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ARTICLE

Preferred ways of giving birth in non-pregnant and pregnant nulliparous women: the role of control beliefs

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ABSTRACT

Purpose: To explore the association between delivery-specific, health-related control beliefs and preferred ways of delivery in nulliparous Hungarian women. Moreover, since data about the delivery-specific control beliefs and delivery-related preferences of non-pregnant nulliparous women are lacking, the present study also seeks to provide descriptive information in this regard.

Methods: A total of 984 Hungarian nulliparous women (26.45 ± 5.42 years; 660/77.2% non-pregnant and 224/22.8% pregnant) were included in the present study. The online assessment included measures of delivery-specific (internal-, healthcare professional-, and chance-related) health control beliefs, fears of childbirth, self-esteem, as well as preferences regarding delivery setting (i.e. spontaneous vaginal birth in hospital, planned cesarean birth and home birth).

Results: Healthcare professional-related control beliefs were associated with a stronger preference for spontaneous vaginal birth in hospital (OR = 1.87, 95% CI: 1.56–2.23) and planned cesarean birth (OR = 1.96, 95% CI: 1.60–2.40), alongside a weaker preference for home birth (OR = 0.31, 95% CI: 0.25–0.39). In contrast, internal delivery-specific control beliefs predicted a weaker preference for planned cesarean (OR = 0.66, 95% CI: 0.55–0.78) and a stronger preference for home birth (OR = 1.63, 95% CI: 1.33–2.00). A general preference index for medicalized ways of delivery was negatively associated with internal – and positively with healthcare professional – and chance-related control beliefs (βs = −.173, .074 and .445, respectively).

Conclusions: Delivery-related control beliefs are important psychological characteristics in the prediction of preferences for ways of delivery. Understanding delivery-specific control beliefs may be an important component of supporting women to give birth in a mentally and physically healthy way.

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Delivery-related preferences; delivery-related control beliefs; nulliparous women; fear of childbirth

Introduction

Maintaining and acquiring personal control is one of the most important concerns connected to health-related decisions, and this applies to birth-related decisions as well. The means (place and mode) of delivery are among the most important aspects of this choice, which is at the intersection of several socio-ecological, interpersonal and intrapersonal factors [1] that also have evolutionary roots [2]. Moreover, the choice of the best and safest place for delivery is one of the most frequent concerns around pregnancy and delivery. Women are often concerned about the potential choices regarding giving birth even before pregnancy, and their preferences solidify by the first trimester or even sooner [3]. Further, research shows that later external influences have little impact on these preferences [4]. In what follows we address the role of psychological processes (fear of childbirth and personal control) in relation to birth preferences in general, and then present a model of the construction of beliefs about delivery-related control as a potential core component of these processes.

Preferences for a certain means of delivery: psychological processes

One of the often-studied factors that may have an impact on individual choices concerning the place and mode of delivery is the level of fear regarding childbirth [5]. Greater fear of childbirth makes the choice of

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medicalized types of birth more likely [3,6,7]. Perceptions of delivery as a painful and uncontrollable event are frequently reported causes for a preference for elective cesarean both in pregnant and non-pregnant women [8–10]; presumably because elective cesarean is perceived as the best way of handling risks and unforeseen consequences during labor and delivery [11,12]. Higher levels of birth anxiety may have an impact on future delivery outcomes as well; they may lead to a worse birth experience, lower satisfaction and self-esteem, and more medical intervention [13–15].

While fear of childbirth is one of the most frequently studied psychological phenomena in relation to the preferred means of delivery, the level of personal control that women have over delivery-related situations (e.g. in relation to pain control *via* analgesics, the availability of medical staff, and the manageability of the wider environment) may have significant effects on their choice process as well [16]. Several studies have shown that higher perceived competence and self-efficacy – that is, greater control over the process – during pregnancy predict lower levels of anxiety and less pain and medical intervention in the process of delivery [17–19]. A preference for personal control and autonomy is more likely to lead to the choice of home birth [20,21], which in turn may lead to a highly satisfactory birth experience [22]. Moreover, the information and support that is available from the social environment may affect the way that women strive for personal control, and thus their choices in relation to means of delivery [23]. As the emotional availability of important others is especially significant for pregnant and laboring women [24], an experience of a low level of support from significant others may lead to a choice of medicalized delivery and elective cesarean as strategies for regaining personal control [25]. In sum, the perceived availability of internal and interpersonal resources predicts perceived control over delivery, which in turn has an impact on preferred place and mode of delivery.

Beliefs about health-related control

These data suggest that the personal control women can exert over their delivery-related choices may play an important role in prenatal and perinatal processes and outcomes. However, it is not evident what women themselves think about their opportunities to control the factors surrounding their child's delivery. Their beliefs about the extent and nature of control may be as diverse as their other psychological characteristics. The theory of the health-related locus of control conceptualizes how an individual constructs his or her beliefs or expectations regarding the factors that determine their health [26]. Theoretical models assume that people attribute the course and state of their health and illness to a certain set of "agents"; namely, to themselves ("Internal control beliefs"), to significant or powerful others ("Others-related control beliefs") and to mere chance ("Chance-related control beliefs"). A wide range of studies suggest that the health locus of control is associated with attitudes, affects, values, and coping styles, which in turn determine health-related factors such as perceived self-efficacy and perceived behavioral control [27–29].

Research on control beliefs in pregnancy and delivery

It can be assumed that control beliefs specifically concerning childbirth – that is, beliefs regarding the individual's ability to influence the outcomes of childbirth – may play an important role in delivery-related preferences and may help to explain and conceptualize previously studied, more proximal processes such as fear of childbirth or self-efficacy in the context of pregnancy and delivery. General health-related control beliefs have been examined using the Multidimensional Health Locus of Control (MHLC) Scales [30] on samples of pregnant women with regard to their own and their babies' health [31–33]. Moreover, the concept of health-related control beliefs has also been applied to assess pregnant women in the first [33] and the third trimester of pregnancy [34]; however, mixed results were found regarding the applicability of this general scale version to pregnancy and delivery.

In response to these concerns, Stevens and colleagues [35] developed a version of the MHLC scale for the measurement of labor and delivery-related control beliefs in pregnant women specifically. Higher scores on the Powerful Others (i.e. healthcare professional-related control) factor of this scale (MHLC-LD [35]) were related to selecting obstetricians as care providers and the hospital as the intended location for delivery, and a stronger preference for repeated cesarean delivery. In contrast, higher "Internal" scores were related to a preference for midwives and home birth, as well as vaginal birth after first cesarean [35–37]. Higher scores on the Chance scale were related to stronger preferences for hospital delivery, as well as higher anxiety about childbirth, lower self-esteem [32,38] and more depressive symptomatology

[32,34,39]. Finally, stronger internal control beliefs related to labor and delivery predicted higher childbirth satisfaction in post-partum women, even after controlling for a series of confounding variables [39].

More recently, the revised version of the Multidimensional Health Locus of Control Scales for Labor and Delivery (MHLC-LD-R) was developed to assess delivery-specific control beliefs regardless of the respondent's actual stage of reproductive life cycle or role in delivery (e.g. pregnant or non-pregnant, support person for a pregnant woman, healthcare professional) [40]. Conceived in the frame of the general model of health locus of control, MHLC-LD-R measures the strength of internal, chance-related and healthcare professional-related control beliefs, wherein the latter dimension represents the more general "Powerful others" dimension in the context of labor and delivery. According to the validation study [40], over and above subjective health status and health locus of control in general, more internal delivery-related control beliefs predicted less fearful attitudes and stronger interest toward labor and birth.

The present study

In the last 10 years, public debates have arisen in Hungary about the possibility for and availability of home birth [41], along with renewed striving for a more humane hospital birth practice. By the middle of the 2010s, out-of-hospital birth had become legally accepted and midwives were allowed to provide prenatal care for pregnant women when a low-risk pregnancy was appraised [42]. Along with these changes, rates of cesarean section have been slowly rising, comparably to other medium- and highly developed countries [43] while rates of planned home birth are very low (in 2015, 442 deliveries, equivalent to about 0.5% of deliveries in Hungary; see [42]). Public and private discussions about birth-related themes may have contributed to a social atmosphere in which the awareness of many people has been heightened concerning their birth- and delivery-related beliefs and preferences. The present study was conceived in this broader context.

According to the above-presented overview, delivery-specific control beliefs may play an important role in forming/changing preferences for certain means (i.e. places and modes) of delivery; not just with women who are actually pregnant, but also in those who are before their first pregnancy or between pregnancies. However, studies that address the role of delivery-specific control beliefs in pregnant nulliparous women are sparse, and even entirely lacking in the case of non-pregnant nulliparous women. Therefore, the first goal of the present study was to assess the association between delivery-related control beliefs and preferences for different places and modes of delivery in a sample of nulliparous Hungarian women, a population which has been understudied in this regard to date. We hypothesized that (H1) stronger internal delivery-related control beliefs would predict a stronger preference for home birth; while (H2) stronger beliefs in the control of powerful others (i.e. medical professionals) and chance would predict stronger preferences for medicalized ways of delivery (i.e. vaginal birth in hospital and elective cesarean section).

Moreover, we expected that (H3) these associations would hold even after controlling for a series of potentially confounding factors. Beyond sociodemographic characteristics (e.g. age and education) and subjective health status, we considered psychological aspects that have been previously identified as correlates of mode of delivery and control beliefs, such as fear of childbirth and self-esteem [15,32,38]. Finally, previous studies have also suggested that the way in which a woman herself was born and her family members' experiences with giving birth could also have an effect on birth-related beliefs and choices [44–48]. Therefore, the mode of the participants' own birth was also assessed and considered in the analysis.

As a second aim of the study, we approached an understudied population: non-pregnant nulliparous women. Both qualitative [23] and quantitative studies [49] show that birth-related anxiety may be present well before the first actual pregnancy, or between pregnancies. Similarly, findings suggest that women strive to identify the personal meaning of childbirth and their attitudes toward its circumstances long before they even consider their first pregnancy [47,50].

Given the personal significance of childbirth and childbirth-related choices across the lifespan, it is highly surprising that studies regarding the delivery-related control beliefs, expectations, and intentions of non-pregnant, nulliparous women are lacking. Therefore, we also compared non-pregnant versus pregnant women in our sample to investigate (E1) if pregnancy status is associated with systematic differences in delivery-specific control beliefs and preferences; and (E2) if pregnancy status moderates the association between control beliefs and preferences for labor and delivery setting. Explicit hypotheses regarding the direction and the magnitude of these associations were not formed due to the explorative nature of the investigations.

Methods

Sample and procedure

The study protocol was approved by the Research Ethics Board of Semmelweis University. University students on an introductory psychology course (who were offered partial credit for their involvement) were asked to distribute the online questionnaire pack for the study (*via* the *Surveygizmo* platform) in two waves. First, non-pregnant nulliparous women were recruited for the study through social media platforms (Facebook, and the personal email lists of the students who were involved), using snowball methodology. Second, nulliparous women who were pregnant with their first baby were recruited through peer forums. Again, snowball recruitment was undertaken with the help of psychology students as research assistants. Respondents were informed about the general aim of the study (i.e. research into the potential predisposing factors behind the choice of the mode and place of delivery) and gave their informed consent prior to joining the assessment procedure.

According to the power analysis, 200 respondents were required for both subsamples as a minimum, since this sample size would enable the detection of a .2 correlation at $p = .05$ with a statistical power of .8. During the recruitment phase for the study, 35.3% and 54.1% of the potential participants who accessed the online platform completed the survey in the pregnant and non-pregnant samples, respectively. A total of 984 women thus completed the Hungarian-language online survey. The mean age of respondents was 26.45 years (SD = 5.42 years), 224 (22.8%) of whom were pregnant when completing the survey. The larger part of the sample consisted of women with a college- or university-level education (57.4%). Detailed characteristics of the sample are presented in Table 1.

Measures

The sociodemographic variables included into the analyses from the complex test battery of the survey were related to respondents' age, pregnancy status (currently pregnant or not) and educational attainment (having vs. not having completed post-secondary education). A single, yes-or-no type item was used to explore if the respondents themselves were born *via* cesarean birth (taking the respondents' expected age and cultural context into account, own home birth was not a realistic option).

To estimate the participants' subjective evaluation of their health status, the following question was asked: "Taken as a whole, how would you rate your health status (1 = very bad, 2 = bad, 3 = average, 4 = good, 5 = excellent)?" Considering the low frequency of certain answers, responses were dichotomized to reflect the following categories: average or worse (1–3) versus good or excellent (4–5).

The Rosenberg Self-Esteem Scale [51,52] was used to assess the overall level of self-esteem. This scale is comprised of 10 items that refer to self-respect and self-acceptance, each rated on a four-point Likert-type scale ranging from "Totally disagree" (1) to "Totally agree" (4). The internal consistency of the tool was very good for the present sample ($\alpha = 0.90$).

The nine-item Fearful Attitudes subscale ($\alpha = 0.89$) from the Birth Attitudes Scale [53] was also employed in the present study. This subscale captures both

Table 1. Sociodemographic characteristics and delivery preferences of study sample, stratified by pregnancy status.

	Total	Non-pregnant	Pregnant	Test statistics
N (% of total sample)	984	760 (77.2)	224 (22.8)	
Age (years) mean (SD)	26.45 (5.42)	25.98 (5.71)	28.02 (3.88)	$t = 5.02$ (982) $p < .001$
Education, *N* (%)				
Secondary and lower	419 (42.6)	343 (45.1)	76 (33.9)	$\chi^2 = 8.81$ (1), $p = .003$
College or higher	565 (57.4)	417 (54.9)	148 (66.1)	
Self-rated health, *N* (%)				
Average or worse	139 (14.1)	121 (15.9)	18 (8.0)	$\chi^2 = 8.87$ (1), $p = .003$
Good or excellent	845 (76.9)	639 (84.1)	206 (92.0)	
Own birth: cesarean (%)				
No	873 (88.8)	674 (88.8)	199 (88.8)	$\chi^2 < 0.01$ (1), $p > .999$
Yes	111 (11.2)	85 (11.2)	25 (11.2)	
Vaginal birth in hospital (%)				
Preferred	741 (75.4)	536 (70.6)	205 (91.5)	$\chi^2 = 40.71$ (1), $p < .001$
Not preferred	242 (24.6)	223 (29.4)	19 (8.5)	
Cesarean (%)				
Preferred	213 (21.7)	144 (19.0)	69 (30.8)	$\chi^2 = 14.26$ (1), $p < .001$
Not preferred	770 (78.3)	615 (81.0)	155 (69.2)	
Home birth (%)				
Preferred	194 (19.7)	170 (22.4)	24 (10.7)	$\chi^2 = 14.91$ (1), $p < .001$
Not preferred	789 (80.3)	589 (77.6)	200 (89.3)	

general and specific (e.g. medical complication-related) fears regarding delivery. Items were rated on a seven-point scale ranging from "Not at all" (1) to "Very much" (7).

The revised version of the MHLC-LD-R [40] is a 12-item measure used to assess delivery-specific control beliefs. The MHLC-LD-R contains three subscales for measuring the magnitude of the perceived influence of pregnant woman (Internal subscale, four items, $\alpha = 0.82$), chance or fate (Chance subscale, four items, $\alpha = 0.83$), and the professionals who are present during labor and delivery (Healthcare professionals subscale, four items, $\alpha = 0.74$) on delivery outcomes. All items were rated on a six-point scale that ranged from "strongly disagree" (1) to "Strongly agree" (6).

Three ad-hoc questions were administered to assess preferences for giving birth (1) spontaneously in hospital, (2) *via* elective cesarean birth in hospital, and (3) at home. Preferences for each option were rated on a six-point scale ranging from "I would definitely avoid this option" (1) to "I would definitely choose this option" (6). For further analysis, scores for the three choice options were transformed in two ways. First, given the low frequency of certain answers, the variables were dichotomized to reflect the following categories: preference for avoiding the given option (1–3), versus preference for choosing the given option (4–6). Second, we also examined whether the three choice options reliably represented one underlying dimension. The principal component analysis of the three items indicated that they loaded on one component (explained variance 59.1%) with positive loadings for the two hospital delivery items and negative loading for the home birth item (absolute values were above 0.7). We interpreted the underlying dimension as an overall preference for giving birth in a medical setting. Accordingly, a composite score (treating the item measuring the preference for giving birth at home as an inverse item) was computed by adding up the raw (non-dichotomized) scores on all three items. The internal consistency of this composite score was – considering its brevity – acceptable ($\alpha = 0.65$). We subsequently refer to this composite index as a medicalized delivery preference index.

Statistical analyses

A separate binary logistic regression model was run to investigate the associations between the independent variables and each of the three dependent variables and help assess respondent preferences regarding the setting of giving birth (spontaneously in hospital, planned cesarean in hospital and at home). Considering the continuous nature of the variable created as a composite score from the three separate items, an additional linear regression analysis was also run to test the concurrent role of the predictors in the case of the medicalized delivery preference index.

In the case of all four dependent variables, the interactions of pregnancy status and the subscales of the MHLC-LD-R were also investigated in additional models to better understand if pregnancy status moderates the association between delivery-specific control beliefs and preferences regarding the setting for giving birth. To make the individual contributions of the continuous predictors more comparable, all regressions were run employing the *z*-scores of the appropriate independent variables. Statistical analyses were undertaken using Statistical Package for the Social Sciences (SPSS) for Windows, version 23.

Results

Bivariate analyses

According to hypotheses H1, H2, and the aim of the explorative comparisons between subgroups (E1), we first tested bivariate associations between pregnancy status (non-pregnant vs. pregnant) and the other study variables, including the sociodemographic and psychological characteristics, as well as delivery-related control beliefs and preferences for means of delivery. The results of these analyses are presented in Tables 1 and 2.

Pregnant women in the present sample were somewhat older, had higher educational attainment, and reported better self-rated health status than their non-pregnant counterparts. Further, they had higher self-esteem and tended to believe more strongly that delivery outcomes depend on chance. They also preferred spontaneous vaginal and cesarean delivery in hospital more and home birth less. Consequently, there was a clear difference in the composite medicalized delivery preference index between the two subgroups, with pregnant women preferring institutionalized delivery more. However, there was no significant difference between the two subgroups in terms of fear of childbirth and internal and healthcare professional-related control beliefs.

Multivariate analyses

In a series of multivariate analyses, it was tested whether the bivariate relationships of delivery-related control beliefs held after controlling for several other

Table 2. Psychological characteristics of the study sample, stratified by pregnancy status.

	Total		Non-pregnant		Pregnant			Pearson correlation coefficients				
	m	SD	*m*	SD	*m*	SD	Test statistics	1	2	3	4	5
1. MHLC-LD-R Internal	14.76	3.21	14.75	3.13	14.79	3.47	$t(982) = -0.15$, $p = .879$					
2. MHLC-LD-R Chance	9.95	3.63	9.64	3.46	10.97	4.02	$t(982) = -4.85$, $p < .001$	−.262***				
3. MHLC-LD-R Professionals	15.64	3.33	15.57	3.50	15.87	2.67	$t(982) = -1.17$, $p = .241$	−.099***	.273***			
4. FAC	3.39	1.38	3.35	1.36	3.54	1.45	$t(982) = -1.86$, $p = .064$	−.236***	.304***	.184***		
5. RSES	29.95	5.45	29.63	5.46	31.00	5.32	$t(982) = -3.31$, $p = .001$	.203***	−.214***	−.105**	−.315***	
6. Medical delivery preference	11.69	3.47	11.23	3.46	13.25	3.03	$t(982) = -7.90$, $p < .001$	−.233***	.268***	.494***	.151***	−.098**

FAC: fearful attitude toward childbirth; RSES: Rosenberg Self-Esteem Scale; MHLC-LD-R: Revised version of the Multidimensional Health Locus of Control Scales for Labor and Delivery.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 3. Predictors of women's preferences regarding modes of delivery (logistical regression).

	Vaginal birth in hospital				Cesarean birth in hospital				Home birth			
		95% CI				95% CI				95% CI		
	OR	Lower	Upper	*p*	OR	Lower	Upper	*p*	OR	Lower	Upper	*p*
Age	0.80	0.66	0.96	.015	1.19	0.96	1.48	.105	1.20	0.97	1.48	.094
Higher education	1.51	1.03	2.22	.034	0.93	0.63	1.39	.736	0.61	0.39	0.95	.028
Good self-rated health	1.36	0.86	2.14	.185	1.13	0.70	1.83	.607	0.95	0.54	1.67	.868
Pregnant (vs. not)	4.56	2.73	7.64	<.001	1.89	1.29	2.77	.001	0.45	0.27	0.74	.002
Own birth: cesarean	0.91	0.55	1.50	.712	1.66	1.04	2.66	.035	0.73	0.38	1.41	.351
FAC	0.79	0.66	0.94	.008	1.17	0.98	1.40	.079	1.00	0.81	1.24	.999
RSES	0.88	0.74	1.05	.155	0.85	0.71	1.02	.077	1.05	0.64	1.30	.683
MHLC-LD-R Internal	0.89	0.75	1.05	.157	0.66	0.55	0.78	<.001	1.63	1.33	2.00	<.001
MHLC-LD-R Chance	1.17	0.97	1.40	.099	1.04	0.87	1.24	.655	0.92	0.74	1.14	.454
MHLC-LD-R Professionals	1.87	1.56	2.23	<.001	1.96	1.60	2.40	<.001	0.31	0.25	0.39	<.001
Cox and Snell R^2	0.139				0.117				0.219			
χ^2	147.3				122.6				243.4			
Sig.	<.001				<0.001				<0.001			

SRH: self-rated health; FAC: fearful attitude toward childbirth; RSES: Rosenberg Self-Esteem Scale; MHLC-LD-R: Revised version of the Multidimensional Health Locus of Control Scales for Labor and Delivery.

variables (H3). Three independent binary logistic regression models were run to predict dichotomous (preference vs. non-preference) scores for spontaneous hospital delivery, elective cesarean and home birth (see Table 3). A preference for spontaneous hospital delivery was significantly predicted by higher healthcare professional-related control beliefs, less fear regarding giving birth, being pregnant, lower age and higher educational attainment. Further, preferences for elective cesarean were significantly predicted by higher healthcare professional-related and lower internal control beliefs, being pregnant, and incidence of own cesarean birth. Finally, preferences for home birth were significantly predicted by lower healthcare professional-related and higher internal control beliefs, a lower level of education, and not being pregnant.

Addressing the study aim of subgroup comparisons at the multivariate level (E2), in a subsequent line of analyses, all previous models were rerun with the additional interaction term of one of the MHLC-LD-R subscales and the pregnancy status variable. Accordingly, nine separate regression analyses were run (three means of delivery using three subscales). None of the interaction terms reached significance at the $p = .05$ level.

The medicalized delivery preference index was significantly predicted by stronger "Chance" and healthcare professional-related and weaker "Internal" beliefs (βs = .074, .445 and −.173, respectively; all ps ≤ .012) together with higher educational attainment and being pregnant (βs = .078 and .223, respectively; all ps ≤ .012; see Table 4). The same linear regression model was run in the subsequent analyses with an additional interaction term of one of the MHLC-LD-R subscales and the pregnancy status variable. None of the three models provided evidence for a significant interaction effect.

Discussion

Giving birth is a significant life-event both at the personal and the relational level [54–58] and pregnancy and post-partum are sensitive, vulnerable periods for depression as well [59]. Birth outcomes are also influenced by whether women have the internal and external resources to make the best choices regarding the

Table 4. Linear regression for predictors of medicalized delivery preference index.

	B	*β*	*p*
Age	−0.180	−0.052	.107
Higher education	0.550	0.078	.012
Good self-rated health	0.168	0.017	.537
Pregnant (vs. not)	1.841	0.223	<.001
Own birth: cesarean	0.491	0.045	.088
FAC	−0.047	−0.013	.645
RSES	−0.145	−0.042	.151
MHLC-LD-R Internal	−0.600	−0.173	<.001
MHLC-LD-R Chance	0.256	0.074	.012
MHLC-LD-R Professionals	1.547	0.445	<.001
R^2 (adjusted)	0.336		
F	50.7		
p	<0.001		

SRH: self-rated health; FAC: fearful attitude toward childbirth; RSES: Rosenberg Self-Esteem Scale; MHLC-LD-R: Revised version of the Multidimensional Health Locus of Control Scales for Labor and Delivery.

setting and conditions of their delivery [16–19]. In the present study, the role of beliefs on locus of control was examined; more specifically, whether delivery-related control beliefs are significant in terms of predicting a preference for different modes of delivery (spontaneous hospital delivery, elective cesarean section or home birth).

While building on and extending previous research on health-related control beliefs [35–37], the present study contains multiple novel aspects both with regard to sampling and outcome measures. First, as birth-related beliefs and expectations about future delivery may be present and develop in women across emerging adulthood [23,47,49,50], we also approached an understudied population – that is, non-pregnant nulliparous women. Second, our sample consisted of Hungarian nulliparous women who were approached in the broader sociocultural context of vivid public and political discussions and gradually changing practices of pre- and perinatal care [41–43]. While we did not address social aspects directly, these considerations might have played a role in the relatively high interest in participating in the study and the stated preferences, too. Further, when assessing preferences for certain modes of delivery, two parallel approaches were employed. On the one hand, we examined individual preferences for three distinct modes (i.e. vaginal birth in a hospital setting, elective cesarean and home birth) separately. On the other hand, we found that these preferences may be also represented by one underlying dimension (preference for medicalized delivery), which was used in the subsequent analyses in addition to the three individual ratings.

The central constructs were delivery-related control beliefs, and we expected that such different beliefs would predict different delivery-related preferences. The results of the study generally supported this assumption. In models both with preferences for specific modes of delivery and also the medicalized delivery preference index, we found that strength of beliefs related to the role of healthcare professionals was the strongest predictor. Higher scores on this domain predicted a preference for hospital births and elective cesareans as well as rejection of home birth. In addition, a higher level of internal control beliefs was weakly but significantly associated with a weaker preference for elective cesarean and a stronger preference for home birth. Consistently, higher scores for internal beliefs predicted a weaker preference for medical settings (as presented by the medicalized delivery preference index). Finally, stronger belief in Chance was unrelated to the specific preference ratings; nevertheless, in the linear regression, it weakly predicted stronger preference for medical settings. This pattern of results suggests that considering delivery as a largely uncontrollable event that depends on mere chance does not influence preferences for the specific setting of delivery (i.e. bad luck cannot be ruled out, regardless of the means of delivery), while, to a certain extent it may contribute to the acceptance of medicalized delivery.

Our results correspond to the findings of previous studies about delivery-specific control beliefs [35–37] and extend a growing body of research devoted to the investigation of the role of health-related control beliefs in determining a number of aspects of health and illness. Specifically, while previous studies of other domains than pregnancy and delivery mostly found a positive role for internal control beliefs and the ambivalent role of external (powerful others and chance) beliefs in health-related outcomes [60–64], delivery-related preferences cannot easily be categorized as more or less desirable. Therefore, it is even more important to support the informed and autonomous choice of women [16,37]. From this perspective, however, especially intriguing is the eminent role of healthcare professional-related beliefs with regard to choice preferences, since previous studies found that a stronger belief in the impact of "Others" – corresponding to the healthcare professional-related control beliefs in this study – was found in more powerless and stigmatized patients. Delivery- and birth-related experiences may be connected to both disempowering and empowering factors [65–67]; therefore, further investigation should be made of those factors and processes that may increase the empowering and autonomy-supporting aspects of delivery-related healthcare.

It is important to stress a series of novel features of these results. First, the results of the present study regarding control beliefs were controlled for several sociodemographic (age and education) and delivery-related characteristics (pregnancy status, self-rated health and own birth) as well as psychological characteristics (fear of childbirth and general self-esteem). Among these potential confounding variables, the only consistent predictor throughout the analyses was pregnancy status, indicating that pregnant women in the sample preferred institutional modes of delivery more and home birth less than non-pregnant women. This association may indicate that the actual experience of pregnancy and the delivery-related preferences of women approaching the delivery may partly change. However, this assumption cannot be tested decisively based on our cross-sectional comparisons: as the subsample of pregnant women was older on average, differences in relation to preferred ways of giving birth may reflect cohort effects as well. On the other hand, while in the multivariate analysis stronger fear of childbirth predicted only a weaker preference for vaginal birth, and characteristics like self-esteem and own birth proved to be unrelated to preferences, the predictive power of healthcare professional-related control beliefs remained significant. These results emphasize the significance of control beliefs as core psychological components of the delivery-related decision processes. Moreover, results also support the general notion that cognitions (i.e. beliefs and expectations) about the effect of one's own health-related behavior may play a causal role in the maintenance and change of health behaviors [68].

Second, the main associations between delivery-related control beliefs and delivery preferences were robust across pregnancy status; none of the tested interactions were significant in the regression analyses (both logistic and linear regressions), which suggests that delivery-related control beliefs may have similar roles at different stages of reproductive life. Our data also reinforce the fact that women may even form their delivery-related cognitions and basic preferences before their actual pregnancy [23,49]. In addition, their delivery-related preferences seem to be influenced by delivery-related cognitions throughout the reproductive life cycle. However, little is known about how women form, maintain, and change their delivery-related control beliefs and what the main factors are that contribute to these processes. Cultural values and social discourse are important sources of information with regard to choice: in societies where elective cesarean is becoming more frequent, women may feel increasingly unsure about their ability to spontaneously give birth [11], even if this impression is biased due to an extensive media focus [69]. Interpersonal and professional communication, as well as broader social discourses transmitted through mass media, may considerably influence individual control beliefs and thus delivery-related preferences [36,70]. Further studies may contribute to a deeper understanding of the factors that shape delivery-related cognitions and expectations.

Finally, the study was conducted in Hungary, a Central European country, not in the context of a non-Western-European or North American one. While our main study focus was a theoretically and practically important general construct (i.e. control beliefs), the results presented herein may be of direct relevance to the delivery-related healthcare system in Hungary as well. Preferences for cesarean section were stated by around 11% of respondents, considerably lower than the actual 30–35% of deliveries that occur through CS [43]. In contrast, home birth was preferred significantly more as a way of delivery (22.4 and 10.7% of respondents in the nonpregnant and pregnant subsample, respectively) than the actual home birth rate of 0.5% [42]. These discrepancies show that, to a certain extent, women's needs may be unmet in the healthcare system and more effort is required to provide them with reasonable opportunities for choice both at the level of healthcare professionals and the healthcare system in general. We may also assume that the perceived gap between personal preferences and the options provided by the system also has an adverse effect on delivery-related control beliefs in women. However, such effects need to be scrutinized in later studies.

Limitations of the study

The findings presented in this paper must be interpreted in the light of certain limitations. The cross-sectional design of this study does not allow for the drawing of conclusions about any causality between control beliefs and choice preferences, and nor can we give a decisive account of the trajectory of control beliefs before and after becoming pregnant. Further research with longitudinal designs is needed to shed light on the temporal/causal relations and mediators of the formation of causal beliefs and their effect on delivery-related choices. Moreover, our results reflect data from a non-representative Hungarian sample whose replication should be attempted in cross-cultural investigations. With regard to the distributions in

the sample, concerns may arise about the different sample sizes of the subsamples and the possibility of a potential sampling bias. Finally, although the measurement tools that were applied have previously been used and validated in several studies of healthy individuals (Rosenberg Self-Esteem Scale [51,52]) or have been validated prior to the present study using the same sample (fearful attitudes toward delivery [53] and MHLC-LD-R [40]), some of the measures and scales included in the study have not been validated using samples of pregnant women before. While there is a long-standing empirical basis for using these measures in numerous different settings, further studies are needed to validate our results.

Conclusions

While the present study has addressed whether control beliefs are significant factors in predicting delivery setting-related preferences, we assume that cognitions about the availability of means of delivery and the extent of personal control affect the entire reproductive process. Understanding delivery-specific control beliefs and related processes may therefore represent an important means of supporting women to give birth in a mentally and physically healthy way. As delivery-related effects and cognitions can be effectively modified by psychological interventions [71], the application of these interventions regarding delivery-related control beliefs seems to be promising for facilitating empowerment. Healthcare professionals appear to be especially important sources of control for many pregnant and also non-pregnant women, which fact emphasizes the importance of providing personalized care in both delivery-specific and primary care settings. The introduction and development of a midwifery model of care (e.g. [72,73]) could create an especially promising systemic interface between women's needs and professional duties.

Further research should address several important aspects of control-belief-related processes that were not included in this study. While the present data have provided support for the central role of delivery-related control beliefs as an important psychological process, little is known about the interpersonal and societal predictors of these beliefs, nor their life trajectory across the reproductive life cycle. Moreover, the role of control beliefs may be important not only in terms of preferences for a place and mode of delivery but also in the specific actions by which individuals try to create a safe and satisfying institutional, environmental and interpersonal context for their labor and delivery.

Disclosure statement

No potential conflict of interest was reported by the authors.

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