



## Translation and validation of the Hungarian version of the Birth Satisfaction Scale-Revised (BSS-R)

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### ABSTRACT

**Background:** Evidence relating maternal birth experience to a range of maternal and neonatal outcomes is increasingly compelling. Consequently valid and reliable self-report of birth experience from the mothers perspective is critical.

**Aim:** The current study sought to translate and validate a Hungarian-language version of the Birth Satisfaction Scale-Revised (BSS-R).

**Method:** Following forward and backwards translation into Hungarian, the Hungarian BSS-R (HU-BSS-R) was administered to women in a major Transylvanian hospital maternity unit within 72 h postpartum. Key psychometric characteristics were then examined in relation to factor structure, divergent and convergent validity, internal consistency, and known-groups discriminant validity.

**Results:** Two-hundred and thirty-two women completed the HU-BSS-R. Confirmatory factor analysis revealed the HU-BSS-R to offer an excellent fit to data for the established tri-dimensional measurement model. The HU-BSS-R was also found to offer excellent convergent and divergent validity and known-groups discriminant validity. No significant differences were observed between internal consistency observations between the current study and the original UK validation study.

**Conclusions:** The HU-BSS-R is a valid and reliable translation of the original BSS-R, it has proved itself to have excellent psychometric properties and is suitable for use in the Hungarian maternity context.

### Introduction

Globally, nearly 140-million women give birth every year (UNICEF, 2016), with the majority healthy and not requiring complex care provision. As part of this process, skilled maternity care professionals have a duty to strive towards optimizing the health environment for all pregnant women and their unborn infants (World Health Organisation, 1996). To reduce risk and guide care at a global level, the World Health Organization (WHO) has published research-based protocols that outline expected standards of high-quality care for mothers during labour and the postnatal period, which steer care towards providing a more positive birth experience (World Health Organisation, 1996,

2016). In the past, maternity care was solely designed to reduce risk and treat complications, with a new modern emphasis upon improving women's evaluations of birth satisfaction (Grundstrom et al., 2023; Hamm et al., 2020). Despite several decades of research that has focused upon what constitutes high-quality maternity care, what is delivered across the world appreciably differs (Oladapo et al., 2018). Since the landmark UK Changing Childbirth report (Department of Health, 1993), conditions of maternity care provision have become higher priority, particularly in relation to providing women with choice, continuity, control, and birth planning (Department of Health, 2007). Thanks to this redirected focus, a more holistic approach (psychological, sociological, physical) has been taken towards improving women's experiences of

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childbirth, with profound effects upon memories and subsequent mental health (Doherty et al., 2023; Ratislavova et al., 2022). Larkin et al. (2009) defined the birth experience as a unique and unparalleled life event, which is determined by a multitude of external factors and influences based upon personal experience. Amongst these elements is the need for birthing woman to feel in control, which includes feeling supported and receiving high quality communication from delivery room staff (Shamoradifar et al., 2022). Healthy childbearing women desire to have a positive birth experience, with safety and psychosocial wellbeing equally valued (Downe et al., 2018). Hence, maternity care professionals should design care to fulfil or exceed women's personal and socio-cultural beliefs and expectations (Downe et al., 2018). By increasing levels of choice and personal control (Cook and Loomis, 2012; Goodman et al., 2004) and providing continuous support (Lunda et al., 2018), women's birth experiences may be significantly improved. Improving birth satisfaction is important, because a negative birth experience can cause postpartum depression (Ahmadpour et al., 2023), impact couple's relationships (Delicate et al., 2018), effect women's health and infant development (Smarandache et al., 2016), arouse traumatic stress symptoms (Garthus-Niegel et al., 2013) and result in tokophobia (Bhatia and Jhanjee, 2012).

Measuring birth satisfaction is an important clinical outcome, with several measures having been developed (Sawyer et al., 2013). Using robust validated scales is an important component of improving quality of maternity care provision (Grundstrom et al., 2023; Nakic Rados et al., 2022). Fit for purpose, the 10-item Birth Satisfaction Scale-Revised (BSS-R) (<https://www.bss-r.co.uk>) is a multidimensional psychometrically robust tool developed to measure women's experiences of childbirth (Hollins Martin and Martin, 2014). The BSS-R is recommended as the self-report measure of choice for measuring birth satisfaction by the *International Consortium of Health Outcomes Measurement in the Pregnancy and Childbirth Standard Set* (The International Consortium for Health Outcome Measurement, 2017) ([www.ichom.org/medical-conditions/pregnancy-and-childbirth/](http://www.ichom.org/medical-conditions/pregnancy-and-childbirth/)). The BSS-R has also been incorporated into the *European-wide Medical Data Models (MDM)* metadata registry for academic medical research developed by the Institute of Medical Informatics, University of Münster in Germany (Dugas et al., 2016). The original founder UK-BSS-R has been validated and translated into several languages. For example, the Greek-BSS-R (Vardavaki et al., 2015), US-BSS-R (Barbosa-Leiker et al., 2015), Australian-BSS-R (Jefford et al., 2018), Turkish-BSS-R (Goncu Serhatlioglu et al., 2018), Spanish-BSS-R (Romero-Gonzalez et al., 2019), Slovakian-BSS-R (Skodova et al., 2019), Iran (Persian)-BSS-R (Mortazavi et al., 2021), Israel (Hebrew)-BSS-R (Skvirsky et al., 2020), Brazil (Portuguese)-BSS-R (Ferrari et al., 2021), Italian-BSS-R (Nespoli et al., 2021), Dutch-BSS-R (Emmens et al., 2023), Czech Republic (Czech)-BSS-R (Ratislavová et al., 2022) etc. (see: <https://www.bss-r.co.uk>). English is spoken by just 16 % of the Hungarian population as a second language (Census Department of the Hungarian Central Statistical Office, 2012), therefore a valid and reliable Hungarian-language version of the BSS-R is highly desirable for use within the Hungarian maternity context. The aim of this study was therefore to translate and validate a Hungarian version of the BSS-R (HU-BSS-R) and:

- (1) Demonstrate the replicability and property of the tri-dimensional measurement model of the BSS-R to the HU-BSS-R.
- (2) Evaluate divergent validity of the HU-BSS-R.
- (3) Evaluate convergent validity of the HU-BSS-R.
- (4) Determine internal consistency of the HU-BSS-R: *Quality of Care* (QC), *Women's Attributes* (WA), and *Stress Experienced* (SE) sub-scales, and total HU-BSS-R scale scores.
- (5) Compare the HU-BSS-R total and sub-scale scores by mode of birth and parity.

## Method

### Design

A cross-sectional survey was used to gather an appropriate amount of data for analysis. Ethical approval for the study was granted by the site hospital ethics committee.

### Participants

A purposive sample of postnatal women ( $N = 232$ ) were recruited from the Odorheiu Secuiesc Municipal Hospital, which is in Transylvania, the central historical region of Romania. The vast majority of the population of this county is Hungarian. Inclusion criteria included the participant being over 16-years of age, speaking Hungarian at a native level, having no major complications, and giving birth within the past 72 h. Volunteers provided informed consent, and confidentiality was assured.

### Translation processes

The founder UK-BSS-R (Hollins Martin and Martin, 2014) was translated into Hungarian by 6 independent bilingual translators (4 certified translators & 2 certified medical translators), using the forward and back translation method. The final HU-BSS-R was then scrutinized for fluency by 2 experienced senior obstetricians and a philosopher, with discrepancies resolved. Post verification, a pilot study was conducted with ( $n = 23$ ) postnatal women, all of whom verified comprehensibility of HU-BSS-R items.

### Data-collection instrument

The BSS-R (Hollins Martin and Martin, 2014) measures domains of *Quality of Care* (QC) (4-items), *Women's Attributes* (WA) (2-items), and *Stress Experienced* (SE) during labour (4-items), with each item scored on a 0–4 scale, with a score of 40 representing the highest measure of birth satisfaction. The BSS-R consists of 10-items that are scored on a 5-point Likert scale, which ranges from (i) Strongly Agree, (ii) Agree, (iii) Neither Agree nor Disagree, (iv) Disagree, (v) Strongly Disagree.

Subscale scores can be calculated individually, along with a total score ranging from 0 to 40.

### Data collection

A paper copy of the HU-BSS-R was issued to participants in the hospital setting within 72 h post birth. Data was gathered and collated by the first author, with full cooperation and assistance of maternity care staff. Data was gathered between 1st February and 30th June 2023.

### Data analysis

Six outliers were identified by examination of Mahalanobis distances (Mahalanobis, 1936) and removed from the dataset leaving complete HU-BSS-R data for analysis comprising  $N = 226$  participants (mean age 28.81 (SD 5.57), range 16–44 years). The mean duration of pregnancy was 38.89 (SD 1.41), and range 32–41 weeks. The mean duration of labour was 5.06 (SD 3.57), range 0–16 h. One-hundred and forty-seven (65 %) women had a spontaneous vaginal delivery,  $N = 22$  (10 %) women had induced vaginal delivery,  $N = 33$  (15 %) women had an emergency Caesarean section, and  $N = 23$  (10 %) women had an elective Caesarean section. Many participants had given birth previously ( $N = 127$ , 56 %). In addition, the distributional characteristics of the H-BSS-R items were scrutinized to determine suitability of the data for parametric analysis and any evidence of significant skew and kurtosis.

### Confirmatory factor analysis

Confirmatory Factor Analysis (CFA) was used to evaluate the fit of the established three-factor measurement model comprising SE, WA and QC domains. A bifactor model was also evaluated, which comprised an overarching domain of birth experience and three (uncorrelated) domains of SE, WA and QC. Recent validation studies of the BSS-R have also evaluated a two-factor model (Moreira et al., 2023), with SE and WA items representing a single factor correlated with the QC factor due to the high correlation between SE and WA factors that has been reported (Martin et al., 2018). Absence of outliers and item normal distributional characteristics are a requisite for undertaking CFA using maximum-likelihoods estimation approaches (Brown, 2015; Kline, 2015). Criteria for acceptable model fit were a comparative fit index (CFI; (Bentler, 1990) >0.90, the root mean squared error or approximation (RMSEA; (Steiger and Lind, 1980) <0.08 and the square root mean residual (SRMR; (Hu and Bentler, 1999) <0.06.

### Divergent validity

Divergent validity was evaluated by correlation of HU-BSS-R sub-scale scores and the total scale score with participant age (Grundstrom et al., 2023). It is predicted that correlations (Pearson's  $r$ ) between HU-BSS-R scores (total and sub-scale) and participant age would be very low (<0.20) (Akoglu, 2018).

### Convergent validity

Convergent validity was determined by calculating Pearson's  $r$  correlations between HU-BSS-R sub-scale and total scale scores, and comparing these with those published in the original UK-BSS-R development paper (Hollins Martin and Martin (2014). We then compared the inter-scale correlations with those reported in the original BSS-R development paper using the method of Diedenhofen and Musch (2015). It is predicted that there will be no significant differences between the correlation comparisons.

### Internal consistency

Internal consistency was assessed using Cronbach's alpha (Cronbach, 1951) to evaluate all three HU-BSS-R sub-scales and total scale score. Cronbach's alpha values of 0.70 or higher are considered acceptable (Kline, 2000). Since the WA sub-scale comprises two items, the internal validity of this sub-scale was assessed by the inter-item correlation (Pearson's  $r$ ), with an acceptability range of 0.15–0.50 (Clark and Watson, 1995). Comparisons with alphas reported in the original UK-BSS-R development study (Hollins Martin and Martin, 2014) were also undertaken using the method of Diedenhofen and Musch (2016). Recent BSS-R translation and validation studies (Ratislavova et al., 2022) have also reported McDonalds Omega ( $\omega$ ), Omega hierarchical ( $\omega_h$ ) and Omega total ( $\omega_t$ ) with regard to internal scale reliability (Hayes and Coutts, 2020; Revelle and Condon, 2019).

### Known-groups discriminant validity

Known-Groups Discriminant Validity (KGDV) was assessed by examination of differences between HU-BSS-R scores as a function of delivery mode. This approach to KGDV evaluation has been undertaken in many BSS-R translation and validation studies. For example, Grundstrom et al. (2023) and Nakić Radoš et al. (2022). Analysis was undertaken using between-subjects one-way analysis of variance (ANOVA). Parity was also examined as a key KGDV variable, given the recent observation that multiparity is associated with a comparatively better birth experience compared to women having their first baby (Hochman et al., 2023). Comparisons between groups based on parity was undertaken using the between-subject  $t$ -test.

## Results

### Distributional characteristics

The means, standard deviations, range, skew and kurtosis

characteristics of the H-BSS-R (items, sub-scales and total score) are shown in Table 1. There was no evidence of excessive skew or kurtosis, although it was noticed for item 10 'The delivery room was clean and hygienic', with the score range limited to the highest three ratings.

### Confirmatory factor analysis

The findings from the CFA evaluation are summarised in Table 2. The single-factor model was found to offer a poor fit to data. In contrast, the tri-dimensional measurement model of the BSS-R (Hollins Martin and Martin, 2014) was found to offer an excellent fit to H-BSS-R data, as did the two-factor model. No statistically significant difference was observed between the three-factor model and the two-factor model in terms of model fit using the chi-square differences test ( $\Delta\chi^2 = 0.47$ ,  $df = 2$ ,  $p = 0.79$ ). The bifactor model was also observed to offer an excellent fit to data.

### Divergent validity

No criterion significant correlations were observed between participant age and SE, WA, QC sub-scales and the total H-BSS-R score,  $r = 0.18$ ,  $p < 0.05$ ,  $r = 0.14$ ,  $p < 0.05$ ,  $r = 0.02$ ,  $p = 0.75$  and  $r = 0.15$ ,  $p < 0.05$  respectively.

### Convergent validity

Pearson's  $r$  correlation coefficients between HU-BSS-R sub-scales and the total H-BSS-R score are shown in Table 3. The original UK-BSS-R development study correlations are also shown, and using the correlation comparison method of Diedenhofen and Musch (2015), no statistically significant differences were observed between the correlation dyads of the current study and those reported in the original instrument development study.

### Internal consistency

Internal consistency observations are summarized in Table 4. Cronbach's alpha for the QC sub-scale and total scale were >0.70. The SE and WA sub-scale alpha was <0.70. No statistically significant differences ( $p > 0.05$ ) were observed between Cronbach alpha scores of the current study compared to the original UK BSS-R development and validation study (Hollins Martin and Martin, 2014). The inter-item correlation between the two WA items was  $r = 0.48$ ,  $p < 0.05$ . Total scale McDonalds Omega ( $\omega$ ), Omega hierarchical ( $\omega_h$ ) and Omega total ( $\omega_t$ ), adopting the thresholds of Nájera Catalán (2019), McDonalds Omega ( $\omega$ ), Omega hierarchical ( $\omega_h$ ) and Omega total ( $\omega_t$ ), 0.77 (95 % confidence interval 0.72 - 0.82), 0.58 and 0.84, respectively were all acceptable.

### Known-group discriminant validity

Comparisons of HU-BSS-R sub-scale and total scores as a function of parity are shown in Table 5. Excepting the QC sub-scale, statistically significant differences between groups were observed on the SE and WA sub-scales and HU-BSS-R total score. Bonferroni post-hoc testing revealed significant differences between women who had a spontaneous vaginal delivery, compared to those who had an emergency Caesarean section on the WA sub-scale and HU-BSS-R total score. No statistically difference could be determined between groups on the SE sub-scale when  $p$  criterion was adjusted for multiple comparisons.

Excepting the QC sub-scale, highly statistically significant differences were observed on SE and WA sub-scales and the total HU-BSS-R score as a function of parity, with multiparous women reporting comparatively greater birth satisfaction (Table 6).

Comparison of Hungarian-BSS-R total and sub-scale scores differentiated by parity. Standard deviations are in parentheses, degrees of freedom = 224

## Discussion

Results from this statistical validation of a Hungarian version of the

**Table 1**

Mean, standard deviation and distributional characteristics of individual *Hungarian-BSS-R* items, sub-scale totals and the total *Hungarian-BSS-R* score. se=standard error of the mean.

Item	Item content	Domain	Mean	SD	Min	Max	Skew	Kurtosis	se
BSS-R 1	I came through childbirth virtually unscathed	SE	2.71	1.10	0	4	-0.61	-0.70	0.07
BSS-R 2	I thought my labour was excessively long	SE	2.59	1.09	0	4	-0.54	-0.42	0.07
BSS-R 3	The delivery room staff encouraged me to make decisions about how I wanted my birth to progress	QC	3.05	0.91	0	4	-1.03	1.11	0.06
BSS-R 4	I felt very anxious during my labour and birth	WA	1.95	1.26	0	4	0.09	-1.24	0.08
BSS-R 5	I felt well supported by staff during my labour and birth	QC	3.55	0.60	1	4	-1.06	0.75	0.04
BSS-R 6	The staff communicated well with me during labour	QC	3.55	0.59	1	4	-1.16	1.66	0.04
BSS-R 7	I found giving birth a distressing experience	SE	2.40	1.14	0	4	-0.24	-1.04	0.08
BSS-R 8	I felt out of control during my birth experience	WA	2.10	1.07	0	4	-0.11	-1.00	0.07
BSS-R 9	I was not distressed at all during labour	SE	1.99	1.12	0	4	0.30	-0.92	0.07
BSS-R 10	The delivery room was clean and hygienic	QC	3.72	0.47	2	4	-1.24	0.16	0.03
Stress	Sub-scale total		9.69	3.05	0	16	-0.19	-0.01	0.20
Attributes	Sub-scale total		4.04	2.00	0	8	0.03	-0.89	0.13
Quality	Sub-scale total		13.87	1.94	6	16	-0.69	0.14	0.13
Total	Total score		27.61	5.38	13	40	0.02	-0.21	0.36

\*Domain of the *Hungarian-BSS-R*. SE=Stress experienced during childbearing, WA=Women’s attributes, QC=Quality of Care.

Note: All BSS-R items were retained and no changes were made to item content during the translation process.

**Table 2**

Confirmatory factor analysis and model fit of the *Hungarian-BSS-R*.

Model	$\chi^2$ (df)	p	RMSEA	SRMR	CFI
1. Single factor	273.68 (35)	<0.001	0.174	0.13	0.576
2. Three-factor	31.36 (32)	0.50	0.001	0.04	0.999
3. Two-factor	31.82 (34)	0.58	0.001	0.04	0.999
4. Bifactor	27.16 (26)	0.40	0.014	0.03	0.998

Note: No significant difference was observed between the three-factor and two-factor models using the Chi-square differences test,  $\text{diff} = 0.47$  ( $\text{df}=2$ ),  $p = 0.79$ . The poor fit of the single-factor model is anticipated as the measurement model of the BSS-R is theoretically multidimensional.

**Table 3**

Correlations of *Hungarian-BSS-R* sub-scales and total score and comparison with original UK-BSS-R validation study (Hollins Martin and Martin, 2014).

Scale combination	Current study r	UK study r	Z	95 % CI	p
Stress-Attributes	0.60	0.57	0.48	(-0.09 – 0.15)	0.63
Stress-Quality	0.24	0.26	0.23	(-0.19 – 0.15)	0.82
Attributes-Quality	0.21	0.35	1.61	(-0.31 – 0.03)	0.11
Total score-Stress	0.88	0.86	0.87	(-0.03 – 0.07)	0.38
Total score-Attributes	0.79	0.80	0.29	(-0.08 – 0.06)	0.77
Totals score-Quality	0.58	0.63	0.84	(-0.17 – 0.07)	0.40

Note: The non-significant findings between the current study and the original UK study suggest correlational equivalence among all sub-scale and total score combinations.

**Table 4**

Cronbach’s alpha of *Hungarian-BSS-R* sub-scales and total score and comparison with the original UK BSS-R validation study (Martin & Hollins Martin, 2014). Degrees of freedom = 1.

Subscale	Current study	UK study	$\chi^2$	p
Stress	0.62	0.71	2.46	0.12
Attributes	0.64	0.64	0.00	1.00
Quality	0.71	0.74	0.40	0.53
Total score	0.75	0.78	1.40	0.24

Note: The absence of statistically significant differences indicates internal consistency equivalence between the current study and the original UK study.

BSS-R demonstrates that the HU-BSS-R is a valid translation of the founder UK-BSS-R. Our validation processes have shown that the HU-BSS-R has excellent psychometric properties and can now be considered appropriate for collecting data from Hungarian speaking postnatal women, with CFA proving an excellent fit to data for the well-established tri-dimensional measurement model. The HU-BSS-R was also found to offer excellent convergent and divergent validity and known-groups discriminant validity, with no significant differences identified between internal consistency observations between the current study and the original UK validation study by Hollins Martin and Martin (2014).

Internal consistency of the HU-BSS-R is generally good, although the SE subscale is slightly below par, but not significantly different to the UK-BSS-R (Hollins Martin and Martin, 2014). Findings show that Hungarian women who experienced emergency section reported lower total birth satisfaction scores compared with mean spontaneous vaginal delivery, induced vaginal birth, and elective section, with those having elective section having the highest overall total satisfaction scores (Table 4).

Possible reasons why the elective section group score highest birth satisfaction, could be because there is a significantly lower rate of maternal and fetal complications in this organized context (Schindl et al., 2003). Also, those women who had elective section are more likely to request this option, and so were a self-selecting group. Factors underlying women’s preferences for Caesarian section have shown to be mainly to do with their strong fear of pain and injury to self or infant during labour and delivery, uncertainty surrounding ability to give birth vaginally, and positive views or perceived advantages of CS (Colomar et al., 2021).

However, and in comparison, any other women have clear preference for vaginal birth and develop strategies to keep their birth plans for this mode of delivery (Colomar et al., 2021).

The differences in total satisfaction between *Primiparous* and *Multiparous* women has again shown itself to be higher in the latter group. This finding is unsurprising, because first time mothers report higher levels of fear, lack of control, and dissociation emotions compared to multiparous women (Green et al., 2022), which is underpinned by lack of prior exposure to laboring and giving birth.

The study had a number of important strengths. Not only did the investigation find an excellent fit to the three-factor BSS-R theoretical model, the finding that both the pattern of sub-scale/total scale correlations and the internal consistency observations were not statistically significantly different from the original UK BSS-R instrument development study (Hollins Martin and Martin, 2014) indicates the H-BSS-R to be not only valid and reliable, but also equivalent to the original.



**Table 5**Comparison of *Hungarian-BSS-R* total and sub-scale scores differentiated by mode of birth. Standard deviations are in parentheses, degrees of freedom=3, 221.

BSS-R Scale	Spontaneous Vaginal Birth (n = 147) M (SD)	Induced Vaginal Birth (n = 22) M (SD)	Emergency Section (n = 33) M (SD)	Elective Section (n = 23) M (SD)	F	p	$\omega^2$	(95 %CI)	Effect size
Stress	9.92 (3.00)	9.00 (2.99)	8.52 (3.28)	10.48 (2.61)	2.87	0.04	0.02	0.00 – 0.07	Small
Attributes	4.27 (2.00) <sup>a</sup>	3.72 (2.03)	3.18 (1.83) <sup>a</sup>	4.09 (2.00)	2.89	0.04	0.02	0.00 – 0.07	Small
Quality	13.99 (1.86)	14.23 (1.72)	13.48 (2.05)	13.39 (2.37)	1.33	0.26	<0.01	0.00 – 0.02	V. small
Total score	28.17 (5.29) <sup>a</sup>	26.95 (5.05)	25.95 (5.69) <sup>a</sup>	27.96 (5.21)	2.98	0.03	0.03	0.00 – 0.07	Small

Note:.

<sup>a</sup> indicates statistically significant ( $p < 0.05$ ) Bonferroni-adjusted differences between group pairs. Though statistically significant differences were found for the Stress and Attributes sub-scales and the total BSS-R score, the effect size was small. However, it should be noted that small effect sizes particularly in the context of statistically significant differences are generally considered clinically important.

**Table 6**Comparison of *Hungarian-BSS-R* total and sub-scale scores differentiated by parity. Standard deviations are in parentheses, degrees of freedom = 224.

BSS-R Scale	Primiparous (N = 99)	Multiparous (N = 127)	95 % CI	t	p	Hedges g	Hedges g (95 % CI)	Effect size
Stress	8.77 (2.86)	10.42 (3.00)	0.87 – 2.43	4.18	<0.001	0.56	0.29 – 0.83	Medium
Attributes	3.67 (1.94)	4.34 (2.01)	0.15 – 1.20	2.53	0.01	0.34	0.07 – 0.60	Small
Quality	14.03 (1.97)	13.74 (1.91)	–0.80 – 0.22	1.12	0.26	0.15	–0.11 – 0.41	Negligible
Total score	26.46 (5.24)	28.50 (5.34)	0.63 – 3.43	2.86	0.005	0.38	0.12 – 0.65	Small

Note: A consistent finding among many studies is that multiparous women report a comparatively better birth experience. However, given the wide variability in health economies and clinical practice between countries, the *t*-test *p* value calculation was undertaken as a two-tailed test in order not to ensure a counterintuitive observation would have an equal chance of detection in terms of statistical significance.

Further, given that only a minority of individuals in Hungary speak English, this study is important as it contributes a valid, translated measure of the BSS-R which will not only help to assess and determine birth experience reliably, but also allow international comparisons with other health care systems and maternity practice initiatives to improve the birth experience of women in Hungary.

#### Limitations

One limitation of this study is that data was gathered in the initial 72 h post-delivery whilst participants were still under the care of maternity care professionals, which may have caused a Hawthorne effect. Even so, the total BSS-R scores were not that different to other studies that have proved validity of BSS-R results up to 5-years post-delivery. Also, post-natal women with healthy babies have reduced dependency on staff once their baby is out and well. Further studies to explore this uncharted longitudinal arena are welcome.

#### Conclusion

The current study sought to develop and validate a Hungarian version of the BSS-R, with a wide-range of psychometric approaches used in the undertaking. The HU-BSS-R has now established itself to be a psychometrically robust tool for assessing birth satisfaction amongst Hungarian speaking postnatal women. Findings illustrate that the established three-factor model established in the majority of BSS-R validation studies offer a similar excellent fit to data (Barbosa-Leiker et al., 2015; Jefford et al., 2018; Vardavaki et al., 2015). With similarity, our aim was to translate and validate a Hungarian version of the BSS-R (HU-BSS-R), and to this effect we have been successful. The HU-BSS-R will now be made available through the BSS-R website (<https://www.bss-r.co.uk/>). Finding out more about women's birth satisfaction in Hungary will help maternity care experts develop environments that create a more positive intrapartum experience (World Health Organisation, 2018). Such endeavours are intended to positively advance assessments of intranatal care received (Bohren et al., 2019).

#### CRedit authorship contribution statement

**Hunor Abrán:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Kálmán Kovács:** Conceptualization, Methodology, Project administration, Supervision, Writing – review & editing. **Zalán Horvát:** Conceptualization, Data curation, Methodology. **Edina Eröss:** Methodology, Validation. **Caroline J. Hollins Martin:** Formal analysis, Writing – original draft, Writing – review & editing, Validation. **Colin R. Martin:** Formal analysis, Methodology, Software, Data curation, Writing – original draft, Writing – review & editing.

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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