Summary
Maternal Sensitivity Scale: Validity and Reliability Studies

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Mother-child interaction is important for children's social, emotional, and cognitive development (e.g. Bakermans-Kranenburg, & van IJzendoorn, 2006). One of the critical factors for a healthy mother-child interaction is maternal sensitivity which is defined as being aware of the child's needs and cues, interpreting these needs and cues correctly, and responding to them promptly and appropriately (Ainsworth, Blehar, Waters, & Wall, 1978). In addition, mothers' synchrony with the child's emotional state, meeting the child's physical and psychological needs, and reciprocal interaction between them are considered as among the most important indicators of maternal sensitivity (Bowlby, 1969).

In the literature, there are several methods to measure maternal sensitivity. Some of these methods depend on the mothers' self-report (Han, 2002). However, self-report is not an objective method due to social desirability issue; so observations are preferred to assess maternal sensitivity. The first observational method was developed by Ainsworth and colleagues (1978). This measure assesses mothers' sensitivity to the child's cues in a structured observational procedure. Based on Ainsworth's method, other observational methods have been developed (Coppola, Vaughn, Cassibba, & Costantini, 2006). In these measures, Likert-type scales (Mills-Koonce et al., 2007) or card sorting techniques (Pederson & Moran, 1995) are used. In recent years, card sorting technique has been commonly used, and Maternal Behavior Q-Sort (MBQS; Pederson & Moran, 1995) is one of them assessing mothers' sensitivity based on 2-4-hours observation in the home setting of participants. Researchers spend 2-5 hours for each mother-child observation along with the coding procedure, which makes MBQS inconvenient to use in research. Therefore, a 25-item short-version of MBQS based on 10-minute observation was developed by Tarabulsy and colleagues (2009). There are some limitations of card sorting meth-

od, as well. It is kind of a forced method leading methodological problems since the distribution of each card into groups needs to be equal and dependent on each other (Bailey, Bisceglia, Roche, Jenkins, & Moran, 2009). In addition, there is an extensive training needed to assure the interrater reliability. Therefore, in the short version of MBQS, the card sorting method may not be appropriate. Considering these limitations, a new measure including fewer items without a card sorting method is needed.

In the current study, the items of MBQS are shortened and adapted into a scale format, and Maternal Sensitivity Scale (MSS) is generated. In this process, mother behaviors are described with observable examples. In addition, some of these examples are enriched with culture specific mother behaviors considering the cultural differences in mothers' behaviors (Durgel, Leyendecker, Yagmurlu, & Harwood, 2009). MSS is aimed to assess maternal sensitivity based on the observation of child-mother dyads. In this study, factor structure, validity, and reliability of MSS were examined. MBQS was used to assess concurrent validity, and attachment security and mothers' education level were used to test criterion validity of MSS. It was hypothesized that MSS will have high internal consistency, and it will be positively associated with MBQS, attachment security, and mothers' education level.

Method

Participants

The participants of the study were 120 mother-child dyads. The age range of children were 18-36 months (*M* = 26.43, *SD* = 5.45), and 47% of them were girls (*N* = 56). The age range of mothers were 23-44 (*M* = 32.59, *SD* = 4.14). Of the mothers, 18% (*N* = 21) had elementary school, 23% (*N* = 27) had high school, 45% (*N* = 63) had university, and 15% (*N* = 18) had graduate education.

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Materials

Demographic Information Form. It is included information regarding age, education level, occupation, income, and marital status of mothers.

Maternal Behavior Q-Sort (MBQS). MBQS was developed by Pederson and Moran (1995), and adapted into Turkish by Sümer, Sayıl, and Berument (2016). MBQS is composed of 90 items assessing mothers' sensitivity. The validity studies of the Turkish version showed that it was a valid measure (Sümer et al., 2016). MBQS is based on card sorting method. The items are sorted into 9 piles based on the frequency of mothers' behaviors; each pile includes 10 cards. The profile of each mother is compared with a prototypical ideal mother, and each mother has a sensitivity score ranging between "-1" and "+1".

Turkish Toddler Attachment Sort-60 (TTAS-60). Toddler Attachment Sort-45 was developed to assess children's attachment patterns (Bimler & Kirkland, 2002; Kirkland, Bimler, Drawneek, McKim, & Scholmerich, 2004). The validity study of TAS-45 was completed by Spieker, Nelson, and Condon (2011). In the Turkish version, the items of TAS-45 were translated into Turkish, and additional items were added (Berument & Sümer, 2013-2017). The profiles of Turkish version that reflect attachment types were compared with the original version through Multidimensional Scaling analysis, and the two versions were found to be highly overlapping.

In this measure, after an hour observation, the observers sort 60 items into three piles (less applicable, more applicable, and unsure/unobserved), as each group having at most 25 items. Then the items sorted into "less" and "more" piles are sorted again into two piles based on the applicability to the child without any limitation. Based on this sorting, scores for four attachment types (anxious, secure, avoidant, and disorganized) are obtained for each child.

Maternal Sensitivity Scale (MSS). This scale was generated based on MBQS (Pederson & Moran, 1995) aiming to assess mothers' sensitivity in the interaction with their 18-36-month-old children. Of the 90 items, 35 items were chosen among which are reflecting different aspects of sensitivity, easily observable, so can be objectively coded. Examples for specific maternal behaviors were added to items to make them more concrete. Some of these examples reflect culture specific mother behaviors. After coding 10 videos, the number items were reduced to 29 since some of them could be misunderstood or overlapping. The items were coded through a 3-point Likert type scale (0 = not defining the mother, 1 = somewhat defining the mother, 2 = absolutely defining the mother, NA = not applicable).

Procedure

This study was completed within the scope of TUBITAK funded project. The ethical approval was taken from the University Ethical Committee. The data were collected through 45-60 minute home visits by two researchers. The home visit procedure was videotaped. During the visit, Mother-Child Interaction Observation Procedure (Bahtiyar, 2015; Berument & Sümer, 2013-2017) was followed. The procedure included free-play, separation-reunion, solving a puzzle, feeding the child with a snack, playing with a robot/clown (as a low level stress provoking situation), dressing a t-shirt to the child, and completing the scales. After the home visit procedure, mother-child interactions are coded by two researchers separately. Training for interrater reliability was completed through 10 videos. Of the 110 remaining videos, first-coder coded all the videos, and three second-coders coded approximately 35 videos for each. The videos with interrater reliabilities lower than .70 were recoded as consensus codes. TTAS-60 and MSS were coded simultaneously immediately after watching the videos. MBQS coding was completed by a separate coder who had training for MBQS.

Results

Preliminary Analysis

The interrater reliability analyses of MSS was tested through r_{wg} method (James, Demaree, & Wolf, 1984). The cutoff point was determined as .70, and 15 videos were recoded due to low interrater reliability among coders.

Factor Analysis

Factor analysis was conducted on the 29 items of MSS. Scree plot offered a 3-factor structure. Direct Oblimin rotation was chosen since the items were related. Kaiser-Meyer-Olkin measure was .88, and Bartlett's Test of Sphericity was significant ($\chi2(406, N = 120) = 2018.67, p < .001$). These results showed that the data was appropriate for factor analysis.

Three factors explained 51.38% of the total variance. The first factor explained 35.27%, the second factor explained 10.07%, and the third factor explained 6.04% of the variance. In the first factor, there were 14 items, and it was named as "support/encouragement". The factor loadings ranged between .46 and .84. Two items (item 7 and 22) were excluded due to cross loading and being theoretically inappropriate to the factor. The second factor included 8 items, and named as "responsiveness". The factor loadings ranged between .52 and .78. The third factor included 7 items, and named as "warmth". The factor loadings ranged between .49 and .71. The Cronbach's alpha values were .91, .80, and .78,

respectively. The internal consistency of the whole scale was .92. The correlation analyses showed that support/encouragement was positively related to responsiveness ($r = .47$, $p < .001$) and warmth ($r = .54$, $p < .001$). In addition, responsiveness was positively associated with warmth ($r = .53$, $p < .001$).

Split-half reliability of MSS was tested on randomly selected 14 and 13 items. The Pearson correlation among the two half was .73, and Spearman-Brown correlation was .84. The internal consistency of the first half was .89, and the second half was .82. They showed that the items of the scale could be considered as a whole.

Validity Studies

The concurrent validity of the scale was tested with MBQS based on 30 videos. The correlation between MSS and MBQS was .67 ($p < .001$); showing that the scale had concurrent validity. The criterion validity of MSS was tested with secure attachment and mothers' education level. MSS was positively correlated with secure attachment ($r = .42$, $p < .001$) and mothers' education level ($r = .44$, $p < .001$). The results indicated that MSS had criterion validity.

Discussion

In the current study, MSS was developed based on the items of MBQS to evaluate maternal sensitivity quickly. Within the scope of the study, the factor structure of the scale was examined, and a three-factor structure have been observed. The factors were named as "support/encouragement", "responsiveness", "warmth". The final version of the scale consisted of 27 items, and the internal consistencies of the subscales were adequate.

The concurrent validity of the scale was tested with MBQS which has been commonly used in the literature (e.g. Bernier, Carlson, & Whipple, 2010). The high correlation among the scales indicated that MSS had concurrent validity. The criterion validity of MSS was tested with attachment security; and their significant correlation confirmed criterion validity of MSS. The association between maternal sensitivity and secure attachment has been shown in various studies in the literature (i.e. Behrens, Parker, & Haltigan, 2011; Moran, Lindsey, Evans, Tarabulsy, & Madigan, 2008). Contrary to previous studies, in this study, the correlation between MBQS and secure attachment was not significant. This unexpected result can be due to low sample size in the analysis.

There are some limitations of the study. Firstly, due to the difficulties of data collection in home visits, the sample size of the study was limited. Secondly, since the interactions of mother-child dyads were videotaped, mothers might have behaved different than their usual ways due to social desirability, nevertheless it is still beneficial to observe mother-child relationship in their homes despite its limitations (Forehand & McMahon, 1981; Mash & Barkley, 1986).

The study has certain strengths. When the scale is formed, culture specific aspects of maternal sensitivity was considered; and specific examples were added to the items to make easier to observe. In addition, the sample consisted of participants from different socioeconomic backgrounds and from different cities in Turkey; which increases its generalizability. Finally, MSS was evaluated using a Likert type scale rather than card sorting method which saves time, easier to code, thus, require shorter training.

In further studies, the association of MSS can be tested with children's other developmental outcomes such as emotional and behavioral development. In this study, the age range of children were 18-36 months. If necessary, the age range can be extended to 18-40 months. However, younger than 18 months may not be appropriate since their language and motor developmental levels may make some items of MSS difficult to be observed.

In conclusion, the findings indicated that Maternal Sensitivity Scale is a reliable and valid scale to assess maternal sensitivity. It is suggested to be used in future studies since it is practical and appropriate to use in mother-child dyads from different socioeconomic backgrounds.