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

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### ABSTRACT

**Background:** Satisfaction with the birth experience has been established to be critical for the wellbeing of the mother. The Birth Satisfaction Scale-Revised (BSS-R) is a brief and psychometrically robust multi-dimensional self-report tool designed to assess birth experience. The current investigation sought to translate and validate a Czech Republic version of the BSS-R (CZ-BSS-R).

**Methods:** Following translation psychometric assessment of the CZ-BSS-R was undertaken using a cross-sectional design. A between-subjects design was incorporated in order to evaluate known-groups validity evaluation of the translated measure. Four hundred and sixty-five Czech-speaking women within the Czech Republic took part in the study. Confirmatory factor analysis was undertaken and divergent and convergent validity and internal consistency characteristics also evaluated.

**Results:** The CZ-BSS-R was observed to have excellent psychometric properties and conceptually and measurement faithful to the original English-language measure. Consistent with previous investigations using the BSS-R significant differences were found in scores as a function of delivery type.

**Conclusions:** The CZ-BSS-R is a valid, robust and reliable measure of birth experience and suitable for use with Czech-speaking women in the Czech Republic. The study highlighted that instrument and emergency Caesarean section were associated with a lower level of birth satisfaction compared to vaginal delivery.

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### KEYWORDS

Birth satisfaction; birth experience; scales; psychometrics

## Introduction

Childbirth is one of the fundamental milestones in a woman's life. When assessing the quality of perinatal care provision, the expert community has generally been more concerned with the physical health and safety of mother and child. However, over the last two decades, increasing attention has focused on childbearing women's mental health, emotional security, and subjective delivery experience (Chabbert, Panagiotou, & Wendland, 2021; Chabbert, Rozenberg, & Wendland, 2021).

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Larkin et al. (2009) define the experience of labour and birth as an individual life event, which is influenced by social, environmental, organisational and political events, along with women's individual life experience. Thus, the experience of childbirth is a complex construct, which is effected by a number of pre-delivery and intrapartum factors (Baguiya et al., 2021; Heuckendorff et al., 2021; Swain et al., 2021). Experiences of childbirth are connected with the quality of care and support provided by maternity care staff and the care provider interaction they provide, and each woman's involvement in decision-making (Hodnett et al., 2002; Hollins Martin & Martin, 2014). The environment where the delivery takes place and support provided by the woman's partner also impacts upon experiences of childbirth (Breman et al., 2019; Christiaens & Bracke, 2009; Mollard & Kupzyk, 2022; Yang et al., 2020). Individual influencers from the woman's perspective, emphasis the importance and relevance of birth satisfaction (Christiaens & Bracke, 2007; Christiaens et al., 2007). Delivery satisfaction is comprised of both the woman's emotional responses to the experience of labour and birth, and her cognitive evaluation of events. As such, birth satisfaction can be defined as a retrospective maternal evaluation of the woman's own labour and birth events (Hollins Martin et al., 2012), which is influenced by many situational, cognitive and emotional factors (Preis et al., 2019). Levels of birth satisfaction will vary according to individual circumstances, with the woman content with some aspects of her experience and discontented with others (Lemmens et al., 2021).

Delivery experience and its evaluation can have long-term impact upon mother and infant well-being (Goodman et al., 2004; Nilver et al., 2017; Preis et al., 2019), with a positive experience associated with positive personal growth and self-respect (Goodman et al., 2004; Lundgren, 2005; Nilver et al., 2017). In contrast, a negative birth experience increases risk of developing post-natal depression (PND; Bell & Andersson, 2016), post-traumatic stress disorder (PTSD; Garthus-Niegel et al., 2013; Harrison et al., 2021), fear of future childbirth, and request for subsequent elective caesarean section (Goncu Serhatlioglu et al., 2018; Hildingsson et al., 2011; Jomeen et al., 2021; Nilsson et al., 2017).

The 10-item *Birth Satisfaction Scale-Revised (BSS-R)* is a multi-dimensional psychometrically robust tool developed in the UK to measure women's experiences of childbirth (Hollins Martin & Martin, 2014). Since its adoption by the *International Consortium for Health Outcome Measurement (ICHOM)* into the standard set for pregnancy and childbirth in 2016 (The International Consortium for Health Outcome Measurement, 2016), the *BSS-R* has been recommended as the key clinical measure of birth experience globally (Nijagal et al., 2018). The *BSS-R* (Hollins Martin & Martin, 2014) is comprised of three sub-scales, which measure distinct domains of: (1) quality of care provision (4-items), (2) women's personal attributes (2-items), and (3) stress experienced during labour (4-items) (see, Hollins Martin & Martin, 2014), with each item scored on a 0–4 scale underpinned by statements that the participant circles (*strongly agree, agree, neither agree or disagree, disagree, strongly disagree*) and a total scale score ranging from 0–40. Higher *BSS-R* scores represent greater birth satisfaction. Since development of the original *UK-BSS-R* (Hollins Martin & Martin, 2014), the scale has been validated in several country-specific translated versions (Hollins Martin & Martin, 2022). Validation studies (Hollins Martin & Martin, 2022) of the *BSS-R* have generally found the tool to have good-exemplary psychometric properties, which are faithful to the conceptual model of birth satisfaction outlined in the original UK study (Hollins Martin & Martin, 2014). This underlying measurement model

of the *BSS-R* established and confirmed by factor analysis comprises three correlated factors related to the aforementioned sub-scales of Stress Experienced during labour (SE sub-scale), Women's personal Attributes (WA sub-scale) and Quality of Care (QC sub-scale; Hollins Martin & Martin, 2014). Many previous studies examining the factor structure of the *BSS-R* have found a good fit to data of the *BSS-R* three-dimensional measurement model, for example, Barbosa-Leiker et al. (2015), Nasiri et al. (2020), Romero-Gonzalez et al. (2019), and Skodova et al. (2019). Previous investigations have also found good fit to a bifactor model, indicating the utility of the measure both in the context of a multidimensional sub-scaled index of birth experience and as a summary single total score of birth experience Emmens et al. (2021), Martin et al. (2018), and Nakić Radoš et al. (2022).

The aim of the current investigation was to develop and validate a *Czech-BSS-R* for the purpose of measuring women's experiences of childbirth in the Czech Republic. Our aim was to validate the *Czech Republic-BSS-R (CZ-BSS-R)* through delivering the following objectives:

- (1) Evaluate the established three-dimensional measurement model of the *BSS-R* in the context of the Czech Republic version.
- (2) Determine the internal consistency of *CZ-BSS-R* Quality of Care (QC), Women's Attributes (WA), and Stress Experienced during Childbearing (SE) sub-scales and the total *CZ-BSS-R* scale.
- (3) Evaluate the known-groups discriminant validity of the *CZ-BSS-R*.
- (4) Determine the convergent validity of the *CZ-BSS-R*.
- (5) Determine the divergent validity of the *CZ-BSS-R*.
- (6) Evaluate differences between *CZ-BSS-R* scores in relation to gestational category (pre-term <37 weeks, term 37–42 weeks, post-term >42 weeks).

It is predicted that (i) the *BSS-R* three-dimensional measurement model will offer a good fit to data, (ii) a bifactor model of the *BSS-R* will offer a good fit to the data, (iii) the *CZ-BSS-R* scales and sub-scales will demonstrate acceptable internal consistency (iv), the *CZ-BSS-R* will demonstrate good known-groups discriminant validity based on groups differentiated on the basis of delivery type (v), good convergent validity with a self-perceived birth management measure (a statistically significant ( $p < 0.05$ ) and negative correlation) and finally (vi), the *CZ-BSS-R* will demonstrate acceptable divergent validity with non-significant correlation ( $p > 0.05$ ) with participant age.

## Method

A retrospective cross-sectional study design was used to address the study objectives. Inclusion criteria included speaking Czech, age >18 years, having given birth within the past 12 months.

## Ethical approval

Ethical approval was gained from the Ethical committee of the University of West Bohemia in Pilsen.

### **Translation processes of the measuring instrument**

To create a *Czech Republic BSS-R (CZ-BSS-R)*, the original UK version of the *BSS-R* (Hollins Martin & Martin, 2014) was translated into Czech language using a forward and back translation method (Brislin, 1970; Tyupa, 2011). The aim of the translation process was to create a tool that precisely expresses meaning of each English item in Czech language. First, a professional translator performed forward translation from English into Czech, with a second translator back translating items from Czech into English. Post back translation, discrepancies were discussed using an analysis of word meaning conducted within a focus group. Expert members of the focus group were bilingual and had knowledge of both English and midwifery. Within the group, the final *Czech-BSS-R* was compared with the *Slovak-BSS-R* (Skodova et al., 2019), because of similarity in language. In terms of translating the scale, the neutral middle point was changed from 'neither agree nor disagree' to 'I do not know', which is more matched in meaning within Czech language and a better fit with custom and culture. The comprehensibility of the *CZ-BSS-R* was then verified in a pilot study conducted with ( $n = 10$ ) postnatal women. During this process, items were established to be unambiguously comprehensible, with no doubt concerning meaning recorded.

### **Data collection**

The participants were recruited by means of an online survey using convenience sampling. Informed consent for study participation was embedded in the survey. The call for participation and the online questionnaire was published in four different forums for women on maternity leave in October 2021. A total number of 539 responses were recorded with 465 (86%) fully completed questionnaires included in the initial data screen and analysis.

### **Participants**

Four-hundred and sixty-five women consented to take part in the study, and completed full questionnaire data. Mahalanobis distances were calculated to identify multivariate outliers ( $n = 4$ ), and following removal, the dataset for psychometric evaluation was comprised of  $N = 461$  participants mean age 29.81 (SD 4.82). The majority of women ( $n = 392$ ; 85%) delivered at term, whereas 33 women delivered pre-term (7%). The majority of participants were married ( $n = 242$ ; 52%),  $n = 202$  (44%) were single, and a small minority divorced ( $n = 17$ ; 4%). Three-hundred and twenty-seven (71%) women had a vaginal delivery and  $n = 134$  (29%) had an intervention delivery. Ninety-nine women had a Caesarean section of which  $n = 33$  (33%) women had an elective Caesarean section and  $n = 66$  (67%) had an emergency Caesarean section. Three-hundred and sixteen (69%) women were nulliparous and  $n = 145$  (31%) multiparous.

### **Instruments**

#### **The Birth Satisfaction Scale-Revised (BSS-R)**

The *BSS-R* is a 10-item self-report measure of birth experience comprising three sub-scales of Stress Experienced during labour (SE sub-scale, 4-items), Women's personal Attributes (WA sub-scale, 2-items) and Quality of Care (QC sub-scale, 4-items; Hollins Martin & Martin,

2014). Consistent with contemporary practice of robust self-report measures, a number of items of the *BSS-R* are reverse scored and greater sub-scale and total scale scores equate to greater satisfaction with the birth experience. The *BSS-R* can be used as a sub-scaled instrument, as a total score instrument or both depending on specific purpose of use.

### *Self-Perceived Birth Management (SPBM) measure*

The SPBM is a single-item measure of self-perceived birth management incorporated specifically for the study as an idiom to elicit a response in everyday language. The prime was *I think I managed my birth* to which the responses were 'great', 'well', 'not well' and 'not well at all'. Since these were scored positive to negative but with 'great' scored at '1' and 'not well at all' scored at '4', a higher score indicates comparatively poorer self-perceived birth management.

In addition to the *BSS-R* and SPBM, a questionnaire developed by researchers in accordance with the literature was used in this study. It included demographic questions and 15 semi-closed questions related to the circumstances of the birth (e.g. questions about the place of birth, the condition of the child, pain management at birth, the presence of a close person at birth).

### *Data analysis*

Confirmatory Factor Analysis (CFA) was used to evaluate the established three-dimensional measurement model of the *BSS-R*. The underlying parametric assumptions of CFA require data to be distributionally normal (Brown, 2015). An initial screen of the dataset is thus undertaken to evaluate item skew and kurtosis, and identify and remove multivariate outliers (P. Kline, 2000). The underlying measurement model of the *BSS-R* is comprised of three correlated factors and associated sub-scales of Stress Experienced during labour (SE sub-scale), Women's personal Attributes (WA sub-scale) and Quality of Care (QC sub-scale; Hollins Martin & Martin, 2014). Consistent with previous investigations of a single-factor model was also evaluated. Adopting the approach of previous studies, model estimation was by the maximum-likelihood method (R. B. Kline, 2011; Brown, 2015) and model fit determined by using the comparative fit index (CFI; Bentler, 1990), the root mean squared error of approximation (RMSEA; Steiger & Lind, 1980), and the square root mean residual (SRMR; Hu & Bentler, 1999). Threshold values of >0.90 (CFI), <0.08 (RMSEA) and <0.06 (SRMR) were set to determine model fit adequacy.

### *Internal consistency*

Adopting accepted practice and threshold values (P. Kline, 2000), internal consistency of the *CZ-BSS-R* sub-scales SE and QC and total score was determined using Cronbach's Alpha (Cronbach, 1951), with values of 0.70 or greater indicating acceptable internal consistency. Further, and again adopting convention and the approach of previous *BSS-R* validation studies, for example, Emmens et al. (2021) the two-item WA sub-scale was evaluated using inter-item correlation (Pearson's *r*) and adopting an acceptable threshold range of 0.15–0.50 (Clark & Watson, 1995). We also calculated the total scale internal consistency of the *CZ-BSS-R* using McDonalds Omega ( $\omega$ ), Omega hierarchical ( $\omega_h$ ) and Omega total ( $\omega_t$ ) since  $\omega$  has been suggested as a better indicator of total scale internal consistency (Hayes &

Coutts, 2020) and it has also been suggested that  $\omega h$  and  $\omega t$  should be reported when reporting total-scale Cronbach's alpha (Revelle & Condon, 2019). Comparisons to the original Hollins Martin and Martin (2014) study were made using the method of Diedenhofen and Musch (2016) which is based on the Cronbach alpha sampling error theory of Feldt et al. (1987) which details how Cronbach alpha estimations may be compared and statistically evaluated for statistically significant differences by reference to the chi-square distribution. Given similarity of Czech language to Slovak, a comparison was also made with the internal consistency findings of Skodova et al. (2019).

### **Known-groups discriminant validity**

Numerous validation studies, for example, Zafar et al. (2021) have evaluated known-groups discriminant validity of the *BSS-R*, by comparing *BSS-R* sub-scale scores with total score, as a function of delivery type. Recent studies have investigated *BSS-R* score differences on the basis of CS type (elective vs. emergency) with equivocal findings (Emmens et al., 2021; Nakić Radoš et al., 2022). Type of delivery was therefore categorised into vaginal delivery, instrumental (vaginal)/vacuum delivery, elective Caesarean Section (CS) and emergency CS. One-way analysis of variance (ANOVA) was used to compare differences between these groups on *CS-BSS-R* sub-scale and total scores and in the event that a statistically significant main effect was observed, post-hoc testing is undertaken using the Bonferroni correction to control for Type 1 error.

One-way ANOVA was used to determine any differences in *CZ-BSS-R* sub-scale and total scores, as a function of gestation categorised into (pre-term, term, and post-term). Post-hoc testing is undertaken using the Bonferroni correction to control for Type 1 error. Error in the event of a statistically significant main effect being observed.

### **Convergent validity**

Divergent validity was evaluated using correlations that compared Spearman's rho *CZ-BSS-R* sub-scale and total scores, with the SPBM measure of how women believed they managed their birth.

### **Divergent validity**

Correlation coefficients (Pearson's  $r$ ) were calculated between *CZ-BSS-R* total and sub-scale scores, and participant age to determine divergent validity.

## **Results**

The descriptive and distributional characteristics of *CZ-BSS-R* items and scale scores are summarised in Table 1. No evidence of excessive skew or kurtosis was observed.

**Table 1.** Descriptive and distributional characteristics of the CZ-BSS-R.

Item	Item content	Domain*	Mean	SD	Min			se
					Max	Skew	Kurtosis	
BSS-R 1	I came through childbirth virtually unscathed	SE	2.59	1.32	0.4	-0.63	-0.87	0.06
BSS-R 2	I thought my labour was excessively long	SE	2.21	1.42	0.4	-0.34	-1.31	0.07
BSS-R 3	The delivery room staff encouraged me to make decisions about how I wanted my birth to progress	QC	2.22	1.24	0.4	-0.20	-1.05	0.06
BSS-R 4	I felt very anxious during my labour and birth	WA	2.36	1.25	0.4	-0.43	-0.93	0.06
BSS-R 5	I felt well supported by staff during my labour and birth	QC	2.79	1.21	0.4	-0.88	-0.23	0.06
BSS-R 6	The staff communicated well with me during labour	QC	2.95	1.19	0.4	-1.07	0.14	0.06
BSS-R 7	I found giving birth a distressing experience	SE	2.47	1.36	0.4	-0.54	-1.03	0.06
BSS-R 8	I felt out of control during my birth experience	WA	2.21	1.29	0.4	-0.28	-1.14	0.06
BSS-R 9	I was not distressed at all during labour	SE	1.85	1.23	0.4	0.28	-1.07	0.06
BSS-R 10	The delivery room was clean and hygienic	QC	3.58	0.62	1.4	-1.42	1.87	0.03
Stress	Sub-scale total		9.12	4.12	0.16	-0.35	-0.67	0.19
Attributes	Sub-scale total		4.57	2.28	0.8	-0.41	-0.76	0.11
Quality	Sub-scale total		11.54	3.57	1.16	-0.82	-0.13	0.17
Total	Total score		25.24	8.45	1.40	-0.54	-0.31	0.39

\*Domain of the Czech BSS-R. SE = Stress experienced during childbearing, WA = Women’s attributes, QC = Quality of Care. Mean, standard deviation and distributional characteristics of individual Czech BSS-R items, sub-scale totals and the total Czech BSS-R score. se = standard error of kurtosis.

**Table 2.** Confirmatory factor analysis and model fit of the CZ-BSS-R.

Model	$\chi^2$ (df)	<i>p</i>	$\Delta\chi^2$ (df)	$\Delta\chi^2$	RMSEA	SRMR	CFI
1. Single factor	729.89 (35)	<0.001			0.208	0.109	0.705
2. Three-factor	86.71 (32)	<0.001	643.17 (3)	<0.001	0.061	0.043	0.977
3. Bifactor	54.43 (26)	<0.001	675.46 (9)	<0.001	0.049	0.030	0.988

Note: In model 3. WA items were set to be equal in relation to contemporary practice for the run of bifactor models. Without this constraint, model fit of the bifactor model was similar  $\chi^2 = 54.245$ , *df* = 25, RMSEA = 0.050, SRMR = 0.030, CFI = 0.988

**Table 3.** Correlations of Czech bss-r sub-scales and total score and comparison with original UK BSS-R validation study.

Scale combination	Current study <i>r</i>	UK study <i>r</i>	Z	95% CI	<i>p</i>
Stress-Attributes	0.80	0.57	5.54	(0.14–0.33)	<0.001
Stress-Quality	0.47	0.26	3.00	(0.07–0.35)	0.003
Attributes-Quality	0.51	0.35	2.42	(0.03–0.30)	0.015
Total score-Stress	0.90	0.86	2.20	(0.01–0.08)	0.03
Total score-Attributes	0.86	0.80	2.39	(0.01–0.12)	0.02
Totals score-Quality	0.78	0.63	3.73	(0.07–0.24)	<0.001

### Confirmatory factor analysis

Model 1. (unidimensional) offered a poor-fit to data (Table 2). The three-factor measurement model (Figure 1) offered a generally excellent fit to data across most indices, with RMSEA offering an acceptable fit (model 2). The bifactor model (model 3) revealed an excellent fit to data across all model fit indices. In terms of CFI and SRMR indices, RMSEA was found to be borderline acceptable. A strong general factor of combined SE and WA items was observed, and in addition, a separate QC factor.



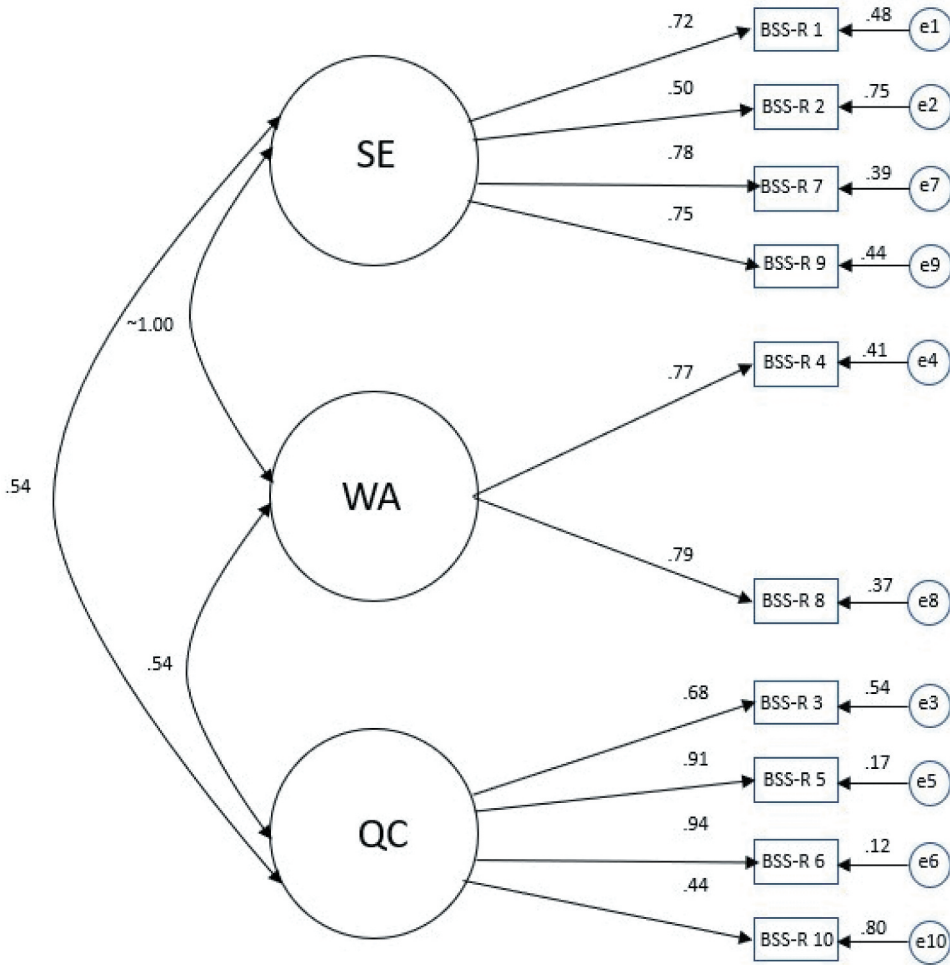


Figure 1. Standardised factor loadings of the three-dimensional measurement of the BSS-R.

**CZ-BSS-R sub-scale and total score correlations**

Correlation combinations (Table 3) were all observed to be statistically significant ( $p < 0.01$ ). Comparison with the original UK study, using the method of Diedenhofen et al. (2015), revealed a greater degree of correlation in the current study across all combinations ( $p < 0.05$ ).

**Internal consistency**

- Cronbach’s alpha of CZ-BSS-R total scale and all sub-scales were acceptable ( $>0.70$ ). Cronbach’s alpha of WA and QC sub-scales, and the BSS-R total scale, were significantly higher than the original UK study (Table 4). Total scale McDonalds Omega ( $\omega$ ), Omega hierarchical ( $\omega_h$ ) and Omega total ( $\omega_t$ ) were all acceptable based on threshold values detailed in the Monte Carlo simulation study of Nájera Catalán (2019) at

**Table 4.** Cronbach's alpha of Czech BSS-R sub-scales and total score.

Subscale	Current study (i.)	UK study (ii.)	Slovakian study (iii.)	i. vs. ii $\chi^2$	<i>p</i>	i. vs. iii $\chi^2$	<i>p</i>
Stress	0.77	0.71	0.74	2.50	0.11	1.08	0.30
Attributes	0.76	0.64	0.66	4.30	0.04	4.79	0.03
Quality	0.83	0.74	0.81	8.55	0.004	0.89	0.35
Total score	0.87 (*0.88, 0.77, 0.91)	0.78	0.78	14.94	<0.001	26.68	<0.001

0.88, 0.77 and 0.91, respectively. Comparison with the Slovakian study (Skodova et al., 2019) also revealed significantly higher WA sub-scale and total scale internal consistency estimations. Inter-item correlation of the CZ-BSS-R sub-scale WA items was  $r = 0.61$ ,  $p < 0.001$ , (95% CI 0.55–0.66).

### Known-groups discriminant validity

Highly statistically significant main effects were observed for delivery-type category across all CZ-BSS-R sub-scales and the total score ( $p < 0.001$ ). Post-hoc testing revealed those having an emergency CS to have significantly lower SE, WA, QC sub-scale and total scale scores compared to elective CS and vaginal delivery groups. Women having an instrumental (vaginal)/vacuum delivery had significantly lower SE and WA sub-scale and total scale scores compared to vaginal delivery. The instrumental (vaginal)/vacuum delivery group had significantly lower SE sub-scale scores than those having an emergency CS. Effect sizes were large for the WA sub-scale and the CZ-BSS-R total score, medium for the SE sub-scale, and small for the QC sub-scale (Table 5).

The elective CS group was observed to have significantly higher CZ-BSS-R sub-scale and total scale scores, compared to the emergency CS group. Effect sizes were medium for all CZ-BSS-R sub-scales, and large for the total scale score.

One-way ANOVA based on gestational-term categorisation revealed significant main effect across all scales, with the exception of the QC sub-scale (Table 6). Post-hoc testing revealed significantly higher scores in the term group compared to the post-term group on the SE sub-scale and the total score. Post-hoc differences between groups were not significant on the WA sub-scale when the Bonferroni correction was applied to comparisons. No statistically significant differences were observed between pre-term and term and pre-term and post-term on any post-hoc comparisons.

### Convergent validity

CZ-BSS-R total and sub-scale scores were observed to be significantly ( $p < 0.001$ ) and negatively correlated, with SPBM (SE  $r_s = -0.55$ , WA  $r_s = -0.54$ , QC  $r_s = -0.31$ , CZ-BSS-R total  $r_s = -0.55$ ).

### Divergent validity

No significant correlations were observed between SE, WA, and QC sub-scales, and the CZ-BSS-R total score and participant age (SE  $r = 0.07$ ,  $p = 0.12$ , WA  $r = 0.06$ ,  $p = 0.19$ , QC  $r = 0.07$ ,  $p = 0.11$ , and total scale,  $r = 0.08$ ,  $p = 0.07$ ).

**Table 5.** Comparison of Czech BSS-R total and sub-scale scores differentiated by delivery type.

BSS-R Scale	Vaginal Delivery (n = 327) M (SD)	Instrument Delivery (n = 35) M (SD)	Elective Section (n = 33) M (SD)	Emergency Section (n = 66) M (SD)	F	p	$\omega^2$	(95%CI)	Effect size
Stress	10.06 (3.73) <sup>b,d</sup>	6.54 (4.44) <sup>c,d</sup>	9.15 (3.64) <sup>a,c</sup>	6.05 (4.04) <sup>ab</sup>	25.47	<0.001	0.14	(0.08–0.20)	Medium
Attributes	5.08 (2.07) <sup>b,c</sup>	3.23 (2.21) <sup>c</sup>	4.42 (2.57) <sup>a</sup>	2.86 (2.09) <sup>ab</sup>	25.27	<0.001	0.14	(0.08–0.19)	Medium
Quality	12.01 (3.30) <sup>b</sup>	11.23 (3.77) <sup>c</sup>	11.91 (3.18) <sup>a</sup>	9.20 (4.03) <sup>ab,c</sup>	12.49	<0.001	0.07	(0.03–0.12)	Medium
Total score	27.11 (7.43) <sup>b,c</sup>	21.00 (8.87) <sup>c</sup>	25.48 (8.07) <sup>a</sup>	18.11 (8.71) <sup>ab</sup>	28.21	<0.001	0.15	(0.09–0.21)	Large

Note: <sup>ab,c</sup> indicates statistically significant ( $p < 0.05$ ) Bonferroni-adjusted differences between group pairs.

Comparison of Czech BSS-R total and sub-scale scores differentiated by delivery type. Standard deviations are in parentheses, degrees of freedom = 3, 457.

**Table 6.** Comparison of Czech BSS-R total and sub-scale scores differentiated by term status.

BSS-R Scale	Pre-term (n = 33)	Term (n = 392)	Post-term (n = 36)	<i>F</i>	<i>p</i>	$\omega^2$	(95%CI)	Effect size
	M (SD)	M (SD)	M (SD)					
Stress	7.97 (3.88)	9.37 (4.11)*	7.50 (4.00)*	4.86	0.008	0.02	(<0.01–0.04)	Small
Attributes	3.82 (2.34)	4.68 (2.28)	4.11 (2.11)	3.01	0.05	0.01	(<0.01–0.03)	Small
Quality	11.33 (3.00)	11.65 (3.60)	10.53 (3.53)	1.71	0.18	<0.01	(<0.01–0.02)	Very small
Total score	23.12 (7.54)	25.70 (8.46)*	22.14 (8.35)*	4.10	0.02	0.01	(<0.01–0.04)	Small

Note: \* indicates statistically significant ( $p < 0.05$ ) Bonferroni-adjusted differences between groups

Comparison of Czech BSS-R total and sub-scale scores differentiated by term status. Standard deviations are in parentheses, degrees of freedom = 2, 458.

## Discussion

Our findings indicate that the CZ-BSS-R is a psychometrically robust measure and faithful to the measurement model of the original UK-BSS-R (Hollins Martin & Martin, 2014). The three-factor measurement model of the BSS-R offered an excellent fit to data across all fit indices confirming the transferability of the three-dimensional structure to Czech Republic language and context. The bifactor model was found to offer an excellent fit to data, again supporting the suggestion of Martin et al. (2018) regarding the utility of the measure in terms of total scale or sub-scale scoring. We are reminded to reflect that although the bifactor model revealed a better fit to data than the three-dimensional model of the BSS-R, bifactor models are known to exhibit statistical bias (Burke & Johnston, 2020; Greene et al., 2019; Murray & Johnson, 2013) compared to other model types in terms of model fit indices, and therefore conclusions regarding bifactor model fit superiority cannot be made with confidence.

The CZ-BSS-R was observed to have good internal consistency for all sub-scales and the total scale score, thus confirming this domain of reliability and confidence in use of the measure. Correlations between BSS-R sub-scales and total scores were significantly higher than those observed in the original UK BSS-R development study (Hollins Martin & Martin, 2014). It may be that within the context of the social, cultural and service delivery factors that uniquely define the Czech birthing experience, there may be the potential to influence a more powerful and statistically stronger relationship between QC delivery, SE by birthing woman, and their innate attributes.

Known-groups discriminant validity analysis revealed further insights into the impact of delivery type beyond previous investigations that have shown that intervention delivery is associated with comparatively lower BSS-R scores compared to vaginal delivery (Jefford et al., 2018; Nespoli et al., 2021; Romero-Gonzalez et al., 2019; Skvirsky et al., 2020). Additionally, our findings expand on the observations of Emmens et al. (2021) and Nakić Radoš et al. (2022) regarding differences in BSS-R scores with respect to elective CS compared to emergency CS. No significant differences were observed between CZ-BSS-R sub-scale and total scores between women who birthed vaginally and those who had an elective CS. This highlights that even though the proportion of women having an elective CS was comparatively small in the study population, their appraisal of their birth experience was similar to those having a vaginal delivery and thus suggesting that clinical support and preparative activity for an elective CS promotes equity in terms of perceived birth experience. Women may thus suffer from psychological trauma post-emergency CS (Tomsis et al., 2021), which is not the case when they have had time to prepare for CS that

is planned and managed (Fenwick et al., 2003). The Fenwick et al. (2003) study also supports the importance of providing choice and control to childbearing women, which is a key premise of the concept of birth satisfaction. Also, when a woman wishes to have a Caesarean section, support and information is provided, which due to time constraints would not happen in an emergency situation (Kenyon et al., 2016). Clearly, an emergency CS is an unanticipated event and it can be no surprise that this has a deleterious impact on the birth experience, incorporating as it does, all aspects of subjective experience which precipitate the emergency CS.

Instrumental (vacuum)/vacuum delivery was associated with significantly lower CZ-BSS-R SE and WA sub-scale scores and the total scale score, again these findings resonate with key evidence that instrumental (vaginal) deliveries are associated with increased perceived trauma, even greater than CS (Muraca et al., 2017) thus a relatively impoverished birth experience may be anticipated. A vaginal delivery compared to an operative procedure such as a CS remains arguably the optimal birthing type for the mothers' birth experience where this is possible (Guittier et al., 2014) and desirable by the woman herself. Our findings also support the health agenda of reducing the level of CS's undertaken where possible (Negrini et al., 2021) and consistent with the woman's choice but also extends this tenet to the reduction of instrumental (vaginal) delivery where possible.

Good convergent validity was observed with the anticipated significant and negative correlation observed between self-perceived birth management and sub-scales and the total CZ-BSS-R score. The significant correlation between the SPBM score and the QC sub-scale was the lowest observed, which corroborates the notion that the perception of 'quality of care' represents the woman's insight into actual care delivered (essentially, external to the woman herself). Whereas and in contrast, the SE and WA sub-scales, may relate more to characteristics of the individual and their interaction with the environment. Good divergent validity was also found, with no statistically significant relationships observed between participants age and any of the CZ-BSS-R sub-scale or total scale scores.

It was observed that those who delivered post-term had significantly lower SE sub-scale and total CZ-BSS-R scores, compared with women who birthed at term. There is comparatively little research on post-term birth experience, compared with pre-term. Nonetheless, some explanatory accounts for these observations are now considered. For example, it may be that women in the post-term group experience increasing discomfort, which impacts upon their experience of stress. An alternative and perhaps conflating explanation might be that the woman's expectations about birth are simply not being met. As such, this gives rise to uncertainty and stress that reduced women's levels of birth satisfaction, specifically within the SE domain. This may be a fruitful area for further research, both to gather evidence regarding women's perception of post-term delivery, and also to proactively consider potential interventions that reduce stress and enhance birth satisfaction. A limitation of the study is that though we noted the marital status of participants, we did not collect specific data on the partnership status of the large minority of women who were single. This omission we plan to address in future research with the CZ-BSS-R since there may well be differences in scores between single women with and those without, a partner.

## Conclusion

The CZ-BSS-R was found to have excellent psychometric properties and measurement properties in terms of factor structure, consistent with the original UK version (Hollins Martin & Martin, 2014). Our study also corroborates observations of others, that emergency CS and instrumental (vaginal) delivery is associated with a comparatively impoverished birth experience, compared with vaginal delivery. Elective CS was found to be broadly comparable with vaginal delivery.

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Availability of the BSS-R

The BSS-R is free to use for clinical and research purposes, but requires permission. Please contact Professor Caroline J Hollins Martin at c.hollinsmartin@napier.ac.uk for permission to use. Also, for more information about the BSS-R, see the dedicated BSS-R website at: [www.bss-r.co.uk](http://www.bss-r.co.uk)

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