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Original Research Article

A short responsive interaction scale: construction and preliminary reliability and validity

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ABSTRACT

Background: Responsive interactions among caregivers and newborns are essential for positive and optimal growth and development. The aim of this cross-sectional study was to develop and validate a short responsive interaction tool (SRIS) to assess caregiver responsiveness of newly delivered mothers.
Methods: The SRIS consists of twenty elements that are used to classify new-born handling, interactions, consoling techniques, engagement, and distress. High reliability and internal consistency were shown in the data gathered from 257 mothers (Cronbach's alpha=0.8354). The scale's one-dimensional structure was discovered through construct validity analysis, demonstrating the consistency of the scale's evaluation of response interactions.
Results: The results indicate that the valid and reliable instrument for gauging the responsiveness of caregivers during their initial contact with neonates. It provides a useful and approachable method with possible uses in healthcare settings and research for evidence-based parenting interventions.
Conclusions: To improve the tool's generalizability and usefulness in fostering early childhood development and parental engagement, further research is necessary to validate it across a variety of contexts.

Keywords: Early childhood development, Responsive interactions, Responsive caregiving, Parenting

INTRODUCTION

Responsive interactions during the initial stages of a child's life hold utmost significance. The interactions that take place help to create a positive bond between the caregiver and the child. The nurturing care framework defines responsive caregiving as caregivers' prompt and sensitive responses to a child's variety of cues such as children's sounds, verbal, and nonverbal gestures, and requests with close observation.[1] Responsive interaction can be described as the caregiver's positive and suitable responses to the child's cues and activities. This can be vocal, such as effectively addressing the child's questions or reacting to the child's actions with open-ended questions. Nonverbal answers can also be used, such as allowing the child to take the lead while the responsible adult follows. Children taking the lead allows the parents to determine whether their child is interested in the activity. Eshel and colleagues found that responsiveness can be viewed as a cycle of three steps.[1] The first step is Observation: The child's movements and vocalizations are among the cues that the caregiver, typically the mother serves. The second step is interpretation where the caregiver correctly deciphers these cues, such as recognizing that an agitated baby is either sick or is simply tired and in need of rest. The third and final step is the action step where the caregiver meets the child's needs, by responding to them quickly, reliably, and effectively. This demonstrates that the relationship formed at birth is critical in the carer recognizing when their newborn is in discomfort or enjoying themselves.

The development of language is specifically enhanced by responsive interactions, which can take place in many different forms. A child's exposure to sparking, encouraging and persistent verbal and nonverbal interactions plays a groundbreaking role in language development among children if accurate vocabulary and expressions are provided to grab the child's focus within these interactions.[2] This suggests that fostering communicative engagement can support a child's intellectual growth, which may act as a buffer against developmental problems.

However, many children from birth to five years are at a higher risk of not reaching their developmental potential, especially those from low and middle-income countries (LMICs).[3] In early childhood, the developmental process of a child can relate to external factors such as extreme poverty, abuse, or neglect. More than 40% of children below the age of 18 years in LMICs are living in severe poverty.[4] To prevent these issues from worsening it is perlative that caregivers and health care professionals recognize problems and address them before the child is affected or reduce their conditions from worsening.

A study conducted in Sindh, Pakistan evaluated the effectiveness of providing responsive caregiving and child developmental outcomes. This was accomplished through first-hand observation of mother-child dyads. The study included 868 mother-child dyads, and it was discovered that many of the individuals in this study lived in multi-generational families. The average number of children in these homes was between two and three. At 24 months postpartum, around 16% of the mothers in this research fulfilled the screening criteria for depression.[5]

According to the Centre on the Developing Child at Harvard University (2007), secure and nurturing connections serve as vital for healthy development. According to research, when children are terrified by a traumatic event, those who have solid reliable connections with their parents or non-parent caregivers endure minimal stress hormone activation, whereas those with insecure relationships encounter substantial stress response system activation.[6,7]

Early childhood development (ECD) is one of the major global agendas and international agencies are calling on all healthcare institutions to become a part of advocating ECD in healthcare settings. One of the leading academic medical centers in Karachi its Department of Obstetrics and Gynaecology initiated the Early Childhood Development-Parenting Readiness Education Program (ECD-PREP) that offers a wide range of services on parenting education and responsive caregiving by integrating education, research, and services. This is a one-of-a-kind program launched (06 November 2020) from a university hospital platform in Pakistan and will require intensive efforts for its success. As the program aims to develop caregivers' capacity to responsively interact with the newborn, however, there is a gap in research surrounding responsive interactions at birth specifically in healthcare settings. This is indicative of the need for a standardized tool that enables healthcare providers to observe these responsive interactions between the newborn and the caregiver. The aim of the study was to develop and validate a Short Responsive Interaction Scale (SRIS) among mothers of newborns presenting at a tertiary care hospital in Karachi, Pakistan.

METHODS

Development and validation of a SRIS

The development and validation of the SRIS were carried out by a team of trained early childhood development personnel. A thorough study of several tools teaching and feeding interaction tools from the University of Washington and responsive interaction tools from the University of Toronto was conducted and several concepts of care for child development from UNICEF and WHO were also done. Based on these desk studies this tool was developed.

A validity was done showing this to six professionals and seeking their input. A pilot was also done on 30 parents for which the Cronbach alpha came 0.88. Based on this, specific items were identified and made part of the tool. After establishing reliability from the pilot, the actual data collection was done to understand the early responsive interactions. The data was collected between January 2023 to July 2023. The tool was developed and validated in the English language. The primary objective was to develop an SRIS tool that is suitable for nurses, midwives, lactation consultants, breastfeeding counselors, and other healthcare professionals involved in the care. This tool was intended to be utilized consistently and effectively, both in research studies and broader practical applications. Additionally, the goal was to design a tool that facilitates assessing the handling of newborns, newborn interactions, comforting measures, engagement, and distress while maintaining simplicity and user-friendliness. Specific guidelines for newborn responsive interactions were also developed to implement the tool.

Measures and tool

Basic demographic and perinatal characteristics pertaining to the mother included: age range, education, profession, number of children, and gravida. The tool contains 20 items highlighting four categories to measure which include handling of newborns, interactions, comforting measures, engagement, and distress. Each item is preceded by the 'yes or no' response (Appendix).

Study design and subjects

A cross-sectional study design was used in this study. The participants were mothers of newborns who presented in the Department of Obstetrics and Gynaecology of one of the leading tertiary care hospitals in Karachi Pakistan. Participants were eligible if they were newborn mothers,

married, 18 years or older, had minimum education of matriculation, and willingness to participate in the study by giving informed written consent.

Sample size

The sample size was determined based on the commonly recommended guidelines found in the literature. Literature evidence indicates that the sample size should be a minimum of 10 participants per item in quantitative instrument validation studies.[8] Therefore, a sample size of 200 (10 participants×20 items) was considered. The obtained sample size included 10% of the non-respondent rate which made the final sample size 220. The sample size achieved was 257.

Data Collection and management

Data was collected after taking the informed written consent from the participants. The data was collected using the tool. The tool was online and self-administered. Once the data was completed it was transferred to the analytical tool where it was checked for missing data and cleaned. No missing data was found.

Statistical analysis

The internal consistency of the scale was calculated by Cronbach's alpha, computing inter-item correlation, and corrected-item total correlation The convergent validity of the SRIS was assessed through the calculation of the Pearson correlation coefficient. Frequency and percentages were computed for the data in the descriptive statistics. Factor analysis was performed using the maximum likelihood technique to determine the one-dimensionality of the tool to understand that the items in the tool are all uniform and underlying the same concept. The goodness of the fit of the model was assessed through Chi square/degree of freedom <5.0 value as significant. All the statistical analysis was carried out using STATA version 17.

RESULTS

Of the 257, most of the mothers were of age between 20-30 years 125 (48.64%). More than one-third of the mothers were graduates 86 (33.46%) with most of them homemakers 175 (68.09%). Most of the mothers have multigravida 160 (62.26%) and have at least 2 children 152 (59.14%). Regarding the children's rights, 177 (68.87%) mothers were aware of it. Most of them knew emergency ambulance number 152 (59.14%) and whom to contact if the newborn is unwell 212 (82.49%) (Table 1).

Internal validity

The Cronbach's alpha coefficient for the SRIS was 0.8354 and did not increase by 0.10 in case any item was removed. Question 7 only exhibits a relatively weak correlation on corrected item-total correlations (0.2987). All other items in the tool were within acceptable range. The mean corrected item-total correlation for the 20 items was 0.4877 (Table 2).

Construct validity

The goodness-of-fit of the model using the Chi square indicated that the model did not fit the data well (X^2= 6.117). All factor loadings were >0.50, except for item 7 in the tool which was a little lower (Appendix).

There was no negative correlation between the items in the tool. There was no significant correlation between age, education profession, gravida, and other covariates except for the number of children ($p<0.001$) according to the Pearson correlation coefficient (Table 3).

Table 1: Basic demographic, perinatal characteristics, and knowledge of the mothers (n=257).

Characteristics	N (%)
Age (years)	
20-30	125 (48.64)
30-40	115 (44.75)
40-50	15 (5.84)
50+	2 (0.78)
Education	
Matriculation	45 (17.51)
Intermediate	68 (26.46)
Undergraduate	23 (8.95)
Graduate	86 (33.46)
Postgraduate	35 (13.62)
Profession	
Homemaker	175 (68.09)
Self employed	23 (8.95)
Employed	59 (22.96)

Continued.

Characteristics	N (%)
Number of children	
1	58 (22.57)
2	152 (59.14)
3	35 (13.62)
4	12 (4.67)
Gravida	
Primi gravida	97 (37.74)
Multi gravida	160 (62.26)
Do you know child rights?	
No	80 (31.13)
Yes	177 (68.87)
Do you know emergency ambulance number?	
No	105 (40.86)
Yes	152 (59.14)
Do you know whom to contact if your newborn is unwell?	
No	45 (17.51)
Yes	212 (82.49)

Table 2: Descriptive statistics and internal consistency of the SRIS (n=257).

Characteristics	N (%)	Corrected item correlation
Does the caregiver ensure that the environment of the newborn is safe?		
No	30 (11.67)	0.3048
Yes	227 (88.33)	
Does the caregiver pick and holds the newborn safely?		
No	31 (12.06)	0.3442
Yes	226 (87.94)	
Does the caregiver maintain eye contact with the newborn?		
No	54 (21.01)	0.4943
Yes	203 (78.99)	
Does the caregiver describe the activity to the newborn that they are engaged in?		
No	46 (17.90)	0.5133
Yes	211 (82.10)	
Does the caregiver praise the newborn?		
No	94 (36.58)	0.6467
Yes	163 (63.42)	
Does the caregiver connect with the newborn through non-verbal communication?		
No	71 (27.63)	0.6230
Yes	186 (72.37)	
Does the caregiver encourage newborn play behaviour?		
No	62 (24.12)	0.2987
Yes	195 (75.88)	
Does the caregiver encourage newborn play behaviour?		
No	93 (36.19)	0.5908
Yes	164 (63.81)	
Does the caregiver talk to the newborn gently?		
No	46 (17.90)	0.4849
Yes	211 (82.10)	
Does the caregiver avoid speaking in newborn language?		
No	101 (39.30)	0.4420
Yes	156 (60.70)	
Does the caregiver use more than 1 word or sentence to describe one situation or object to the newborn?		
No	107 (41.63)	0.5982
Yes	150 (58.37)	
Does the caregiver attend to the newborn with soothing remarks when they show discomfort?		
No	44 (17.12)	0.4103
Yes	213 (82.88)	

Continued.

Characteristics	N (%)	Corrected item correlation
Does the caregiver caress the newborn in a calming gesture?		
No	44 (17.12)	0.4162
Yes	213 (82.88)	
Does the caregiver avoid harsh handling of the newborn?		
No	51 (19.84)	0.3992
Yes	206 (80.16)	
Does the caregiver provide applauding remarks to the newborn?		
No	88 (34.24)	0.5208
Yes	169 (65.76)	
Does the caregiver encourage efforts made by the newborn?		
No	64 (24.90)	0.6259
Yes	193 (75.10)	
Can the caregiver recognize the newborn cues for discomfort and disengagement?		
No	84 (32.68)	0.5114
Yes	173 (67.32)	
Does the newborn display clear signs of withdrawal to the caregiver?		
No	81 (31.52)	0.5155
Yes	176 (68.48)	
Does the newborn demonstrate changes in facial expressions and body language?		
No	62 (24.12)	0.4373
Yes	195 (75.88)	
Does the newborn actively respond to the mother while the two connect?		
No	39 (15.18)	0.5769
Yes	218 (84.82)	

Table 3: Association of SRIS with demographic characteristics and other covariates (n=257).

Characteristics	r	P value
Age (years)		
20-30	0.3121	0.5500
30-40		
40-50		
50+		
Education		
Matriculation	0.7069	0.8161
Intermediate		
Undergraduate		
Graduate		
Postgraduate		
Profession		
Homemaker	0.5559	0.9742
Self employed		
Employed		
Number of children		
1	0.9756	<0.001
2		
3		
4		
Gravida		
Primi gravida	0.1459	0.2114
Multi gravida		
Do you know child rights?		
No	0.6502	0.2732
Yes		
Do you know emergency ambulance number?		
No	0.1863	0.0633
Yes		

Continued.

Characteristics	r	P value
Do you know whom to contact if your newborn is unwell?		
No	0.7069	0.2269
Yes		

DISCUSSION

The evaluation of responsive caregiver-child interaction associated with child growth and development can guide about quality of the family environment and the quality of parent-child relationships.[8,9] The current study aims to investigate the psychometric properties of the SRIS and determine the preliminary validity and reliability of the self-report version.

A worldwide number of tools have been developed that used to assess the parent's responsiveness and quality of mother-child interaction, mainly are from the Western world. However very few have been developed, validated, and used in the Eastern world.[10-13] Most of them only covered mother-child interaction with a more than a year-old child, the tools that assess caregiver responsiveness and responsive interaction in the early days of life are limited. SRIS was mainly developed to assess responsive interactions with newborns, the items were taken specifically from teaching and feeding tools of the University of Washington and responsive interactions by the University of Toronto. The present study conducted in Pakistan investigated the 'responsive interaction' of newborn mothers who have visited the tertiary health care setting by using the SRIS. The 20-item SRIS has good psychometric properties that are consistent with the findings of other scales used to assess caregiver-child interaction.[14,15] The current SRIS has high internal consistency and overall strong reliability that is 0.83, the other scale found similar results and internal consistency of the scales on samples from Turkey and the United States.[16]

The parenting dimensions can be negative and positive, negative attributes can be parental rejection, intrusiveness, hostility, and harsh disciplinary practices, therefore positive attributes include showing love, affection, comfort, and positive interaction with the child.[17-19] Positive attributes of child rearing are related to positive child development outcomes and child learning however negative parenting may lead to a number of behavior problems and low well-being.[20]

A study conducted in Pakistan found that 23% of children are living in a home environment that is not conducive to child development and children are at risk of delayed development.[21] The SRIS has been designed as a valuable child nurturing measure that can predict positive child outcomes. Certainly, the items included in the SRIS have been chosen as representative of responsive interaction that is also aligned with theory and practices related to child nurture. The SRIS captured mainly the four main attributes of responsive interaction that include, child handling, interaction with the child, comfort, and engagement, which are also consistent with theory and other attributes included in other scales.[22]

The current SRIS has simple items that are easy to administer or can be self-rated and require approximately 10-15 min to complete. The scoring is based on a dichotomous scale 'yes or no' category that make SRIS easy and quick as compared to other observational scales that require complex ratings that cannot be used without proper training.[23,24] A higher score represents higher responsiveness interaction.

Given that the study also has some limitations, all the study participants were mothers; therefore, the study results cannot be generalized to other caregivers because after birth newborn babies enter into a social network that is made up of both parents mother, and father, grandparents, siblings, and extended family all of them significantly influence the infant development sleep adjustment and behavior regulation.[25,26] Another limitation is that the study was conducted in a tertiary health care setting only, so in the future other settings such as primary health care, home, and childcare settings should be included and SRIS needs to validate in a variety of other settings.

Limitation

Moreover, the current study has not explored the socio-economic status of the respondents and the gender of the child, however gender of the child is an important predictor for social interaction.[27] Therefore, more research is needed with a larger sample to examine the relationship between child gender, socioeconomic status of the caregiver, and responsiveness interaction. Although the majority of the study population was educated, validation on another subgroup of the population with different characteristics could extend the validity of the SRIS.

CONCLUSION

Early responsive caregiver-child interaction is crucial for child development. The current SRIS is a self-report easy and quick measure to assess responsive interaction among newborns and caregivers having good validity and reliability. This can be used in health care and community settings to assess maternal responsiveness and parent-child interaction, similarly, can be used to evaluate the effect of any parenting intervention as used in other studies. More research is needed on the sample of other caregivers and testing of the tool in a variety of settings as compared to health facilities.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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APPENDIX

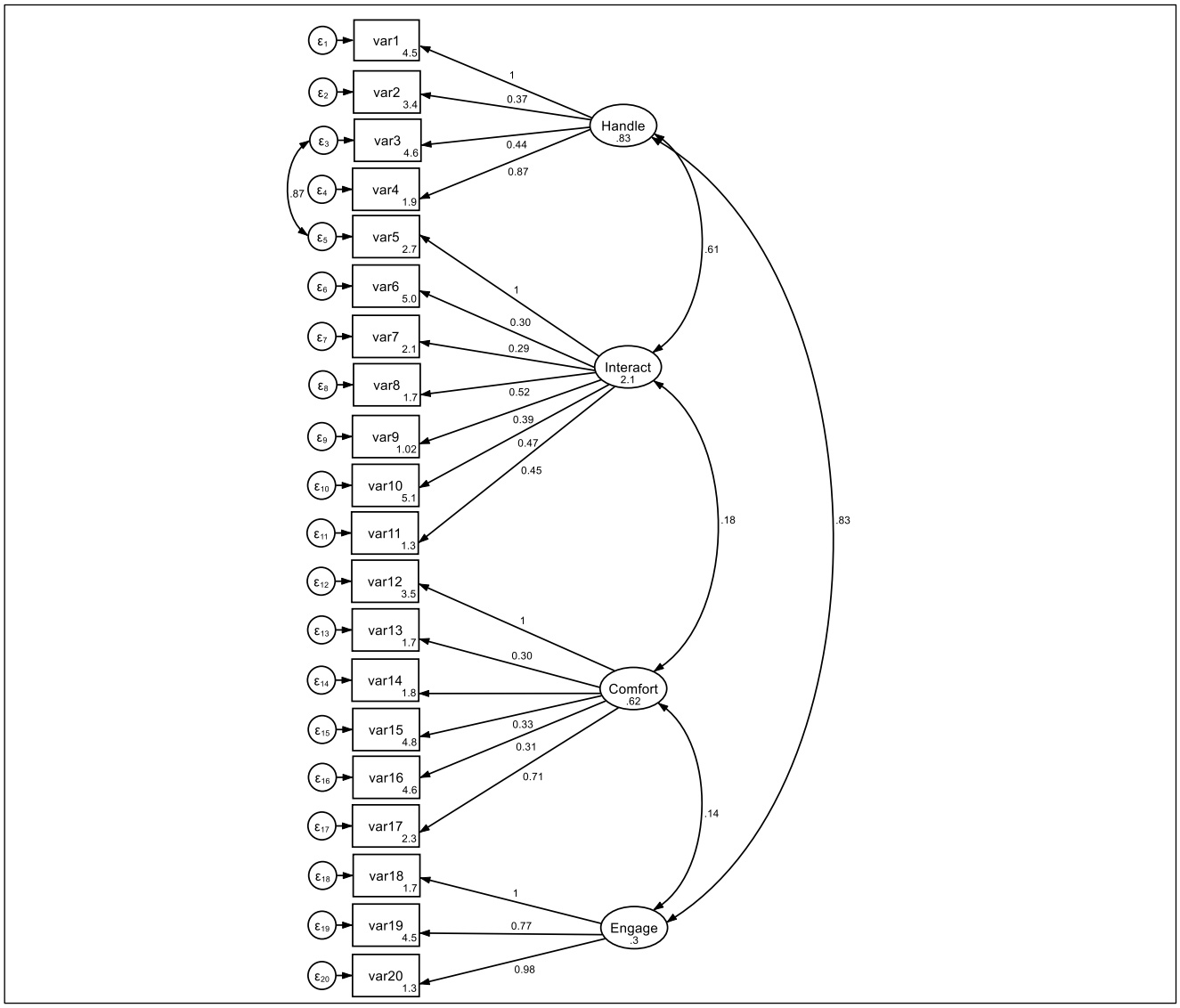

Figure 1: Confirmatory factor analysis for the SRIS.