the first third of pregnancy (t1).

Dyadic coping

Dyadic coping was measured with the first two subscales of the Dyadic Coping Inventory (DCI; Bodenmann, 2008b). The first subscale comprises four items about the desired involvement of the partner when feeling stressed or burdened (e.g., *I ask my partner to take over tasks and activities if I am overloaded*). The second subscale contains 11 items assessing the partner's reaction to the expressed stress (e.g., *She/he gives me the feeling that she/he understands me and that she/he is interested in my stress*). The subscales were combined. All items were answered on a six-point Likert scale (1 = *strongly disagree* and 6 = *strongly agree*). Cronbach's α was .87 for female and .88 for male participants. Dyadic coping was assessed in the first third of pregnancy (t1).

Implicit attitudes (Partner IAT)

I used a partner-specific adaption of the IAT (Greenwald et al., 1998) developed by Banse and Kowalick (2007) to assess participants' implicit attitude toward their partners. The attribute dimension featured four words representing either the partner (e.g., first name, profession) or four words representing others, and the object dimension four positive and four negative words. The words for "Partner" and "Others" were generated using the following procedure: Participants were first presented with ten stimuli (e.g., first name, profession) from which they chose the four items they most strongly associated with their partners (for the attribute dimension "Partner"). For every item category (e.g., profession) they chose, they had to choose a corresponding item out of five default items that they did not associate with anyone (for the attribute dimension "Others"). All words were presented in German. The partner IAT consisted of three training blocks (1, 2, and 4; 24 trials each) and two critical blocks (3 and 5; comprised of 4 practice trials and 80 trials each). Incorrect responses were followed by a red X for 1,000 ms, but no correct response had to be given. The inter-trial interval was 250 ms. As in the birth-related mindset IATs in the previous studies, the D-index was used (Greenwald et al., 2003). Three male participants had an error rate larger than 25% and were excluded from the analyses. To determine Cronbach's α for the IATs, both the compatible block and the incompatible block were divided block-wise into two test halves that were used as items for the reliability analyses (female α = .76; male α = .78). Higher IAT values indicated a more positive partner attitude. The partner IAT was also administered in the first third of pregnancy (t1).

RESULTS AND DISCUSSION

Descriptive statistics and intercorrelations

Means and standard deviations for each of the utilized measures are displayed in Table 30 and Table 31. Additionally, I performed paired *t*-tests to test for sex differences. Results indicated female and male participants did not differ in attachment, implicit attitudes, relationship satisfaction, or in their evaluation of the infant's well-being and behavior. These results are also presented in the tables and non-significant mean differences are marked with an index. Zero-order correlations between the relationship measures can be found in Table 30. As expected, strong correlations occurred within the sexes, indicating an overlap in the measured constructs and thus a latent attribute. Correlations between the sexes were small to medium. For female participants the implicit attitude did not correlate with any of the questionnaires used. For male participants implicit attitude correlated positively – albeit only moderately ($.17 \leq r \leq .23$) – with all questionnaires, thus, male participants with an implicitly more positive attitude towards the partner had higher scores in the explicit measures. The men's implicit attitude also weakly correlated with women's explicit attitude, female relationship satisfaction, and female dyadic coping. Again, effects were small (all rs $\leq .14$ with $p < .05$). Table 31 shows the intercorrelations of birth experience and the variables assessed during the first six weeks after birth. Within the sexes correlations were medium to high, but between the sexes correlations were rather small except for strong correlations for birth experience and perceived infant's well-being. In the following section, I integrate and discuss the different pieces into one model as described above (see paragraph *Model assumptions*).

Associations with birth, birth experience, and postpartum well-being

Table 32 displays the associations between the relationship variables and low-intervention birth, birth experience, and postpartum well-being. Results did not indicate significant associations between relationship variables and low-intervention birth or the birth experience for women or for men. The only exception was a significant correlation between female dyadic coping and birth experience, indicating dyadic coping increased the probability of a positive birth experience. However, the effect was small. Small to medium correlations emerged between the relationship variables and the variables general and emotional well-being such that better relationship quality increased well-being after birth. Aside from a small positive correlation between female attachment and a more positively perceived well-being and behavior of the infant, relationship variables were not associated with the infant's well-being and behavior.

Table 30

Descriptive statistics and zero-order correlations of the relationship measures

	M	*SD*	1	2	3	4	5	6	7	8	9	10
Female participants												
1. Attachment	5.20_A	.77	(.60)	.52**	.07	.57**	.57**	.21**	.19**	.11	.22**	.19**
2. Explicit attitudes	5.48	.45		(.83)	.08	.72**	.65**	.33**	.28**	.13*	.36**	.33**
3. Implicit attitudes	$.68_A$	.34			(.76)	.11	.07	.09	.04	.07	.06	.01
4. Relationship satisfaction	5.33_A	.62				(.87)	.64**	.34**	.32**	.14*	.39**	.37**
5. Dyadic coping	4.86	.68					(.87)	.29**	.23**	.13*	.25**	.33**
Male participants												
6. Attachment	5.12_A	.79						(.59)	.58**	.19**	.59**	.43**
7. Explicit attitudes	5.39	.50							(.83)	.17**	.78**	.49**
8. Implicit attitudes	$.71_A$	.40								(.78)	.18**	.23**
9. Relationship satisfaction	5.30_A	.58									(.82)	.57**
10. Dyadic coping	4.53	.74										(.88)

Note. t1: n = 304, except for IAT male participants: n = 301. **p-value < 0.01. *p-value < 0.05. If indexed with $_A$ female and male are not statistically different from each other (p < .01). Reliability (Cronbach's α) in brackets.

Table 31

Descriptive statistics and zero-order correlations of birth experience and postpartum adjustment variables

	M	*SD*	1	2	3	4	5	6	7	8
Female participants										
1. Birth experience	4.79	1.02	(.90)	.38**	.32**	.24**	.60**	.18**	.24**	.19**
2. General well-being	4.09	.83		(.95)	.68**	.43**	.19**	.12*	.20**	.22**
3. Emotional well-being	5.17	.52			(.93)	.53**	.13*	.22**	.31**	.28**
4. Infant's well-being	4.77$_A$	.61				(.88)	.18**	.14*	.17**	.54**
Male participants										
5. Birth experience	5.20	.76					(.85)	.25**	.32**	.30**
6. General well-being	4.73	.82						(.95)	.75**	.37**
7. Emotional well-being	5.30	.50							(.96)	.36**
8. Infant's well-being	4.74$_A$	.58								(.86)

Note. N varied between 274 and 290. ***p*-value < 0.01. **p*-value < 0.05. If indexed with $_A$ female and male are not statistically different from each other ($p < .01$). Reliability (Cronbach's α) in brackets.

In sum, the results of the AUCs and correlation analyses did not suggest that the couple's relationship quality impacts labor and birth or the birth experience as I had expected. However, I nevertheless included the variables in the a priori hypothesized SI model.

Single indicator model

Again, I estimated a fixed-reliability SI model. To reduce the number of (latent) factors, I only used the birth-related mindset and the relationship variables assessed at measurement time 1 (t1). The relationship scales relationship attachment, attitudes towards romantic partner, relationship satisfaction, and dyadic coping were factorized, representing the relationship quality (high scores indicate a higher quality). The reliabilities of the scores used as indicators was fixed to .90 for all variables. Due to the dichotomous coding of the dependent variable low-intervention birth, WLSMV was chosen as the estimator. Analyses were again performed in Mplus 7.4 (Muthén & Muthén, 1998-2015) using the default convergence criteria and the default processing of missing values. Co-variances of all exogenous variables as well as covariances between the

Table 32

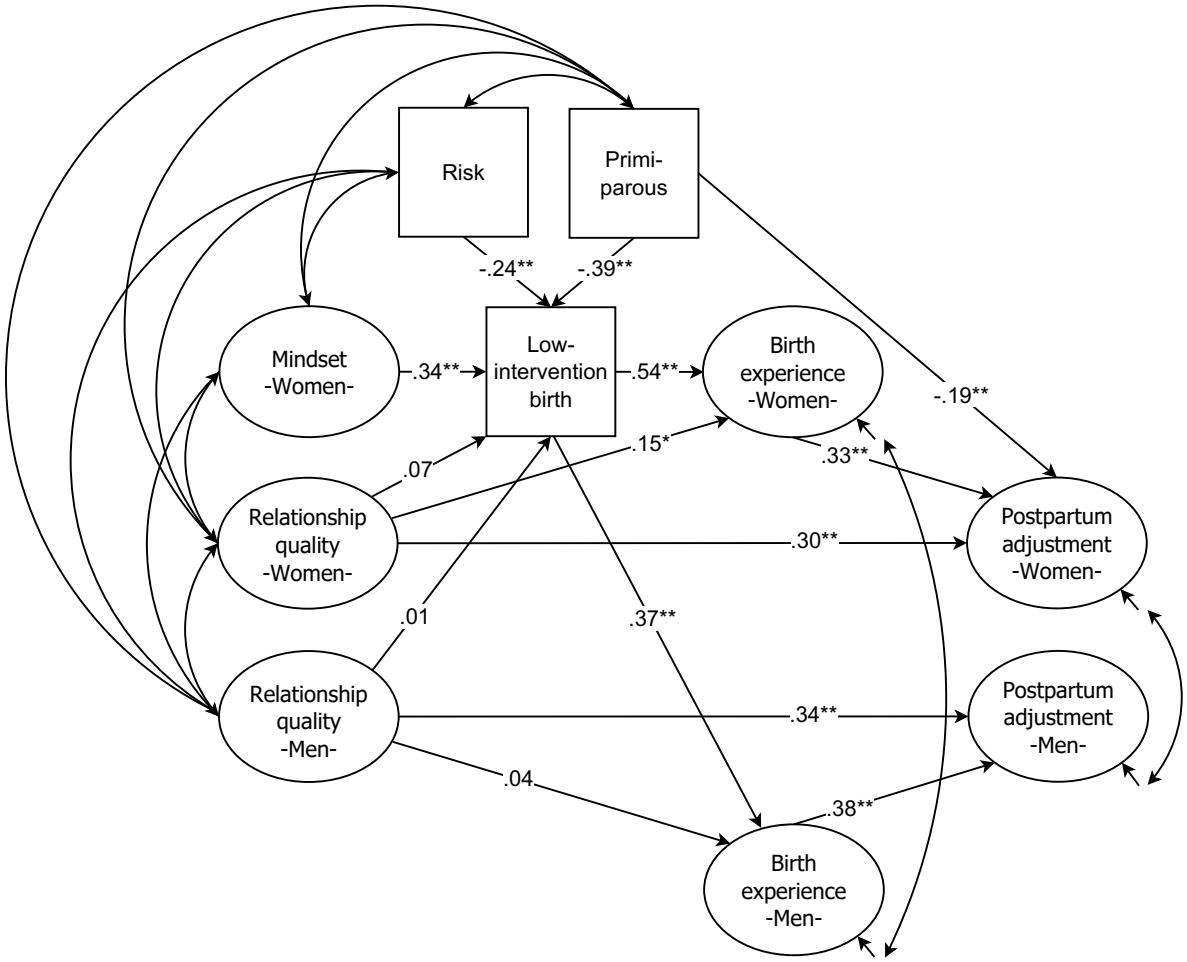
AUCs and partial correlations for/between the relationship variables and low-intervention birth, birth experience at t3a, and the variables assessed postpartum (EMA)

	α	Low-i. birth[A]	Birth exp. at t3a	General well-being	Emotional well-being	Infant's well-being
Female participants						
1. Attachment	.60	.52	.09	.27**	.36**	.13*
2. Explicit attitudes	.83	.50	.11	.11	.23**	.02
3. Implicit attitudes	.76	.58	.04	.03	.08	-.02
4. Relationship satisfaction	.87	.49	.08	.16**	.29**	-.04
5. Dyadic coping	.87	.51	.14*	.18**	.29**	.08
Male participants						
6. Attachment	.59	.48	.02	.20**	.31**	.03
7. Explicit attitudes	.83	.49	.01	.32**	.33**	.07
8. Implicit attitudes	.78	.43	-.02	.14*	.18**	.03
9. Relationship satisfaction	.82	.45	.02	.36**	.38**	.10
10. Dyadic coping	.88	.46	-.05	.20**	.28**	.08

Note. t1: n = 304, (except for IAT male participants: n = 301), t3a for females: n = 293, t3a for males: n = 279. [A]AUCs, all other correlation coefficients. **p-value < 0.01. *p-value < 0.05.

Figure 12

Linear structure of the latent (displayed as circles) and manifest (displayed as rectangles) variables with the standardized weights of the SI model for relationship quality



residuals of the endogenous variables were freely estimated. I assessed the model fit using the χ^2-test ($\alpha = .05$) and the fit indices RMSEA (≤ 0.05), CFI (≥ 0.96), and WRMR (≤ 1.00). As for previous analyses, the cutoff values in parentheses refer to the recommendations from Yu (2002). In Figure 12 the linear structure of the latent (displayed as circles) and manifest (displayed as rectangles) variables of the SI model with the standardized weights is revealed. The χ^2-test of model fit was not significant ($\chi^2 = 16.795$, df = 19, p = .604) and the approximate fit indices (RMSEA = 0.000, CFI = 1.000, WRMR = 0.366) also supported the good fit of the model (Yu,

2002). As for both previous models, the model displays three significant predictors of low-intervention birth: prenatal risk (-.24) and being primiparous (-.39) decreased the probability of a low-intervention birth, having a more natural birth-related mindset during pregnancy (women at t1; .34) increased the probability of a low-intervention birth. Contrary to my assumption, low-intervention birth was not predicted by the women's nor by the men's relationship quality score. Results revealed again that low-intervention birth positively predicted both women's (.54) and men's (.37) birth experiences. Female birth experience was also predicted by the women's ratings of their relationship quality, suggesting that a better relationship quality was associated with a more positive birth experience. However, the effect was relatively small (.15, $p < .05$). Female postpartum adjustment was negatively affected by being primiparous (-.19) but positively affected by a positive birth experience (.33). It was also positively predicted by female relationship quality (.30). Accordingly, male postpartum adjustment was also predicted by male relationship quality (.34). Thus, results of the SI model indicated that relationship quality had no positive effect on low-intervention birth but had a positive effect for female participants on birth experience and for both genders on postpartum adjustment.

Single indicator model with partner attitude IAT

For the fixed-reliability SI model with the partner attitude IAT the procedure was the same as in Model 1: all reliabilities were fixed to .90, except for the partner attitude IAT (fixed reliability: .75), WLSMV was chosen as the estimator, Mplus 7.4 default convergence and default processing of missing values were used, and covariances of all exogenous variables and covariances between the residuals of endogenous variables were freely estimated. The variables entered into the model were the same as in Model 1, but the partner attitude IAT was added, having the same paths as the latent factor relationship quality. Standardized results of the coefficients are displayed in Table 33. Results indicated a slightly better fit ($\chi^2 = 18.972$, df = 23, $p = .703$, RMSEA = 0.000, CFI = 1.000, WRMR = 0.336) of Model 2 compared to Model 1 (without IAT), however, none of the IAT paths reached significance (all $p \geq .157$). The remaining path coefficients were similar to those in Model 1, strengthening its validity. However, due to the missing predictive value of the partner attitude IAT and the almost identical fit indices of the two models, I consider Model 1 (without IAT) to be the preferred model (Figure 8).

SUMMARY

Results from Study 6 demonstrated the positive influence of relationship quality on stressful life events, however this effect became especially evident for the phase of transition to parenthood.

Table 33

Standardized results of the two model variants (without and with IAT) Part 3

	Model 1		Model 2 with IAT	
Coefficients	Est.	*p*	Est.	*p*
Low-intervention birth on				
mindset – women -	.339	< .001	.337	< .001
risk	-.240	< .001	-.230	< .001
primiparous	- .395	< .001	-.393	< .001
relationship quality – women –	.070	.375	.062	.442
implicit attitude – women –	-	-	.101	.171
relationship quality – men –	.010	.895	.037	.629
implicit attitude – men –	-	-	-.105	.150
Birth experience women on				
low-intervention birth	.540	< .001	.538	< .001
relationship quality – women –	.149	.005	.159	.004
implicit attitude – women –	-	-	-.022	.699
Birth experience men on				
low-intervention birth	.369	< .001	.374	< .001
relationship quality – men –	.044	.530	.037	.609
implicit attitude – men –	-	-	.027	.725
Postpartum adjustment women on				
Primiparous	-.195	.002	-.200	.001
birth experience – women –	.333	< .001	.330	< .001
relationship quality – women –	.305	< .001	.313	< .001
implicit attitude – women –	-	-	-.012	.850
Postpartum adjustment men on				
birth experience	.340	< .001	.384	< .001
relationship quality – men –	.383	< .001	.315	< .001
implicit attitude – men –	-	-	.074	.359

Note. $n = 304$

Here, both women and men benefited from greater relationship quality. Their general and emotional well-being was better than in couples with lower relationship quality. The results are consistent with previous research that has investigated mostly single aspects of relationship quality and their associations with transitions to parenthood (e.g., Iles et al., 2011; Mazzeschi et al., 2015; Simpson & Rholes, 2018). In Study 6, relationship quality had only a slightly positive influence on the birth experience, replicating previous research that found a positive association between secure attachment and a positive birth experience (Reisz et al., 2019). However, in the present study the effect was small and relationship quality did not influence the process of labor and birth at all. Previous research suggests that for women physical contact with their partners

right before being exposed to a stressor reduced cortisol and heart rate response, independent from relationship quality (Ditzen et al., 2007). This could imply that the presence of the partner alone could have a positive effect on birth and birth experience and that in this case relationship quality only plays a subordinate role. Since in the present study only eight fathers were not present at birth, I refrained from testing this hypothesis with the available data set. It should also be noted that the relationship quality was rather high in the present study ($4.53 \geq M \leq 5.48$), a narrowing of variance that was also observed in the study conducted by Ditzen and colleagues (Ditzen et al., 2007). Possibly, more variance in relationship quality would lead to a greater effect on the birth experience. However, all these considerations should be empirically clarified in future studies. In contrast to the study by Banse and Kowalick (2007), the partner attitude IAT revealed no incremental variance over and above the directly assessed relationship quality. Since none of the IATs used in this dissertation indicated predictive values over the used questionnaires, I discuss the IATs together in more detail in the general discussion.

GENERAL DISCUSSION

This dissertation comprises a total of six studies. In three validation studies, Studies 1, 2, and 3, using a retrospective design, I developed the theory of the birth-related mindset and related measuring instruments: The Mindset and Birth Questionnaire (MBQ), the Birth experience scale, and different indirect procedures (ST-IATs, IRAP, ideographic IAT, attitude IAT). Contrary to the questionnaires, however, the indirect measures, did not yield satisfactory or informative results (see below). Within the framework of a final prospective longitudinal study, I demonstrated that the women's birth-related mindset can causally predict labor and birth and, in addition, that men's representations about birth also seem to be important for the process of giving birth. To what extent the partners influence each other's mindsets, or whether there are circumstances under which one of the partners has a stronger influence, could not be fully clarified in the present research. This certainly represents an important question for future research. Results of the longitudinal study also revealed that labor and birth affect the subjective birth experience and that this in turn influences short- and long-term psychological well-being. Specially, the birth experience impacted the general and emotional well-being of the mother, the father, and the infant within the first six weeks after the birth. Additionally, for female participants a negative birth experience predicted breastfeeding problems and worse perceived wound healing. Well-being measured in the first six weeks after birth in turn influenced the occurrence of postpartum depression and post-traumatic stress (only assessed for females) symptoms eight weeks after birth and parent-child attachment six months after birth. Postpartum depression and post-traumatic stress symptoms six months after birth were predicted by their symptoms eight weeks after birth. A high relationship quality acted as a buffer for female birth experience, but the effect was small. For both partners relationship quality positively impacted transition to parenthood.

Sample and cultural effects

Since I wanted to increase the variability in the samples, in the validation studies I explicitly tried to recruit women with out-of-hospital birth experiences, thus, probably a more natural mindset. In the longitudinal study the rate of out-of-hospital births was also higher than normally expected in a German sample. It is possible that women with more natural mindsets were more interested in participating in the study and flyers were given out in birth centers and by homebirth midwives. This (intentional and unintentional) oversampling implies that the study results are not representative for the German population of mothers. Studies conducted with the goal of making inferences about the prevalence of different mindsets require a different research design.

Another open issue is the cultural transferability of the developed questionnaire. My theoretical framework and hypotheses are rooted in Germany and may not be pertinent in countries with other health care systems and birth cultures. Women in Germany can choose by whom the routine prenatal check-ups are performed and whether they want to hire a freelancing midwife for one-on-one support during labor and birth (at home, in a birthing center, or at the hospital). These choices are pertinent external criteria for a German sample. In other countries, a more natural or medical mindset of birth may be related to other behaviors or decisions, and in many countries an elaborated medical setting for giving birth may simply not exist. Therefore, if the MBQ were to be used in other countries or cultures, it would need to be validated and possibly adapted. Nonetheless, related concepts such as birth beliefs (Preis & Benyamini, 2017; Wilson & Sirois, 2010) exist also in other cultures.

Are there other mindsets associated with birth?

I have developed the construct of the birth-related mindset and questionnaire items based on concepts (medical, natural) found in interviews, forums, and blogs, and in the scientific literature. In spite of this, my approach was largely theory-driven. It cannot be ruled out that a data-driven approach (see e.g., Koch, Imhoff et al., 2016, for findings on group stereotypes) would have led to different facets of a birth-related mindset. Also, the choice of a certain dependent variable influences the results to some extent (Fiedler, 2011). Thus, it is quite possible that the proposed birth-related mindset reflects the data sufficiently, but other – not measured – mindsets could play an important and perhaps even more important role. This is especially true for men's birth-related mindsets, as the theoretical model was originally formulated for women. It is also conceivable that the mental representation of birth should be conceived of as a multidimensional birth-related mindset. For instance, Dahlen (2013) developed the constructs 'childbirth' (taking no risks for the child is the most important criterion of a birth because the baby has priority over the mother) and 'motherbirth' (mother and child are equally important, because only a happy mother can take good care of her child), which might be a promising mindset to study. Preis and Benyamini (2017) argue that medical beliefs about birth involve a strong risk perception of birth. Theoretically, this seems plausible, but whether the birth-related mindset (or beliefs) can be explained by an increased birth-related risk perception or whether the birth-related risk perception is a distinct factor should be explored in further studies. Thus, overall, the birth-related mindset I postulate is only *one* possible mindset and above all it is only *one* possible psychological factor associated with birth. The longitudinal study e.g., suggests that the relationship quality can have an effect on the female birth experience (although, the effect was

only small) and especially on well-being and coping after birth. Other potentially associated factors should be explored in further studies.

Low-intervention birth and normal birth index

The process of labor and birth is complex. Nevertheless, for statistical analyses I have combined this process into the dichotomous variable 'low-intervention birth,' based on the established normal birth index (Werkmeister et al., 2008). For definition, operationalization, and testing of hypotheses it is both useful and necessary to agree on defined indices. However, the used index surely represents only a crude reflection of birth. It does not include all interventions (e.g., not Kristeller maneuver), it does not weight the interventions (e.g., a C-section might be more invasive than an epidural), and it does not depict social facets such as communication, which could be especially important for the birth experience. For birth evaluation it is not only important whether an intervention was performed, but also how it was performed. Was there, for instance, sufficient explanation so that the women understood why the intervention was necessary or were alternatives considered if the women preferred to avoid a specific intervention. All of this cannot be captured by an index and must be operationalized differently if one wants to answer these questions

An additional difficulty of the index concerns the term 'normal'. Although the term, among others, is widely used in the medical context by the WHO (e.g., 1996; 2018), the term normal contains a strongly normative connotation. However, nothing is inherently normal or *un*normal, but rather relies on cultural and context-sensitive definition – on which the professional stakeholders have not even fully agreed, yet. The Society of Obstetricians and Gynaecologists of Canada et al. (SOGC; 2008) defines childbirth as normal even if interventions are performed (e.g., augmentation of labor, epidurals) as long as they support vaginal births. Thus, in this definition normal birth describes above all the birth mode and hence is very different from the definition of normal that I used (Werkmeister et al., 2008). In some cases, even aspects before the birth such as risk factors at the start of birth (WHO, 1996), or aspects after birth such as such as skin-to-skin contact with the newborn and breastfeeding (e.g., SOGC et al., 2008) are included in the definition of normal birth. Thus, even in professional definitions it is not at all obvious (or unanimous) what normal means. For women and families, however, the term normal might imply there is a certain 'ideal birth' that needs to be achieved. Not birthing normally (however it is defined) means deviating from what is normal. Psychologically, that is certainly not what one intends to convey. In the present thesis I therefore used the term 'low-intervention birth,' with the advantages that it does not contain any normative connotation and also it is clear what it

refers to: to interventions performed during labor and birth, not to aspects before or after birth. Whether this definition, derived from the normal birth index (Werkmeister et al., 2008), includes all relevant interventions should be critically discussed further.

Being primiparous

The results of the longitudinal study revealed that being primiparous (giving birth for the first time) was a strong risk factor for not having a low-intervention birth. The reasons for this are probably multifaceted and should be investigated empirically in further studies. Both physical/medical and psychological reasons are conceivable. The potential psychological reasons are discussed here, as they may serve as hypotheses for future research. Primiparous women may have had inadequate or inaccurate expectations regarding childbirth; they could have been e.g., overwhelmed by the intense pain. Results suggested that primiparous women perceived the birth pain as more intense than woman who have given birth before (AUC = .60, p < .05), but the effect was only small. Being primiparous was negatively related to a more natural mindset (t2: AUC = .37, p < .001) and to having one-on-one support from a freelancing midwife (AUC = .38, p < .001), both aspects that increased the probability for a natural birth. Possible in theory are also cognitive distortions of the maternal caregivers. Due to time pressure, division of information, and shift changes, cognitive bias and errors in the medical domain are not uncommon (Dror, 2011). According to the availability heuristic (Tversky & Kahneman, 1974), expectations of the medical staff – e.g., that giving birth for the first time is associated to more problems during labor and birth – may bias the use of interventions, which in turn could then strengthen the availability heuristic. To what extent the presented hypotheses are valid should be investigated in future studies in order to be able to prepare primiparous women appropriately for labor and birth.

IAT

Already in the validation studies, the development of an indirect measure to assess a potentially implicit birth-related mindset was difficult. The birth attitude IAT from the third validation study, Study 3, showed the most potential for being informative and useful. In the longitudinal study, the birth attitude IAT indicated weak associations with low-intervention birth at both t1 (female: AUC = .59, p < .05) and t2 (female AUC = .58, male AUC = .58, p < .05), thus participants with an implicitly more natural mindset had a higher probability of a low-intervention birth. However, in the SI models the birth attitude IAT no longer had predictive value. A similar pattern emerged with the partner attitude IAT used in Study 6. For women the partner IAT had no predictive value

at all, and for men small correlations occurred with general (r =.14, p < .05) and emotional (r = .18, p < .01) well-being after birth. In the SI model, the partner IAT again made no predictions.

The results are in line with existing research, indicating only small or no predictive validity and incremental variance of indirect measures above questionnaires (Meissner et al., 2019; Oswald, et al., 2013). Possible causes such as lack of reliability are unlikely in the present longitudinal study; for all measurement points – except at t4 for female participants – reliabilities were in the typical IAT reliability range of .7 and .9 (Gawronski & Hahn, 2019). It is further argued that the lack of predictive validity for IATs is due to the IAT's measuring evaluations rather than motivation, but motivation might be a better predictor of behavior (Meissner et al., 2019). Especially in the context of childbirth it can be assumed that motivation is a decisive factor. Meissner et al. (2019) also argue behavior to be strongly context-specific and that the IAT often does not reflect this context-specificity. For birth, this is certainly a valid argument due to strong situational factors such as pain or complications. However, the question of whether the use of a birth attitude IAT is necessary at all arises. In the present sample the MBQ predicted labor and birth about as strongly as the predictors medical risk and being primiparous. The positive correlation between the explicit and implicit birth-related mindsets further suggests that socially desirable responses (Teige-Mocigemba et al., 2010) are probably not avoided by the use of the IAT. In practice, the employment of a questionnaire would certainly be easier to implement than an IAT. It is also questionable whether the IAT has an advantage in measuring an implicit outcome; because as stated in the introduction it is not evident whether the IAT necessarily measures an implicit outcome, and the MBQ outcome may also be implicit in the sense that participants do not know what is being measured (De Houwer, 2006). However, this is an empirical question.

In the case of couple relationships, I would question the use of indirect methods less strongly. Studies have already indicated predictive value of indirect measures above direct measures (Banse & Kowalick, 2007; McNulty et al., 2013). Furthermore, studies have suggested that motivation to evaluate the partnership positively could be a crucial factor because only under stress do automatic judgments become more likely (e.g., Hicks & McNulty, 2019). This is consistent with the reasoning in dual-processing theories that assume motivation to increase the probability for reflective behavior (Strack & Deutsch, 2004). Although pregnancy and childbirth can be potentially stressful, they also represent a positive and intimate time, and the motivation to evaluate the relationship positively presumably is high – not least of all so as to not jeopardize transition to parenthood. Likely motivational strategies to maintain positive evaluations such as

idealization occur (Murray, 1999). In contrast to the study by Banse and Kowalick (2007), participants in the longitudinal study had no stressful pregnancy complications that might have enhanced the partner IAT's predictive value. Furthermore, explicit relationship quality comprised the four aspects attachment, explicit partner attitudes, relationship satisfaction, and dyadic coping. Thus, explicit relationship quality might have simply overpowered the IAT. Note however that in the AUC analyses implicit partner attitudes only predicted outcomes for male participants and the single explicit scales all yielded higher effects than the partner IAT. Overall, the study could not (conceptually) replicate the incremental effect of implicit measures for assessing implicit relationship evaluations found in previous studies and the use of indirect measures in the longitudinal study remained unsatisfactory for both relationship quality and birth-related mindset.

Replication

Replication is an important aspect of science (Nosek & Errington, 2017). Nonetheless, research suggests a frequent lack of replicability of psychological studies (e.g., Open Science Collaboration, 2015) partly due to researcher's degrees of freedom (Simmons et al., 2011). False positive findings are argued to be persistent (Pashler & Harris, 2012), therefore I briefly comment on the study results with regard to replication. The initial and core results of the birth-related mindset theory were replicated three times for female participants. Results from Study 1 were replicated in Study 2 and 3 as well as in the longitudinal study (broken into Study 4, 5, and 6). Although the validation studies already indicated that labor and birth were associated with the birth experience, the longitudinal study is the first study demonstrating an impact of the birth experience on subsequent psychological factors. Though results were in line with previous research (e.g., Bell & Andersson, 2016; DiMatteo et al., 1996; Durik et al., 2000), a replication of the SI model would be prudent. The same applies to the results of the examination of relationship quality. Previous studies already revealed a positive effect of relationship quality for stressful life events (e.g., Banse & Kowalick, 2007), but the effect of relationship quality on the birth experience in the present research was only weak, therefore further research seems necessary to confirm this finding. The greatest need for replication arises for the male sample. In general, there is little to no (quantitative) research on male influence on birth, their birth experience, and well-being after birth. Interestingly, the SI model of men replicates the SI model of women. Further studies should explore whether those results are valid for and generalize to other samples.

Overestimation

Mindset theories about motivation and achievement have recently been criticized as overestimating their effects (Burgoyne et al., 2020). Social psychological effects achieve an average effect size of r = .21 (Burgoyne et al., 2020; Richard et al., 2003; note, those results refer to meta-analyses from before 1998). In the studies presented here, the coefficients in the SI models were slightly higher than the above-mentioned. However, since the results of the studies may be of high practical relevance, the results should not lead to misunderstandings and should not be regarded as deterministic in any form. Although the results of the longitudinal study suggest that the birth-related mindset can have an influence on labor and birth, situational aspects should not be underestimated (e.g., type of support, occurring difficulties). Furthermore, that birth is partly influenced by a psychological factor does not imply that this factor, the birth-related mindset, can be modified easily, such as by telling women to relax or to attend a particular course or anything of the kind. We do not know much about the development[9] of the birth-related mindset (or e.g., of birth beliefs; Preis et al., 2018) nor if or how it can be changed. Research for this is necessary. The results of the study also do not imply that interventions should be omitted. However, it became evident that intervention-rich births are perceived more negatively than low-intervention births and that intervention-rich births may have negative psychological consequences. Some researchers point out that in connection with pregnancy and birth, there seems to be a predominant view to be *better safe than sorry* (Lyerly et al., 2009). Already during pregnancy, many behaviors are judged as dangerous for the fetus. Women are obliged to give up potentially harmful foods, sports, medications, and a variety of other aspects of pre-pregnancy lifestyle. Not all alleged risks are empirically shown to be risks and in some cases the avoidance of potential risks may have the adverse effect of causing more serious risks, e.g., not taking necessary medication (Lyerly et al., 2009; Robinson, et al., 2015). From a psychological perspective it seems important to include psychological outcomes in decision-making as well, thus careful weighing of medical and psychological benefits and harm of different interventions is necessary (in conjunction with recognizing that some interventions are essential to save the lives of mother and child).

[9] I explored some potential aspects in the longitudinal study (e.g., influence of performed routine check-ups, previous birth experiences), however, these have not yet been analyzed and are not part of this dissertation.

EPILOGUE

> "If you favor the scientific side, you will pretend that significance is fully reducible to medical metrics, that the quality of a birth should be measured solely by how safe it is. If you favor the natural side, you will pretend that value is reducible to what's natural, [...] In one case, safety subsumes significance; in the other, significance is assumed to indicate safety. Both fail to capture the complexity of what it is to be human."
>
> Alan Levinovitz (2020, p. 100)

Whenever I present this research – privately or publicly – there is at least one person who reproaches me for implying natural means good and medical bad. As if there was a *good* mindset (natural mindset) and a *bad* mindset (medical mindset), or *good* births (natural births) and *bad* births (medical births). But neither mindset manifestations nor birth can be divided into good or bad. Apart from safety aspects there is no objective criterion for a good or bad birth. And the safety aspect is vague too, because even different birth modes have different advantages and disadvantages (NICE, 2011). Short-term and long-term. Birth is complex. Often, we do not view it with the necessary complexity. Even if we claim to. The quote above is from the recently published book *Natural. The Seductive Myth of Nature's Goodness* (Levinovitz, 2020). As clearly as it highlights the complexity of birth and, more broadly, of humanity, the corresponding chapter is full of stereotypes. Natural is equated with women giving birth alone in the forest, and medical with (elective) C-sections. But those aspects are only extreme cases. Because the vast majority of women are somewhere in between, operationalized on a Likert scale somewhere between natural and medical (though, in the specific case of the Mindset and Birth Questionnaire, or MBQ, the pole 'natural' cannot be equated with an unattended birth in a forest). So, to answer my initial question asked in the prologue: Yes, there are individual differences in the perception of birth, and these differences determine part of the birth process, combined with other personal and situational factors, such as medical risk and having one's first child. And it seems to be the case – at least in the present samples – that low-intervention births (none took place in a forest!) on average lead to a more positive birth experience. The moderation analyses also indicated that this evaluation is not completely independent of the birth-related mindset, at least not for vaginal births versus C-sections. But *natural* seems to have psychological advantages. And yet in the end

we do not do justice to birth if we keep distinguishing between natural and medical, if we stereotype natural as esoteric and medical as scientific. We need science for both aspects, to take the best of both and combine them. Moreover, research on childbirth has to include more than just the medical outcome. Safety includes more than medical outcomes; among other things it also includes psychological well-being. To dismiss these natural aspects as unimportant, ridiculous, and not empirically tangible does not argue scientifically. Instead of rejecting natural as an ontological claim outside empirical scrutiny, we should define, operationalize, and test naturalness, just as we define, operationalize and test safety.

The present thesis followed a scientific approach. Although the presented studies still leave many research questions unanswered, they demonstrate that the subject of birth is not a purely medical one. Birth and psychology are closely related: psychological factors such as the birth-related mindset impact birth and birth itself impacts psychological outcomes. The importance of the birth experience for the mother, the father, and the infant, and its impact on psychological well-being and transition to parenthood, became obvious. Existing research has suggested that some of the aspects I have studied may have far-reaching consequences as e.g., in the case of postpartum depression (Gunnar & Hostinar, 2015; Ulmer-Yaniv et al., 2018). Of course, the survival of mother and child is the most important outcome of birth. However, as obstetrics is very safe in the western nations, it is time to start thinking about potential long-term effects, both physical and psychological aspects. Thereby, we have to define which aspects are important. My studies suggest that the birth experience might be crucial and that the birth experience is partly negatively affected by performed interventions. So as little as we need forest births and non-evidence-based remedies in obstetrics, we should also not fall into 'the more the better'. Instead, it is necessary to continue to evaluate the benefits and costs of interventions and to find ways to promote low-intervention births. The birth-related mindset may be an important starting-point – which is needed, because my studies empirical support the claim raised by birth advocates all over the world including the WHO (2018): It does matter how women give birth and a positive outcome of birth includes not only a healthy child, but also a satisfying experience for the mother and the whole family.

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APPENDICES

A: MEASUREMENT TIMES AND LIST OF VARIABLES

Measurement times

t1: first third of pregnancy

t2: six to four weeks before the baby's due date

t3a and t3b: within the first week after birth

Note: t3b was either answered by the women or the man

t4: eight weeks after birth

t5: six months after birth

tA: after the routine check-ups/examinations during pregnancy

tB: daily in the first two weeks after the birth, then weekly for postpartum weeks three to six

Variables sorted by content

Demographic data:

Age, gender, due date, current pregnancy week, relationship status (married: yes/no), duration of relationship, educational background, occupation, income, private insurance (yes/no), number of children, birth modes of previous children, desired sex
Measurement time: t1

BIRTH-RELATED ITEMS AND QUESTIONNAIRES

- Birth experience scale
  Measurement time: t1 (only for multiparous women for previous births), t3a, t4, t5
- MBQ: Mindset and Birth Questionnaire
  Measurement time: t1, t2, t4, t5
- Birth attitude IAT
  Measurement time: t1, t2, t4, t5
- W-DEQ: Wijma Delivery Expectancy/Experience Questionnaire (Wijma, et al., 1998)
  Measurement time: t2
  Note: Only parts of the questionnaire were used.
- Birth-specific self-efficacy (Schmidt et al., 2013)
  Measurement time: t2

- Knowledge about birth
  Measurement time: t1

- Evaluation pregnancy class
  Measurement time: t2

- Information on performed examinations during pregnancy
  (e.g., blood sampling, ultrasound)
  Measurement time: tA

- Satisfaction with routine examinations during pregnancy
  Measurement time: tA

- Weight and sizes concerns
  (estimated size and weight (ultrasound), evaluation of estimated weight / size)
  Measurement time: t2

- Information medical risk
  Measurement time: screening questionnaire, t2

- Intentions for birth and the puerperium
  (planned place of birth, planned midwife care during birth, intention to use an epidural, intention to breastfeed after birth)
  Measurement time: t2

- Process of labor and birth
  (week of delivery, position of the child at birth, weight, size, head circumference, Apgar score, duration of birth, place of birth, midwifery care during birth, details of the beginning of birth, mode of birth, interventions during birth [e.g., ultrasound, epidural, CTG], information on birth injuries, information on first contact with child after birth)
  Measurement time: t3B

- Details of the healing process of birth injuries
  Measurement time: tB

PERSONALITY TRAITS

Note: The scales state-trait anxiety, neuroticism, self-efficacy, and self-esteem were presented together in a fixed-random order. The answer format of the scales has been adapted accordingly.

- State-Trait-Anxiety (Laux et al., 1981)
  Measurement time: t1, t4

- Neuroticism (Rammstedt & John, 2005)
  Measurement time: t1, t4

- Self-efficacy (Schwarzer & Jerusalem, 1999)
  Measurement time: t1, t4

- Self-esteem (Ferring & Filipp, 1996)
  Measurement time: t1, t4

- Coping style (Knoll et al., 2005)
  Measurement time: t1
  Note: The answer format was changed.

DISORDER-RELATED SYMPTOMS AND WELL-BEING

- (Postpartum) Depression (Cox et al., 1987)
  Measurement time: t1, t4, t5
  Note: The answer format was changed.

- Post-traumatic stress (Brewin et al., 2002; Hofmann et al., 2002)
  Measurement time: t4, t5
  Note: The answer format was changed and the term "event" was changed into "birth". Only women.

- Hospital phobia
  Measurement time: t1

- Well-being
  Current perceived pain, health/fitness, resilience
  Measurement time: t2, tB

- Emotional well-being (Siegrist et al., 1996)
  Measurement time: tA, tB
  Note: Scale was only used in parts. The answer format was changed.

RELATIONSHIP RELATED QUESTIONNAIRES

- Relationship attachment (Bartholomew & Horowitz, 1991)
  Measurement time: t1, t2, t4
  Note: The answer format was changed.

- Attitudes towards romantic partners (Banse & Kowalick, 2007)
  Measurement time: t1
  Note: The answer format was changed.

- Relationship satisfaction (Sander & Böcker,1993)
  Measurement time: t1, t2, t4, t5

- Dyadic coping (Bodenmann, 2008b)
  Measurement time: t1

- Partner IAT (Banse & Kowalick, 2007)
  Measurement time: t1

INFANT

- Baby's prenatal temperament
  Measurement time: t2

- Parent-Infant Attachment (Brockington et al., 2001)
  Measurement time: t4, t5

- Baby's well-being and behavior
  Measurement time: tB

GENDER STEREOTYPES AND SEXISM

- Benevolent sexism (Eckes & Six-Materna, 1998)
  Measurement time: t1
  Note: The answer format was changed.

- BSRI: Bem's sex role inventory (Bem, 1974; Schneider-Düker & Kohler, 1988)
  Measurement time: t1, t2, t4, t5

- Information on parental leave, responsibilities in parenting
  (Parental leave split, working hours after parental leave, share of care work in the first three years)
  Measurement time: t4

Order of the instruments

Note: Items marked with [f] were only answered by female participants.

t1: Demographic questions, MBQ, state of knowledge about birth, birth-related attitude IAT, personality traits, depression, coping style, hospital phobia, relationship attachment, attitude towards romantic partner, relationship satisfaction, dyadic coping, partner IAT, sexism, BSRI.

t2: current week of pregnancy [f], estimated baby's gender (by ultrasound [f]), estimated baby's size (by ultrasound or midwife) [f], concern/tension due to the estimated size [f], estimated baby's weight (by ultrasound or midwife) [f], concern/tension due to the estimated weight [f], current weight of the woman [f], planned birth-place [f], planned midwifery support during labor and birth [f], evaluation of prenatal class, risk patient classification [f], intentions regarding epidural [f], intentions regarding breastfeeding [f], current well-being (pain, health/fitness, resilience) [f], W-DEQ [f], MBQ, birth attitude IAT, birth-related self-efficacy [f], relationship attachment, relationship satisfaction, baby's perceived temperament, BSRI.

t3a: baby's birth date, perceived labor and birth pain [f], current well-being (pain, health/fitness, resilience) [f], Birth experience scale (for fathers only if they were present at birth, otherwise they were asked to give the reason for their absence).

t3b: baby's birth date, baby's gender, week of pregnancy at birth, child position at birth, baby's birth weight, baby's size at birth, baby's head circumference, Apgar score, baby's need of medical care after birth, duration of birth, place of birth, midwifery support during labor and birth, number of attendant midwives during labor and birth, doula support, information about the beginning and mode of birth, *if applicable:* reasons for planned C-section, information about performed interventions, information epidural (at own request or on advice of the staff), information about interventions after birth, information about birth injuries, information about baby bonding after birth, information about medical risk during pregnancy.

t4: birth experience scale, MBQ, birth attitude IAT, personality traits, postpartum depression, post-traumatic stress symptoms[f], relationship attachment, relationship satisfaction, child rearing stress scale, BSRI, relationship status, whether child has surname of father or mother, information on parental leave and responsibilities in parenting.

t5: birth experience scale, MBQ, birth attitude IAT, postpartum depression, post-traumatic stress symptoms[f], relationship satisfaction, child rearing stress scale, baby's temperament, parent-child-attachment, BSRI, well-being (pain[f], health/fitness, resilience), question about adverse events after birth and on psychotherapy[f].

tA: current week of pregnancy, date and time of routine examination, emotional well-being, person responsible for examination, information on examinations carried out, question for abnormal findings, satisfaction with the examination.

tB: baby's age, emotional well-being, current well-being (pain[f], health/fitness, resilience), information about birth injuries[f], questions about breastfeeding[f], baby's well-being and behavior, question about hospitalization and midwifery care.

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Note: Contains only the references not listed in the main text.

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B: GERMAN VERSION OF THE MINDSET AND BIRTH QUESTIONNAIRE

Anmerkung: Bei den nachfolgenden Fragen wird aus Gründen der sprachlichen Vereinfachung nur die männliche Form "Gynäkologe/Arzt" verwendet. Es sind jedoch gleichermaßen Männer und Frauen gemeint.

1. Eine vaginale Geburt ist ein erfüllenderes Erlebnis als ein Kaiserschnitt.
2. Hebammen sollten sich bei einer Geburt stets Hilfe von einem Arzt holen.
3. Eine der größten Errungenschaften der Geburtshilfe war die Einführung der PDA (Periduralanästhesie).
4. Eine Geburt ist für die Frau in vielerlei Hinsicht peinlich.
5. Auch wenn sich eine Geburt über Stunden hinzieht und sehr schmerzhaft ist, lohnt es sich für Frau und Kind, vaginal zu entbinden.
6. Frauen sollten den Rat eines Gynäkologen ernster nehmen als den einer Hebamme.
7. Frauen sollten anstreben, ohne Schmerzmittel zu entbinden.
8. Eine Geburt ist eklig.
9. Ein Kaiserschnitt birgt viele Vorteile gegenüber einer vaginalen Geburt.
10. Hebammen, die eine Geburt ohne einen Arzt begleiten, überschätzen ihre Fähigkeiten.
11. Es ist erniedrigend, dass eine Frau während der Geburt Urin und Stuhl ausscheidet.
12. Für das Kind macht es keinen Unterschied, ob es per Kaiserschnitt oder vaginal entbunden wurde.
13. Es ist besser, ohne Schmerzmittel zu entbinden.

14. Es ist nicht verwunderlich, wenn begleitende Personen (z.B. Partner) die Geburt als eklig empfinden, da sie eine blutige und schmierige Angelegenheit ist.
15. Frauen, die ihr Kind per Kaiserschnitt entbinden, entgeht eine wichtige Lebenserfahrung.
16. Bei einer normal verlaufenden Geburt sind Frau und Kind bei einer Hebamme am besten aufgehoben.
17. Es ist Unsinn, zu versuchen, ohne Schmerzmittel zu entbinden.
18. Auch wenn die Geburt normal verläuft, sind Frau und Kind am sichersten, wenn ein Arzt anwesend ist.

Antwortformat: 1 = *stimme überhaupt nicht* zu bis 6 = *stimme vollkommen zu*

Items, die rekodiert werden müssen: 2R, 7R, 17R, 30R, 3R, 28R, 4R, 12R, 18R, 24R, 13R, 19R

Trust in midwives: 2R, 7R, 17R, 27, 30R

Low birth-related shame and disgust sensitivity: 4R, 12R, 18R, 24R

Positive view of vaginal birth: 1, 5, 13R, 19R, 25

Negative view of drug support: 3R, 9, 23, 28R

C: GERMAN VERSION OF THE BIRTH EXPERIENCE SCALE

1. Alles in allem würde ich die Geburt meines Kindes als ein schönes Ereignis bezeichnen.
2. Auch wenn ich froh bin, dass mein Kind auf der Welt ist, war die Geburt an sich ein eher schreckliches Ereignis.
3. Ich habe mich während der Geburt meines Kindes alleingelassen gefühlt.
4. Rückblickend bin ich zufrieden mit dem Verlauf der Geburt meines Kindes.
5. Wenn ich die Geburt meines Kindes noch einmal durchleben könnte, würde ich viele Dinge anders machen
6. Ich hatte während der Geburt das Gefühl bevormundet zu werden.
7. Ich würde mir wünschen, die Geburt meines Kindes wäre anders verlaufen.
8. Das Geburtserlebnis hat mich stark und stolz gemacht.
9. Ich würde mir genauso eine Geburt noch einmal wünschen.
10. Ich habe mich während der Geburt geborgen und sicher gefühlt.

Antwortformat: 1 = *stimme überhaupt nicht* zu bis 6 = *stimme vollkommen zu*