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Measuring health professionals' beliefs about skin-to-skin care during a cesarean

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Abstract

Women and their newborns are at risk of delayed or withheld skin-to-skin care (SSC) during a caesarean, which is about one-third of births, worldwide. To date, no instrument exists to assess health professionals' (HPs) beliefs, and potential barriers and strategies for implementing SSC during a cesarean. The study aims were to (1) develop an instrument, *Health Professionals' Beliefs about Skin-to-Skin Care During a Cesarean* (SSC_B), (2) establish its validity and reliability and (3) describe HPs' beliefs about SSC during a caesarean. Quantitative and qualitative analyses were used to test the SSC_B and describe HPs' beliefs. SSC_B analysis yielded a content validity of 0.83 and reliability of $\alpha = 0.9$. We grouped all practice roles as either nurses or physicians. The mean rank score for nurses ($n = 120$, $M = 90$) was significantly higher ($p = 0.001$) than physicians ($n = 46$, $M = 79$). Despite this difference, scores for both roles reflected support for SSC. Participants identified hospital readiness to implement SSC and maintaining maternal and newborn safety as major issues. SSC_B is a valid, reliable instrument to measure HPs' beliefs about SSC during a caesarean birth. HPs can use the SSC_B during quality improvement initiatives to improve access to immediate SSC for women who have a caesarean birth. Improved access can enhance breastfeeding outcomes and promote optimal maternal and child health.

KEYWORDS
barriers to skin-to-skin care, beliefs and attitudes, caesarean, caesarean birth, caesarean section, caesarean surgery, operating room, operating theatre, skin-to-skin care, skin-to-skin contact

1 | INTRODUCTION

Most women and their newborns are healthy, alert and responsive during a medically uncomplicated caesarean birth and able to have immediate and uninterrupted skin-to-skin care (SCC). However, they are vulnerable to having SSC withheld, delayed, interrupted or provided for less than the recommended duration of at least 1 h, which can negatively impact breastfeeding outcomes (Bingham et al., 2019; Columbo et al., 2018; Lande et al., 2020).

Delaying or withholding immediate and uninterrupted SSC during a medically uncomplicated caesarean is usually not necessary (Crenshaw et al., 2019) and may be harmful (Császár-Nagy & Bókkon, 2018; World Health Organization [WHO] & UNICEF, 2018). Given the global rate of caesarean birth (Boatin et al., 2018; Boerma

et al., 2018; Visser et al., 2018), at least one-third of women and their newborns may not have access to this evidence-based practice that significantly improves breastfeeding outcomes and promotes optimal health for women and children (Császár-Nagy & Bókkon, 2018; WHO & UNICEF, 2018).

SSC enables successful breastfeeding (WHO & UNICEF, 2018). Step 4 of the Baby-friendly Hospital Initiative calls upon health professionals (HPs) to provide immediate and uninterrupted SSC and to help mothers begin breastfeeding as soon as possible after birth. SSC that begins immediately during a medically uncomplicated caesarean is feasible and safe, has no negative impact on maternal or newborn physiologic stability or temperature, reduces maternal stress, improves maternal satisfaction with the caesarean experience (Crenshaw et al., 2019) and significantly improves breastfeeding outcomes (Conroy & Cottrell, 2015). SSC during a caesarean also reduces newborn transfers to a neonatal intensive care unit for observation (Schneider et al., 2017), reducing maternal and newborn separation during this psychophysiologically sensitive time.

Key messages

- *Health Professionals' Beliefs about Skin-to-Skin Care During a Caesarean* is a valid and reliable instrument to measure health professionals' beliefs about skin-to-skin care during caesareans.
- Respondents who were categorized in the nurse role scored higher than those in the physician role regarding positive sentiments about immediate skin-to-skin care during caesareans; however, scores for both roles were within the supportive range.
- *Health Professionals' Beliefs about Skin-to-Skin Care During a Caesarean* can be used to identify cultural and site specific barriers impeding immediate and uninterrupted skin-to-skin care during caesareans; and to develop strategies to prepare for, implement, and evaluate quality improvement initiatives.

1.1 | Beliefs and behaviours

According to Azjen (2011), beliefs direct behaviour. Therefore, if HPs' beliefs about SSC during a caesarean were recognized, this information could be used to develop well-designed processes for improving SSC access, identify strategies to overcome barriers and implement evidence-based policies to enable SSC.

Examples of barriers may include the belief that SSC should be delayed until after a newborn assessment in a radiant warmer or after surgery, is not essential to optimal maternal/newborn care, is not safe for mothers and newborns during surgery, is an unnecessary burden on staff and interferes with surgery and anaesthesia care. Additionally, some HPs believe mothers prefer to wait until after surgery to begin SSC (Balatero et al., 2019).

1.2 | Measuring HPs' beliefs

In our literature review, we found no tools or instruments to assess HPs' beliefs about SSC that begins during a caesarean, immediately after birth. To close this gap, we developed and tested an instrument titled, *Health Care Professionals' Beliefs about Skin-to-Skin Care During Caesarean Birth* (SSC_B) (© J. T. Crenshaw & E. D. Adams). The SSC_B could be a resource for maternity staff to assess readiness to implement and assess improvements in immediate SSC during caesarean birth.

1.3 | Aims

Our study aims were to describe the development of the SSC_B, establish its validity and reliability and use it to describe HPs' beliefs about SSC during a caesarean. Two institutional review boards approved the study.

2 | METHODS

2.1 | Procedures for instrument development (SSC_B)

Our framework for instrument development was the theory of planned behaviour (TPB) (Azjen, 2011). Based on the TPB, it is important to understand HPs' beliefs to identify barriers to SSC. Once barriers are identified, cultural changes that prevent SSC can be addressed. Using the TPB, we also defined the latent variable (a hidden, not directly observable construct) as the beliefs of HPs about immediate SSC during caesarean birth. Through concept review, immersion in the literature and conducting focus groups, we identified core beliefs influencing the practice of immediate SSC during a caesarean, linked them to the TPB concepts, mapped the concepts applicable to women having a caesarean birth and created a draft of instrument items (statements or questions).

We based our decision on items in the final instrument on the literature, our knowledge of the TPB (Azjen, 2011), our own clinical experiences, information obtained during focus groups and feedback from peer review SSC experts. Responses from experts were used to test content and the scale validity using the content validity of items.

We categorized the quantitative and qualitative items (statements) into three subscales (core beliefs, barriers and strategies) and defined each one operationally. Core beliefs are a set of beliefs related to SSC during a caesarean birth that provide the foundation for behaviours or actions related to SSC. Barriers are beliefs that prevent SSC from occurring. Strategies are beliefs that facilitate SSC. Fourteen quantitative items are core beliefs; four items are barriers; and five are strategies. Three qualitative items

(open-ended questions) are core beliefs; two are barriers; and two are strategies. Question 30 provided an opportunity for overall comments (see Table 1).

2.1.1 | Focus groups

We received feedback about the latent variable (HPs' beliefs about immediate SSC during a caesarean birth) in focus groups consisting of HPs involved with care of women having a caesarean birth and their newborn. Our goals were to clarify and validate our operational definitions (e.g., medically uncomplicated caesareans; beliefs that drive behaviour related to immediate SSC; responsiveness; and alertness). We developed an interview script to guide focus group discussion.

We conducted focus groups in two hospitals in the United States of America (USA) and three in Southeast China using a convenience sample from health services. Focus group members described barriers and strategies associated with SSC during a caesarean birth, such as the risk of maternal and/or newborn hypothermia, impact on staffing and workflow and concerns about SSC hindering surgery or anaesthesia care. We revised the instrument based on focus group feedback. However, focus group members were not study participants used to validate our instrument or measure beliefs of HPs.

2.1.2 | Preliminary peer-review process, internal review and readability

We sought preliminary feedback from content and research experts ($n = 4$) to clarify terminology and comprehensiveness. We assessed readability using the Simple Measure of Gobbledygook (SMOG) scoring system (McLaughlin, 1969). The instrument was developed at a 10th grade (10.1) reading level. We tested the instrument for readability, errors and duration using interprofessional staff volunteers from a clinical research institute at a Texas university.

2.1.3 | Content validity index

Content experts and researchers in SSC ($n = 7$) participated in assessing content validity using an online platform (Qualtrics). Two methods were used to analyse content validity: item content validity and scale content validity. The content validity index (CVI) was calculated to establish a content validity of ≤0.05 level of significance. The acceptable CVI was set at 0.83 for both item and scale validity (Polit & Beck, 2017).

Item content validity was calculated using the CVI (total number of experts who rated an item as 3 or 4, divided by the total number of experts; for example, $6/7 = 0.86 =$ acceptable). The experts also gave detailed qualitative feedback on the instrument. Almost all questions (24/25) met inclusion criteria. On the basis of the experts' collective feedback, we omitted one question that did not meet inclusion criteria, edited the draft instrument, increased the number of qualitative questions and expanded the demographic questions (see Table 1).

We computed scale content validity by adding the CVI item scores and dividing by the total number of items on the scale, which yielded an acceptable value of 0.91 (Polit & Beck, 2017). Scale content validity was a valid and acceptable value of 0.96.

2.1.4 | Final instrument

The final version of the SSC_B contains 23 6-point Likert scale items (statements), with possible responses ranging from *strongly disagree* to *strongly agree*, and eight open-ended, narrative response items included to gain a deeper understanding of HPs' beliefs about SSC that begins in the operating room or operating theatre (OR), during surgery. Each quantitative statement (see Table 1) was preceded by the same stem: 'When I think about my beliefs related to skin-to-skin care in the OR during an uncomplicated cesarean for alert and responsive mothers and their newborns ….' We used this stem to ensure all participants shared the same understanding of the context and meaning of each statement. The SSC_B scores exist on a continuum, with higher scores indicating participants' beliefs that SSC can or should be implemented during a caesarean and lower scores indicating less supportive beliefs (see Table 1 for SSC_B items; see Table 3 for range and score stratification).

2.2 | Procedures for measuring HPs' beliefs

We collected data from July 2014 to August 2015, administering the SSC_B using Qualtrics. Participants were 18 years of age or older, able to read English and had access to email, with no exclusions based on gender, ethnicity, academic preparation or years in practice. Participants were U.S.-based HPs involved in maternal/newborn care during a caesarean birth and were recruited by email using a variety of sources: (1) purchased contact lists; (2) email list of faculty and students at a health sciences centre in Southwestern United States; (3) interprofessional participants in a multihospital quality improvement initiative, sponsored by a state health department in Southwestern United States; and (4) one author's professional contact list.

2.3 | Procedures for instrument psychometrics

SSC_B was designed to measure a range of agreement with 23 qualitative statements (items) about SSC during a caesarean. One item ('I believe that SSC increases the number of nurses needed so a nurse is needed to monitor the baby') was discarded due to

TABLE 1 Instrument items: *Health Professionals' Beliefs about Skin-to-Skin Care During a Cesarean* (SSC_B©)[a]

Stem: When I think about my beliefs related to skin-to-skin care in the OR during an uncomplicated caesarean for alert and responsive mothers and their newborns…
1. I believe that all healthy mothers and newborns should have immediate, uninterrupted SSC care (CB)
2. I believe that there is insufficient room on mother's chest to begin SSC care (B)
3. I believe that initial newborn assessments should be completed while mothers and newborns are SSC (S)
4. I believe that health professionals should inform mothers prenatally about the benefits of SSC (S)[b]
5. I believe that newborns who have SSC immediately after birth will be more likely to exclusively breastfeed at hospital discharge (CB)[b]
6. I believe that SSC care reduces maternal stress during a caesarean (CB)
7. I believe that equipment required during surgery (e.g., surgical drapes; EKG leads; maternal IV; and blood pressure cuff) makes SSC care difficult to provide (B)
8. I believe that health professionals should inform mothers on admission about the benefits of SSC (S)
9. I believe that SSC should begin after mother and newborn are in the recovery room (CB)
10. I believe that SSC improves newborn physiologic stability (e.g., blood glucose, temperature and oxygen saturation) (CB)[b]
11. I believe that mothers prefer to wait until after the first bath to hold their newborn skin-to-skin (B)
12. I believe that SSC care during surgery improves maternal satisfaction with the surgical experience (CB)
13. I believe that health outcomes of mothers and newborns are unaffected when SSC begins in the recovery room (CB)
14. I believe that SSC improves maternal and newborn attachment CB)
15. I believe that newborns will exhibit a series of instinctive breast-seeking behaviours when placed skin-to-skin (CB)
16. I believe that mothers prefer to wait until they are in the recovery room to hold their newborn skin-to-skin (B)
17. I believe that SSC is not needed if mothers plan to bottle-feed (CB)
18. I believe that SSC increases the risk of newborn hypothermia (CB)
19. I believe that mothers who have immediate SSC after birth breastfeed longer (CB)[b]
20. I believe that to increase safety, a nurse should be assigned to the newborn during SSC (S)
21. I believe that SSC increases maternal milk supply (CB)
22. I believe that SSC reduces newborn stress (CB)
23. I believe that SSC should begin after initial newborn assessments are completed in a warmer (S)
24. In your opinion, should SSC begin in the OR for alert and responsive mothers and their newborn? Please explain your answer (CB)
25. What are 3 main reasons to promote SSC in the OR for alert and responsive mothers and their newborn? (CB)
26. What are 3 main reasons not to promote SSC in the OR for alert and responsive mothers and their newborn? (CB)
27. If a hospital team wanted to promote SSC in the OR, what are the 3 main barriers that would need to be overcome? (B)
28. If a hospital team were to promote SSC in the OR, what would be your 3 main concerns? (B)
29. What are 3 strategies to increase the use of SSC in the OR? (S)
30. What are 3 strategies to promote safety during the use of SSC in the OR? (S)
31. Additional comments about SSC in the OR:

Abbreviations: B, barrier to SSC; CB, core beliefs; OR, operating room (operating theatre); S, strategies to increase SSC; SSC, skin-to-skin care.
[a]© 2021, Jeannette T. Crenshaw & Ellise D. Adams. For permission to use this instrument, instructions, and scoring, please contact Jeannette.Crenshaw@ttuhsc.edu or Ellise.Adams@UAH.edu
[b]Key drivers of SSC positive sentiment towards SSC during a caesarean (eigenvalues < 1.0). Participants were asked to indicate responses to Items 1–23, where 1 = *strongly disagrees with my beliefs about SSC in the OR*; 2 = *disagrees*; 3 = *somewhat disagrees*; 4 = *somewhat agrees*; 5 = *agrees*; and 6 = *strongly agrees*. Participants were asked to give narrative responses to open-ended Items 24–30. Definitions were skin-to-skin care = mother cradles her naked newborn prone on her bare chest; exclusive breastfeeding = baby fed only breast milk from birth (no other liquids or solids except liquids with vitamins, minerals, medicines).

insufficient responses ($n = 4$) from the first wave of participants and because Item 20 was similar ('I believe that to increase safety, a nurse should be assigned to the newborn during SSC') (see Table 1).

Participants responded to the 23 statements using a 6-point Likert scale (1–6), where 1 = *strongly disagree with my beliefs about immediate SSC during surgery*; 2 = *disagree*; 3 = *somewhat disagree*; 4 = *somewhat agree*; 5 = *agree*; and 6 = *strongly agree*. For analysis purposes, we assigned six numerical weight values (0–5) to the statements (0 = *strongly disagree with my beliefs about immediate SSC during surgery*; 1 = *disagree*; 2 = *somewhat disagree*; 3 = *somewhat agree*; 4 = *agree*; and 5 = *strongly agree*). Therefore, the possible summated

TABLE 2 Characteristics of 274 participants who responded to administered instrument items: *Health Professionals' Beliefs about Skin-to-Skin Care During a Cesarean* (SSC_B©)

Characteristics	*n* (%)
Gender	
Female	220 (80%)
Male	29 (11%)
Did not respond	25 (9%)
Age group	
21–30	37 (14%)
31–40	59 (22%)
41–50	68 (25%)
51–60	63 (23%)
61–70	23 (8%)
Did not disclose	24 (9%)
Years in practice	
<1 year	14 (5%)
1–5 years	36 (13%)
6–10 years	41 (15%)
11–20 years	66 (24%)
21–30	50 (18%)
>30	41 (15%)
Did not respond	26 (10%)
Practice role (categorized)	
RN TOTAL	127 (66%)
CNM	7 (6%)
CRNA	7 (6%)
Charge nurse	7 (6%)
Lactation consultant	4 (3%)
RN director	6 (5%)
RN manager	12 (9%)
RN	84 (66%)
Physician TOTAL	47 (17%)
Anesthesiologist	10 (21%)
MFM	1 (2%)
Neonatologist	7 (15%)
Obstetrician	18 (38%)
Paediatrician	11 (23%)
Multiple positions/other TOTAL	26 (28%
Did not respond TOTAL	24 (9%)
Practice location in USA (31 states)	
Texas	108 (39%)
California	17 (6%)
Virginia	15 (5%)
North Carolina	12 (4%)
Wisconsin	11 (4%)
Ohio	8 (3%)
New York	6 (2%)
Maryland	5 (2%)
Pennsylvania	5 (2%)
Washington	5 (2%)
18 other states	37 (14%)
Multiple practice states	7 (3%)
Did not respond	33 (12%)
Average monthly births at facility	
<100	18 (7%)
100–199	70 (26%)
200–299	44 (16%)
300–399	22 (8%)
400–499	11 (4%)
500–999	21 (8%)
>1000	24 (9%)
I don't know	38 (14%)
Did not respond	26 (10%)
Frequency of SSC provided in the OR	
Never	29 (11%)
Rarely	42 (16%)
Sometimes	76 (28%)
Often	53 (19%)
All of the time	41 (15%)
Did not respond	32 (12%)
Baby-Friendly hospital?	
Yes	148 (58%)
No	75 (27%)
I don't know	25 (9%)
Did not respond	26 (10%)
Magnet® recognized hospital?	
Yes	69 (25%)
No	126 (46%)
I don't know	55 (20%)
Did not respond	24 (9%)

Abbreviations: Baby-Friendly, designated as a Baby-Friendly facility by Baby-Friendly USA; CNM, certified nurse midwife; CRNA, certified registered nurse anaesthetist; OR, operating room or operating theatre; Magnet® recognized, designated as Magnet® recognized hospital by the America Nurses Credentialing Center; MFM, maternal–fetal medicine; RN, registered nurse; 18 other states, 1% or fewer from Arkansas, Illinois, Alabama, Florida, Georgia, Michigan, Delaware, Indiana, Kentucky, Massachusetts, Oregon, Colorado, Connecticut, Iowa, Nebraska, New Hampshire, New México and South Carolina.

score ranged from a minimum of zero to a maximum 115 ($5 \times 23 = 115$). Omitted responses were excluded from the summated score. Individual item scores of 3–5 indicate the level of agreement with a statement, and individual item scores of 0–2 indicate the level of disagreement with a statement.

TABLE 3 Overall beliefs and subscale scores for 243 health professionals who responded to 23 quantitative instrument items (statements): Health Professionals' Beliefs about Skin-to-Skin Care During a Cesarean $SSC_B^{©}$

All practice roles $n = 243$		Registered nurse $n = 120$ vs. physician $n = 46$			Multiple positions/other $n = 72$ vs. physician $n = 46$			Registered nurse $n = 120$ vs. multiple positions/other $n = 72$		
Overall and subscale items, score range, and stratification	**Total sample M(SD) Range**	**Nurse M(SD) Range**	**Physician M(SD) Range**	**MWU stat n Test sig (*p*)**	**MP/O M(SD) Range**	**Physician M(SD) Range**	**MWU stat n Test sig (*p*)**	**Nurse M(SD) Range**	**MP/O M(SD) Range**	**MWU stat n Test sig (*p*)**
Overall belief score (23 items) 0 min–115 max 0–18 = strongly disagree 19–37 = disagree 38–57 = somewhat disagree 58–77 = somewhat agree 78–96 = agree 97–115 = strongly agree	89.40(18.15) 26–115	90.34(18.24) 26–115	79.35(19.92) 41–111	1,851.500 $n = 166$ $p = 0.001$	93.81(14.76) 58–115	79.35(19.92) 41–111	951.500 $n = 118$ $p = 0.000$	90.34(18.24) 26–115	93.81(14.76) 58–115	4,788.500 $n = 192$ p=0.209 ns
Core beliefs subscale (14 items) 0 min–70 max 0–10 = strongly disagree 11–22 = disagree 23–34 = somewhat disagree 35–46 = somewhat agree 47–58 = agree 59–70 = strongly agree	56.23(11.71) 16–70	57.02(11.69) 16–70	49.54(13.17) 23–70	1813.00 $n = 166$ $p = 0.001$	59.01(9.29) 36–70	49.54(13.17) 23–70	944.500 $n = 118$ $p = 0.000$	57.02(11.69) 16–70	59.01(9.29) 36–70	4660.500 $n = 192$ p=0.360 ns
Barriers subscale (4 items) 0 min–20 max 0–2 = strongly disagree 3–5 = disagree 6–9 = somewhat disagree 10–13 = somewhat agree 14–17 = agree 18–20 = strongly agree	13.47(3.98) 1–20	13.29(4.12) 1–20	13.11(4.20) 3–20	2684.000 $n = 166$ $p = 0.783$ ns	13.86(3.72) 3–20	13.11(4.20) 3–20	1455.000 $n = 118$ $p = 0.265$ ns	13.29(4.12) 1–20	13.86(3.72) 3–20	4591.000 $n = 192$ p=0.466 ns
Strategies subscale (5 items) 0 min–25 max 0–3 = strongly disagree 4–7 = disagree 8–11 = somewhat disagree 12–16 = somewhat agree 17–21 = agree 22–25 = strongly agree	19.70(4.18) 8–25	20.03(4.02) 8–25	16.7(4.41) 8–25	1542.000 $n = 166$ $p = 0.000$	20.93(3.4) 11–25	16.7(4.41) 8–25	742.000 $n = 118$ $p = 0.000$	20.03(4.02) 8–25	20.93(3.44) 11–25	4856.000 $n = 192$ p=0.148 ns

Note: $SSC_B^{©}$ = Healthcare Professionals' Beliefs about Skin-to-Skin Care During a Cesarean (© 2021, Jeannette T. Crenshaw & Ellise D Adams). Higher scores more closely aligned with statement agreement; lower scores more closely aligned with statement disagreement. MP/0 = multiple positions/other; min = minimum summative score; max=maximum summative score. See Table 1 for instrument items.

2.4 | Procedures for quantitative analysis

The instrument's validity was assessed using (1) factor analysis (principal component analysis [PCA]); (2) Kaplin–Meyer–Olkin (KMO) measure of sampling adequacy; and (3) Bartlett's test of sphericity. The PCA identified four key drivers of positive sentiment (beliefs) about SSC during a caesarean, each having an eigenvalue greater than 1.0 (Statements 4, 5, 10 and 19; see Table 1). Cumulatively, these four key beliefs explained most (64%) respondents' sentiment variance: Statement 5 explained 33%; Statements 10 and 19 each explained 13%; and Statement 4 explained 5%. The KMO was 0.934, indicating that the sample was suitable for factor analysis (IBM Knowledge Center, n.d.). Bartlett's test of sphericity indicated significant correlation of the four principal components (Chi Square 3695.194, *df* 253, $p = 0.000$).

The Cronbach's alpha for the 23 items and subscale items was acceptable. The overall SSC_B Cronbach's alpha was $\alpha = 0.9$ for the 23 items, $\alpha = 0.9$ for the 14 core belief subscale items, $\alpha = 0.7$ for the four barrier subscale items and $\alpha = 0.7$ for the five strategy subscale items.

2.5 | Procedures for qualitative analysis

The eight qualitative questions were analysed using narrative content analyses to create common content categories (process of organizing data into similar content categories). One author initiated the detailed analysis, and through discussion, we agreed on common categories for each question.

We worked within the three previously categorized subscales (core beliefs, barriers and strategies) to narrow the categories into common codes that reflected participants' sentiments. With the use of these common codes, and categories of data that allowed us to draw meaning, we defined concepts and identified connections between concepts. Quotations were analysed and chosen to reflect the categories (an inductive process) and codes (a deductive process). Finally, representative participant quotations were chosen to reflect the codes within each subscale (see Table 5).

3 | RESULTS

Participant characteristics are displayed in Table 2. The quantitative item analysis results are displayed in Table 3. The quantitative component of our qualitative question is displayed in Table 4. The qualitative analysis results are illustrated in Table 5.

3.1 | Participants

Participants ($n = 274$) were from 31 states in the United States who practiced in settings with a variety of average births per month. To analyse results, we categorized the participant-selected practice roles as registered nurse (RN) (included those who selected RN, certified nurse midwife and certified RN anaesthetist), physician (included those who selected obstetrician, paediatrician, maternal–fetal medicine specialist and neonatologist), multiple positions/other and did not disclose. Almost half (46%) were RNs, and 17% were physicians. About one-third (28%) of participants selected multiple positions/other, and 9% did not respond (see Table 2).

3.2 | Quantitative results: HPs' beliefs

3.2.1 | Overall belief scores

A total of 243 (89%) of the 274 participants answered all 23 items; 31 (11%) did not and were excluded from the overall belief score. Possible overall belief score was 0 (minimum) to 115 (maximum). The mean rank overall belief score was 89 ('*agree*'), indicating an overall belief system that supports implementing SSC during a caesarean birth (see Table 3).

3.2.2 | Overall summative belief scores by practice role

We calculated the mean rank summative overall belief score by practice role (RN, physician and multiple positions/other). Five participants did not respond to the practice role item and were excluded from the analysis. The mean rank overall belief score for RNs (90) compared with physicians (79) was significantly different ($p = 0.00$) and higher. However, the mean rank score for both roles was between 78 and 96, indicating an overall belief system for RNs and physicians that supports SSC during a caesarean birth (see Table 3).

TABLE 4 Participant responses ($n = 224$) to the quantitative component of Item 24 of the instrument: *Health Professionals' Beliefs about Skin-to-Skin Care During a Cesarean* (SSC_B)

In your opinion, should SSC begin in the OR for alert and responsive mothers and their babies?	Yes	No	Ambivalent*
n (%)	185 (82.6)	16 (7.1)	23 (10.3)

Note: See Table 1 for all instrument items.

Abbreviations: Ambivalent*, participants' responses could not be identified as yes or no; OR, operating room (operating theatre); SSC, skin-to-skin care; SSC_B, *Health Professionals' Beliefs about Skin-to-Skin Care During a Cesarean*.

TABLE 5 Categorization and coding of participants who responded to qualitative questions (items) from the instrument: *Health Professionals' Beliefs about Skin-to-Skin Care During a Cesarean* (SSC_B)

Question	Response categories	Representative responses	Codes for each category
Core beliefs			
#29 ($n = 225$) In your opinion, should SSC begin in the OR for alert and responsive mothers and their babies? Explain your answer.	Benefits of SSC: psychophysiologic stability, bonding, breastfeeding, patient experience Barriers to SSC: staffing, staff knowledge and beliefs, safety Positive opinions about SSC but only if certain conditions met Concerns about maternal/newborn safety Concerns about maternal/newborn psychophysiologic stability in OR environment	'Yes. skin to skin promotes temp stability, breastfeeding, bonding, patient experience all improves with skin to skin in OR.' 'Yes. But only if there is a RN or staff member assigned to stand at the head of the bed with mom and baby to ensure safety and to constantly be assessing the infant' 'No. There is not enough room on mothers chest while she is supine and draped. Chance for injury to baby and break in sterility is too great.'	Maternal/newborn psychophysiologic benefits Concerns for maternal/newborn psychophysiologic stability Concerns for maternal/newborn safety
#30 ($n = 217$) What are 3 main reasons to promote SSC in the OR for alert and responsive mothers and their babies?	Promotes maternal/newborn psychophysiological stability Promotes bonding (attachment) Improves breastfeeding outcomes	'1. Begins maternal-newborn bonding immediately after birth 2. Promotes newborn transition to extra-uterine life 3. Promotes breastfeeding much sooner than if the newborn were to be taken to the newborn nursery.' 'SSC has proven to effectively regulate the temperature of the newborn & mother, facilitate the initiation of breastfeeding & calms mom & baby, with a positive impact on mother-infant bonding'	
#31 ($n = 216$) What are 3 main reasons not to promote SSC in the OR for alert and responsive mothers and their babies?	OR environment Maternal/newborn psychophysiologic stability in OR environment Maternal preference No reasons not to promote (in favour of SSC)	'Not enough room to get the baby placed skin to skin; dangerous to baby- fall risk (cords and wires hanging from bed to monitors that nurse has to maneuver around to get baby placed skin to skin), some women don't want skin to skin' 'Safety in surgical patients, Limited space and risk of compromising maternal care and sterile field. Harder to monitor the newborn' 'I really cannot think of ANY real reasons NOT to promote SSC in the OR for alert and responsive mothers and their babies. Many will give reasons why it can't be done, but let's face it, it can be done.'	
Barriers			
#32 ($n = 211$) If a hospital team wanted to promote SSC in the OR, what are the 3 main barriers that would need to be overcome?	Safety concerns related to OR environment Staff knowledge/perception/attitudes/beliefs regarding SSC Adequate nurse staffing	'The anesthesiologist not having immediate access to the mother if there was an emergency, inability of the nursery nurse to assess the newborn safely on the mother's	Concerns for maternal/newborn psychophysiologic stability Concerns for maternal/newborn safety Lack of readiness

TABLE 5 (Continued)

Question	Response categories	Representative responses	Codes for each category
	Risk for maternal/newborn psychophysiologic stability	chest, safely positioning the newborn while the mother is lying on the operating room table, and concerns that the newborn will become hypothermic due to the low temperature in the operating room' 'Having every team member on board with the skin-to-skin plan, having an area open to place the baby after delivery, and having a nurse monitoring baby to ensure safety'	
#33 ($n = 190$) If a hospital team were to promote SSC in the OR, what would be your 3 main concerns?	Maternal/newborn safety in OR environment Lack of hospital readiness Newborn/maternal psychophysiologic stability Lack of a designated nurse to provide SSC	'Maintaining temp of infant is OR temperature is cold, making sure mother is able to care/hold infant without nurse at bedside, maintaining sterility of surgical field.' 'That all care givers are informed and in agreement with the process/education of parents to support it/education of staff to support it' '1). Labor nurses in charge of the OR asked to keep track of stable newborn when they need to be running the OR. 2). Staff discouragement of process because of additional work involved. 3). Proper education of staff on best protocols for carrying it out.'	
Strategies			
#34 ($n = 187$) What are 3 strategies to increase the use of SSC care in the OR?	Increase staff education, training and support for providing SSC in OR environment Educate patients/families and communities about benefits of SSC Address hospital readiness (adequate nurse staffing, protocol OR set-up)	'Education starting in office with patients, more staff to give best care to couplets (one RN can NOT be for both mother and infant during this time), change in configuration of OR table to allow better movement and physical support of mothers and infant for SSC' 'Incorporate it into the plan of care so that all healthcare team members and the patients know what to expect; have a protocol in place for when and how to do it; educating healthcare professionals and patients about the benefits of SSC care.' 'Educate staff on benefits/Provide the staff available to have someone available to assess and watch baby on Mom's chest to make sure baby is secure/Educate parents on benefits of SSC'	Hospital readiness Patient, family and community education

(Continues)

TABLE 5 (Continued)

Question	Response categories	Representative responses	Codes for each category
#35 ($n = 180$) What are 3 strategies to promote safety during the use of SSC care in the OR?	OR environment that promotes maternal/newborn safety Adequate nurse staffing to promote maternal/newborn safety Staff education and effective communication to promote safe SSC	'1. Equipment evaluation (portability, maneuverability and durability), including support post-delivery for maternal stability on the operative table. 2. Inclusion of Anesthesia in the implementation phase. 3. One nurse assigned to the infant at all times for the initial hour after birth.' 'Have a RN with the mom and baby at all times. make enough room for this to be done easily so the baby can be observed during SSC. Have anesthesia team input so it doesn't interfere with their workspace.' 'All care providers trained on methods to achieve SSC. Training all on safety measures for mother and baby. Contingencies in place and training for roles in S2S. Training of staff on how to handle S2S for mother and baby, as well as if emergency arises and S2S has to be abruptly interrupted. Simulation drills could assist in creating methods to create safe S2S and also be used for teams to have practice drills on these methods and emergency procedures.'	

Note: Participants' wording and punctuation were preserved in representative responses.

Abbreviations: OR, operating room (operating theatre); SSC, skin-to-skin care; RN, registered nurse; SSC, skin-to-skin care.

3.2.3 | Subscale scores (core beliefs, barriers and strategies)

We calculated the overall mean rank summative score for each subscale: core beliefs, barriers and strategies for the 243 participants. Then we calculated each subscale score by practice role (RN, physician and multiple positions/other) (see Table 3).

Core belief subscale score

The possible core beliefs subscale score was 0 (minimum) to 70 (maximum). Participants' mean rank core belief score was 56, indicating core beliefs that support SSC during a caesarean birth (see Table 3). The mean rank core belief score for RNs (57) compared with physicians (50) was significantly different ($p = 0.00$) and higher. However, the mean score for both roles was between 47 and 58 (agree), indicating core beliefs for both RNs and physicians that support SSC during a caesarean birth (see Table 3).

Barrier subscale score

The possible barrier subscale score was 0 (minimum) to 20 (maximum). The mean barrier score was 13, indicating participant beliefs about barriers that tend to be supportive of SSC during a caesarean. We found no significant difference ($p = 0.783$) in mean rank barrier scores for RNs (13) compared with physicians (13), indicating agreement between RNs and physicians on barriers (see Table 3).

Strategy subscale score

The possible strategy subscale score was 0 (minimum) to 25 (maximum). The mean rank strategy score was 20, indicating beliefs about strategies that facilitate and support SSC during a caesarean (see Table 3). The mean rank strategy score for RNs (20) compared with physicians (17) was significantly different ($p = 0.000$) and higher. The mean score for both roles was between 17 and 20 (agree), which indicates that RNs' and physicians' strategy beliefs facilitate and support SSC during a caesarean (see Table 3).

3.3 | Qualitative results: HPs' beliefs

Item 24 had a quantitative (see Table 4) and qualitative component (see Table 5). Of the 224 participants who answered this question, 185 (83%) supported the belief that SSC should begin during a caesarean (see Table 4). Table 5 displays the categories, codes and corresponding representative responses for core beliefs, barriers and strategies. Participants commonly expressed positive core beliefs about various maternal/newborn psychophysiological benefits; for example, SSC during a caesarean promotes bonding (i.e., attachment), improves breastfeeding outcomes (e.g., hastens initiation and increases milk supply, duration and exclusivity) and supports maternal/newborn psychophysiological stability (e.g., improves thermoregulation, newborn transition to extrauterine life and maternal satisfaction and decreases stress).

When asked to list reasons not to promote SSC during a caesarean, many participants reported that no reasons exist and expressed beliefs strongly favouring SSC. Some participants identified core beliefs about the potential risks to maternal/newborn psychophysiological stability for SSC during a caesarean. Concerns included the risk of poor thermoregulation from a cold OR environment, sterile field contamination, interference with newborn assessment, potential for mother and/or newborn to become unstable and a mother's preference against initiating SSC during surgery. Participants also described core beliefs about the potential risks to maternal/newborn safety from OR environmental constraints. Examples include limited OR space, difficulty with newborn positioning due to cumbersome equipment, risk for newborn falls, interference with surgery and hindering the ability to intervene in a medical emergency. Similarly, participants also identified concerns for maternal and newborn psychophysiological stability and safety as barriers.

Participants discussed hospital readiness (the extent to which a hospital is prepared to provide SSC during caesarean) as both a barrier and strategy. Examples of hospital readiness included logistics for safely implementing SSC (e.g., adequate nurse staffing for one-on-one care, OR space, equipment set-up and agency protocols) and staff preparation (e.g., staff knowledge, perceptions and training). Participants offered strategies to prepare staff for SSC during a caesarean. Examples included providing evidence-based continuing education, identifying staff 'champions' to gain buy-in and using practice simulation. Another strategy participants identified was patient, family and community education about the benefits of immediate SSC.

4 | DISCUSSION

4.1 | SSC_B development and psychometrics

We developed a valid and reliable instrument, and to our knowledge, the first instrument to assess HPs' beliefs about SSC that begins during a caesarean birth. Our results suggest that using SSC_B is effective at differentiating the strength of beliefs about SSC and support for SSC during a caesarean. Therefore, SSC_B can be used for quality improvement initiatives to assess readiness, target educational efforts, assess progress and evaluate quality improvement or evidence-based practice initiatives. Because successful breastfeeding typically follows immediate and interrupted SSC (WHO & UNICEF, 2018), identifying SSC barriers using SSC_B and addressing them can be foundational to improving breastfeeding outcomes. Furthermore, using the SSC_B together with the *Healthy Children Project Skin-to-Skin Implementation Algorithm* (Brimdyr et al., 2017; Cadwell et al., 2018) can further facilitate improvements in SSC during caesareans.

4.2 | HPs' beliefs

4.2.1 | Quantitative responses

Our primary aim (in addition to developing and testing the SSC_B for validity and reliability) was to use our instrument to describe HPs' beliefs about immediate SSC during a caesarean. Our findings that RNs scored higher compared with physicians on beliefs that support of SSC during caesareans are consistent with the experience of others (Alenchery et al., 2018; Balatero et al., 2019). However, despite this difference, the scores for both roles were within the 'agree' range. These results suggest that those leading quality improvement projects in the United States can improve interprofessional collaboration by focusing on shared beliefs.

We found no difference between multiple roles/other and RNs, possibly because most were also nurses (e.g., director and charge nurse). We categorized and analysed certified RN anaesthetists, who may have SSC beliefs similar to anesthesiologists, with RNs; however, we still identified a significant difference between beliefs of physicians and RNs.

If the SSC_B results at an organization indicate that HPs support SSC during uncomplicated caesareans, but SSC is being withheld, the qualitative responses can be valuable in identifying hospital-specific barriers and effective strategies to overcome them. If results show unsupportive SSC beliefs or a gap between physician and nurse beliefs, those leading improvement initiatives can focus on increasing buy-in prior to starting an improvement initiative. Historically, physicians have had a strong influence over practice decisions in many practice settings (Holm, 2011), so improvement efforts may be more effective with a focus on gaining physician support.

Safety concerns

Proponents and opponents of SSC during a caesarean emphasized maternal and newborn safety issues. Participants frequently identified inadequate staffing as a safety concern and emphasized that a strategy to overcome this barrier was having a dedicated nurse for a newborn during SSC. Balatero et al. (2019) also described staffing concerns as a barrier. This concern continues despite guidelines, available for years, that underscore the necessity of one nurse for the mother and a separate nurse for the newborn until surgery is completed (American Academy of Pediatrics & American College of Obstetrics and Gynecology, 2017; Association of Women's Health, Obstetric and Neonatal Nurses Staffing Task Force, 2010).

Culture-specific safety concerns

During instrument development, focus group participants in both the United States and China identified maternal/newborn safety as a barrier to immediate SSC during a caesarean. Although most safety concerns were similar, focus group members in China were concerned that newborns experienced an increased risk of infection from a delay in 'disinfecting the umbilical cord'. Some participants in these focus groups said their concern stems from the belief that cord clamping does not sufficiently prevent infection. Therefore, mothers and newborns "require" early separation for immediate umbilical cord care. Because the SSC_B includes open-ended questions, the instrument enables those leading SSC improvement efforts to surface culturally specific concerns at the local level.

Respondents' priorities: Drivers of a positive sentiment score

Four of the 23 quantitative statements were principle drivers of supportive belief scores regarding SSC during caesarean birth: (1) increases exclusive breastfeeding at hospital discharge; (2) promotes newborn physiological stability; (3) reduces maternal stress; and (4) recognizes the value of informing women prenatally about the benefits. Our results are not surprising, based on current research and other evidence. Caesarean birth is associated with suboptimal breastfeeding outcomes (Lande et al., 2020). However, immediate SSC is not only feasible during medically uncomplicated caesareans (Crenshaw et al., 2019) but provides the opportunity for early breastfeeding, which enhances breastfeeding success (WHO & UNICEF, 2018). According to the WHO and UNICEF, breastfeeding is not only foundational to optimal maternal health and child survival, but it also is a key driver to achieving eight of the 17 United Nations General Assembly (n.d.) Sustainable Development Goals. Not surprisingly, Step 4 of the Baby-friendly Hospital Initiative (WHO & UNICEF, 2018) guides HPs to provide immediate SSC and support mothers to begin breastfeeding.

Studies also show that SSC improves physiological stability (Moore et al., 2016; WHO & UNICEF, 2018) and reduces maternal stress during a caesarean (Crenshaw et al., 2019). In addition, experts recommend that education about the benefits of breastfeeding, including SSC, begin prenatally (Step 3 of the WHO & UNICEF 10 Steps to Successful Breastfeeding; Crenshaw, 2019; Hernández-Aguilar et al., 2018; WHO & UNICEF, 2018). Women who are informed about SSC prenatally and on admission to a maternity unit are better able to advocate for themselves and their newborns. Therefore, focusing educational efforts on these four key drivers may improve SSC quality improvement success. In addition, HPs have a responsibility to help women make informed decisions about the practice of SSC (WHO & UNICEF, 2018) and help them recognize that SSC is feasible and safe during a medically uncomplicated caesarean (Crenshaw et al., 2019).

4.2.2 | Qualitative responses

Most participants supported SSC during a caesarean, yet some reported both positive and negative sentiments. Positive beliefs emphasized maternal/newborn psychophysiological benefits, while concerns and identified barriers focused on maternal/newborn psychophysiological stability and safety.

Lack of hospital readiness was identified as a barrier. However, participants provided strategies to facilitate hospital readiness such as interprofessional collaboration. Barriers also included concerns about mothers' and newborns' psychophysiological stability and safety. Suggested strategies to overcome these barriers were frequently

related to staff education and training. The SSC_B can identify facility and provider-specific barriers to allow targeted education and training.

Participants reported patient, family and community education as a strategy to promote SSC. Increasing family and public knowledge about the benefits of immediate SSC during a caesarean birth could lead to improved rates of immediate SSC and exclusive breastfeeding at hospital discharge and improved psychophysiological outcomes for mothers and newborns. Some participants also recommended a patient-centred approach that included mothers' preferences about immediate SSC. To do this, HPs must empower patients and families with unbiased education about maternal and newborn benefits of immediate SSC while supporting their freedom of choice.

4.3 | Limitations and recommendations

Limitations of our study include the format of a few demographic questions. We only provided 'male' or 'female' as gender options. To be inclusive, we recommend including other options, such as 'nonbinary' and 'prefer not to answer'. The online tool used to administer the instrument was set to allow participants to omit answers, which reduced the ability to analyse a few responses. We recommend setting the software to prevent questions from being omitted but including the option, 'prefer not to answer'. Administering a pilot test of the SSC_B with HPs would have added strength. However, the pilot test conducted by nurses, statisticians and administrative staff at a clinical research institute served a similar purpose.

If SSC is not provided to medically stable mothers and newborns despite SSC_B supportive belief scores, it may be due to an HP barrier, like differing beliefs among HP specialties. In our study, the demographic questions enabled participants to select more than one option. Because we categorized the participant-selected practice roles as RN (i.e., RN, certified nurse midwife and certified RN anaesthetist) and physician (i.e., obstetricians, paediatricians, maternal–fetal medicine specialists and neonatologists), we were unable to compare beliefs by practice roles. We also were unable to explore agreement by practice role related to specific core beliefs, barriers and strategies. Having this information would be valuable in future research, as obstetricians, anesthesiologists and nurse anaesthetists strongly influence the practice of immediate SSC during caesareans.

5 | CONCLUSIONS

SSC_B is a valid and reliable instrument that effectively measures the strength of HPs' beliefs about immediate SSC during a caesarean. Results from the SSC_B can be used to identify site and culturally specific barriers, which can be used to develop strategies and implement policies to drive for improvement initiatives. Nurses scored higher than physicians in positive sentiments about immediate SSC. However, both nurses' and physicians' scores were supportive. The four key drivers of positive overall sentiment supporting immediate SSC were that SSC (a) reduces maternal stress during a caesarean, (b) improves newborn physiologic stability, (c) improves breastfeeding outcomes and (d) requires prenatal education of mothers and families. Focusing on these four drivers, including the impact on improving breastfeeding outcomes, may enhance improvement outcomes. SSC_B is a valuable resource for HPs as they prepare for, implement and evaluate quality improvement initiatives to improve rates of immediate SSC and breastfeeding for women and newborns during caesarean birth.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONTRIBUTIONS

JTC and EDA performed the research. JTC, EDA and REG designed the research study. JTC, EDA and REG analysed data and wrote the paper. HGN and EDA analysed the qualitative responses and wrote the qualitative sections. JTC, EDA, REG and HGN reviewed, edited and approved the final version of the paper.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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