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Development of the Individualised Developmental Care Knowledge and Attitude Scale

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ABSTRACT

Background: There is a need for a valid and reliable scale to determine the individualised developmental care levels of nurses who provide care for preterm newborns.
Aims: To develop the Individualised Developmental Care Knowledge and Attitude Scale for nurses who provide care to preterm newborns and to evaluate its validity and reliability.
Methods: This methodological study was performed with 260 nurses who provide care for preterm newborns in neonatal intensive care units. The content validity of the research was evaluated under the guidance of professionals working in the pediatric field. Collected data were analysed using values, percentage, mean, standard deviation, correlation analysis, Cronbach's alpha reliability coefficient and factor analysis methods.
Results: The total Content Validity Index for all items was found to be 0.930. The result of Bartlett's test of sphericity ($x^2 = 4691.061$, $p = 0.000$) was significant, and the KMO (Kaiser-Meyer-Olkin) measure of sampling adequacy was 0.906. The fit indices for confirmatory factor analysis were $x^2/SD = 4.35$, GFI = 0.97, AGFI = 0.97, CFI = 0.97, RMSEA = 0.057 and SRMR = 0.062. All of the related fit indices were in the accepted range. The Individualised Developmental Care Knowledge and Attitude Scale was developed at the end of the study, and 34 items and four dimensions were identified. The Cronbach's alpha of the full scale was 0.937.
Conclusions: From the results, it can be concluded that the Individualised Developmental Care Knowledge and Attitude Scale is both a reliable and valid measurement tool for determining individualised developmental levels.

1. Introduction

The World Health Organization defines newborns born before 37 weeks of pregnancy as premature/preterm (World Health Organization, 2018). Preterm newborns try to adapt to the extrauterine environment; however, most of their organs and body systems are immature (Cong et al., 2017; Lavallée et al., 2019). Therefore, preterm newborns are at risk of developing various complications and health issues (Cheong et al., 2020; Woythaler, 2019).

Preterm newborns in neonatal intensive care units need individualised developmental care to support their adaptation to the extrauterine environment. These can include ensuring the provision of food, initiating appropriate feeding attempts without wasting time and maintaining their respiration without clinical assistance (Als, 2009; Griffiths et al., 2019; Mosqueda et al., 2013; Sood et al., 2016).

The Newborn Individualised Developmental Care and Assessment Program (Guide) was developed by Heidelise Als in 1986 to provide comprehensive evaluation of the newborn (Als, 1986; Symington & Pinelli, 2002). When it comes to short and long-term care of high-risk/preterm newborns, NIDCAP focuses on the health professionals and their families who are responsible for their care. It has a positive impact on development process by enabling the observation and assessment of newborns in a controlled physical environment such as the neonatal intensive care environment (Als et al., 2003; NIDCAP Program Guide, 2021).

Individualised developmental care applications positively affect health and applied care quality. In particular, they help accelerate the neurodevelopmental functions of preterm newborns and physiological healing. The application of individualised developmental care also reduces the length of hospital stay, leading to a decrease in healthcare costs (Als, 2009; Burke, 2018; Kiechl-Kohlendorfer et al., 2015; Moody et al., 2017; Mosqueda et al., 2013). Therefore, it is essential to provide preterm newborns with supportive nursing care in neonatal intensive care units (Als, 2009; Hendricks-Muñoz & Prendergast, 2007; Mosqueda

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et al., 2013). Neonatal nurses play an important role in substantiating individualised developmental care applications and are often the responsible parties delivering the care (Coughlin, 2021; Park & Kim, 2019). To perform better in neonatal developmental care, newborn nurses must increase their awareness and understanding. If nurses' knowledge and attitudes concerning developmental care are understood, negative attitudes can be modified and positive ones can be guided by find accurate information. By this way, this is an effective step toward ensuring good and desirable nursing care and performance (Milette et al., 2017; Peters et al., 2009). For this reason, there is a need for a standard measurement tool that can be used to evaluate the process of individualised developmental care applied by nurses dealing with newborns. To obtain objective results, it is crucial to use a measurement tool that has been tested for validity and reliability. Therefore, there is a need to develop a scale for the evaluation of individualised developmental care applied by nurses in the neonatal field. The aim of this research was to develop the Individualised Developmental Care Knowledge and Attitude Scale for nurses who are caring for preterm newborns and to determine the scale's validity and reliability.

The aim of this research is:

1. Developing the scale of knowledge and attitudes toward individualised developmental care.
2. Examining the validity and reliability of the scale.

2. Design and methods

2.1. Type of research

The research was conducted methodologically.

2.2. Population and sample

The research population comprised 327 nurses who are neonatal nurses in four hospitals with neonatal intensive care units between July and December 2020. It has been reported that while developing a scale, it is necessary to utilize a participant group that is 5–10 times larger than the number of items to be included in the scale (Esin, 2020; Karakoç & Dönmez, 2014; Yong & Pearce, 2013). Thus, a sample of 260 nurses working in the neonatal intensive care units of specific hospitals was adequate to test the candidate items (43 items) of the Individualised Developmental Care Knowledge and Attitude Scale. Sixty-seven nurses who were included in the pilot application, did not want to participate in the study, did not complete the data collection tools, were on leave or on a report, and did not care for preterm newborns were excluded from the study. The study's inclusion criteria included working as a nurse at NICU for at least six months, caring for preterm infants, and voluntarily participating in the study.

2.3. Data collection tools

The research data were collected using the "Introductory Information Form" and the "Individualised Developmental Care Knowledge and Attitude Scale".

2.3.1. Introductory Information Form

This form was used to collect the personal and occupational demographic data of the nurses. In this form, there were 15 questions about age, gender, family type, educational status, marital status, income status, years of occupational experience and individualised developmental care.

2.3.2. Individualised Developmental Care Knowledge and Attitude Scale

This scale was developed to determine the individualised developmental care levels of nurses taking care of preterm newborns participating in neonatal intensive care units. "Individualised Developmental Care Knowledge and Attitude Scale" consists of 4 sub-dimensions and 34 items. Sub-dimensions were termed "nursing care", "family-centred care", "creating a healing environment" and "individualised developmental care practices". The scale is rated at 4 Likert type. Each expression on the Likert type scale was scored from 4 to 1 (4 = Regularly, 3 = Often, 2 = Sometimes and 1 = Never). There is no item to be reverse scored in the scale. Cronbach's alpha coefficient for the Individualised Developmental Care Knowledge and Attitude Scale is 0.937. The sub-dimensions of the Individualised Developmental Care Knowledge and Attitude Scale; The "nursing care" sub-dimension is 5 items and the Cronbach alpha coefficient is 0.882, the "family-centred care" sub-dimension is 9 items and the Cronbach alpha coefficient is 0.897, the "creating a healing environment" sub-dimension is 9 items and the Cronbach alpha coefficient is 0.830, the "individualised developmental care practices" sub-dimension is 11 items and the Cronbach alpha coefficient is calculated as 0.871. As the score obtained from the scale increases, the level of individualised developmental care of nurses increases.

2.4. Scale development process

When developing a new scale, certain procedures must be followed. First, it is crucial to conduct a literature review to gather and become familiar with the relevant existing research. The initial item pool should be three times greater than the target item count (DeVellis & Thorpe, 2021; Karakoç & Dönmez, 2014). In this study, an item pool of 148 candidate statements regarding the subject was created. It was submitted to the opinions of field experts using the Lawshe technique (Lawshe, 1975). In line with suggestions coming from field experts, some changes were applied, such as excluding similar items, altering some statements, and decreasing item numbers. Then 43 new item pool was designed and represented to the views of 11 pediatric nursing experts. After seeking the views of experts and making the necessary changes, the draft instrument was prepared. The initial implementation and sampling group can then be determined, and a pilot application is conducted.

2.5. Pilot application

A draft scale was distributed to 15 nurses for pilot application purpose. Participants were instructed to circle difficult-to-understand items. The items that contained the responses "unintelligible" and "subject to change" were modified to create the final 43 items. Nurses who have been piloted are not included in the research universe. Additionally, it was determined that roughly 20–25 min was required to answer the scale during the pilot application. In line with the feedback received during the pilot test, corrections were made and data collection stage was started.

2.6. Data collection

Between July and December 2020, data was collected with the participation of 260 nurses who were on sickness and caring for premature babies in the neonatal intensive care unit. The nurses were informed and their permission was obtained prior to data collection. The nurses who provided consent were enrolled in the study. The data collection forms were on paper and filled out by nurses. The data were kept confidential.

2.7. Data analysis

The research data were analysed using the Statistical Package for Social Sciences (SPSS) for Windows 22.0 software and the Lisrel 8.80 package software. Minimum and maximum values, mean, standard deviation, numbers and percentages were used to study variables. Exploratory factor analysis (EFA) was used for the identity construct dimensions and factor loadings. Principal components method was used

as exploratory factor analysis. Varimax rotation was applied. Confirmatory factor analysis (CFA), which has been suggested for confirming the theoretical structure, was assessed by construct validity. The fit indices of the scale were detected. The internal consistency of each construct was evaluated by item-total correlation, the computation of Cronbach's alpha (α) and test-retest analysis. The following tests and analyses were used: skewness and kurtosis for testing normality; the Lawshe technique for content validity; the Kaiser-Meyer-Olkin (KMO) test for EFA; Bartlett's test of sphericity and principal component analysis; a path diagram for CFA; the x^2/SD, GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), CFI (Comparative Fit Index), RMSEA (Root Mean Square Error of Approximation) and SRMR (Standardized Root Mean Square Residual) fit indices; item-total correlation for internal consistency; upper and 27 % lower groups; Cronbach's α coefficient; *t*-test; and test-retest analysis (Büyüköztürk, 2020).

2.8. Ethical principles of the study

Before starting the research, Ethics Committee Approval was obtained for the study from the Clinical Researches Ethics Committee Headquarters of the Ataturk University Faculty of Medicine. Written permission was obtained from the Ataturk University Health Research and Application Center, two hospitals in the Gaziantep Provincial Health Directorate and one hospital in the Şanlıurfa Provincial Health Directorate. The research was conducted under the principles of the World Medical Association (WMA) Declaration of Helsinki. In this research, the informed consent principle, confidentiality, the privacy principle and respect for autonomy were fulfilled.

3. Results

The research findings cover the two main aspects of the development of the Individualised Developmental Care Knowledge and Attitude Scale for nurses caring for preterm newborns: the determination of the content and the construct, and the validity-reliability of the scale.

Demographic Characteristics of Nurses working in Neonatal Intensive Care Unit.

Of the participants, 89.6 % were female, 51.2 % were married and 62.7 % were aged averagely 29. Most respondents (93.1 %) lived in a nuclear family, and 56.9 % had an income that equalled their expenses. Most of the participants had a bachelor's degree (73.5 %), and 83.5 % of respondents worked both day and night shifts. The majority (63.1 %) were pleased to be working in the neonatal intensive care unit. To see there was a range between 83.92 ± 73.43 months of occupational experience, and period of duty in the neonatal intensive care unit was between 62.45 ± 57.39 months.

The majority of the participant nurses (83.8 %) had completed their neonatal intensive care unit training which composes the basics of intensive care. 64.2 % of that training has been in-service training which is gathered from hospital. Almost half (49.2 %) of the nurses received training related to individualised developmental care, and 57.8 % thought their training was sufficient. Of these trainings 38.8 % were of the in-service type.

3.1. Content validity

Interviews with 11 field experts were used to assess the content validity via the Lawshe technique (Lawshe, 1975). The researchers requested the expert groups' view of the elements generated for developing care scale. Content Validity Index (CVI) is computed for all individual items and overall scale. The researcher asked the field experts to rate each scale element in terms of its relationship to the underlying structure. According to the Lawshe test, Content Validity Ratio (CVR) is calculated to determine if an item is required to operate a set of items. For this purpose, the professionals has been asked to give each item a score from 1 to 3 in the form of from essential, useful but not essential, and not necessary. The Content Validity Ratio (CVR) was found to be 0.636 (Ayre & Scally, 2014; Yeşilyurt & Çapraz, 2018). The Content Validity Index (CVI) of the scale items was in the range of 0.636–1.000, which meant that it was not necessary to refine or exclude any items. The total CVI of all items was revealed to be 0.930. The analysis supported the significance of the content validity of all items by showing that CVI values were more significant than the CVRs.

3.2. Exploratory factor analysis

The Individualised Developmental Care Knowledge and Attitude Scale items were subjected to factor analysis to determine construct validity. Before proceeding with the factor analysis, two tests were conducted to generate data for principal component analysis: KMO analysis was used to determine the sample size and Bartlett's test was used to determine the significance between variables. The KMO coefficient must be <0.60 and Barlett's test of Sphericity result must be meaningful ($p < 0.05$) to enable factor analysis (Bursal, 2019). The KMO value was found to be 0.915, and Bartlett's test resulted in $x^2 = 6585.239$ with $p = 0.000$. In light of these results, the data were considered to be appropriate for factor analysis.

The 43 Individualised Developmental Care Knowledge and Attitude Scale items were subjected to principal components analysis to determine the underlying dimensions created by EFA. The scree plot for the Individualised Developmental Care Knowledge and Attitude Scale is shown in Fig. 1.

In alignment with the conceptual framework, items were distributed within four intervening factors. Since item 31 was loaded into two factors, sub-dimensions of eight items (12, 23, 26, 27, 40, 41, 42 and 43) did not correspond to item 31. Thus, the authors decided to remove nine items and reassess the scale. Using Kaiser's Criterion with lambda greater than or equal to one, as well as with examination of the scree plot, 4 components were derived from the data which accounted for 53 % of the variance. The KMO and Bartlett's test values for the revised scale were 0.906 and $x^2 = 4691.061$ ($p = 0.000$), respectively. In deciding the appropriateness of the factor analysis, an anti-image correlation matrix was built, and values on the diagonal were checked. The anti-image matrix value was found to be 0.801 and above. In terms of convergent validity, all ranges meet the expected criteria for factor loads Average Variance Extracted (AVE) and Composite Reliability (CR) supporting the convergent validity of the scale. Discriminant validity is ensured since all AVEs are larger than 0.724.

The standard factor loading estimates should be not <0.30 (Çapık, 2014; Harrington, 2009). As seen in Table 1, all factor loadings were >0.30, and item the distribution fitted the conceptual framework. As a result of these calculations, the underlying dimensions were termed "nursing care", "family-centred care", "creating a healing environment" and "individualised developmental care practices".

The accuracy of the results was then examined using CFA then EFA.

3.3. Confirmatory factor analysis

The fit indices' normal, acceptable and found values for the Individualised Developmental Care Knowledge and Attitude Scale are presented in Table 2 (Çapık, 2014). The model fit indices' values were x^2/SD = 4.35, GFI = 0.97, AGFI = 0.97, CFI = 0.97, RMSEA = 0.057 and SRMR = 0.062. Thus, it can be concluded that all fit indices were within an acceptable range.

As shown in Fig. 2, a four-factor structural path was indicated for the Individualised Developmental Care Knowledge and Attitude Scale. The model was accepted in its original format and no modifications were performed. The estimated factor loadings of the model were between 0.50 and 0.89, and their respective absolute t-values were >1.96.

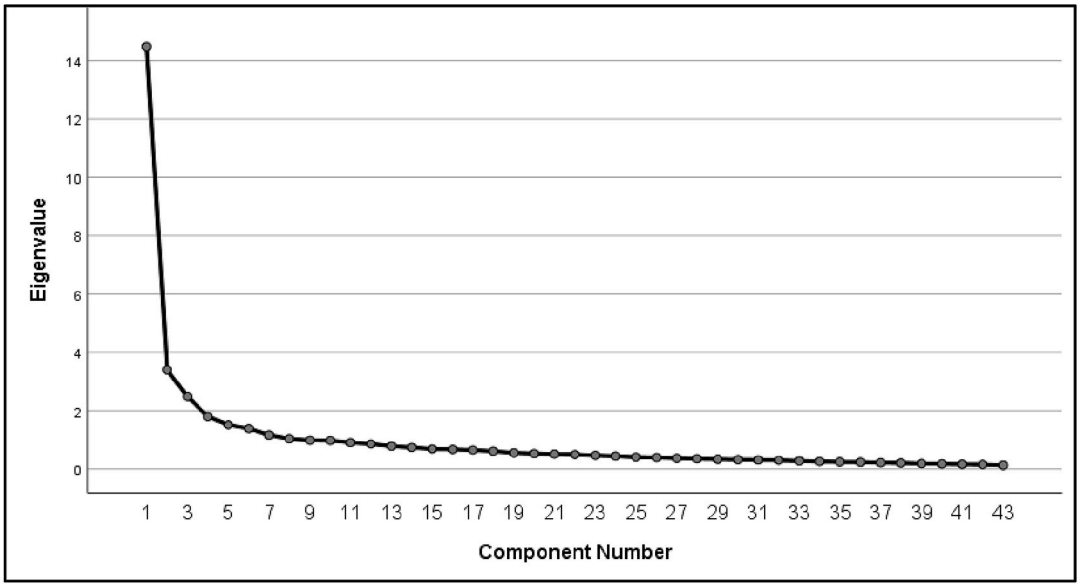

Fig. 1. Individualised Developmental Care Knowledge and Attitude Scale scree plot.

3.4. Internal validity

Cronbach's α of the Individualised Developmental Care Knowledge and Attitude Scale was 0.937, which exceeded the threshold level of 0.7 (Karakoç & Dönmez, 2014). "The nursing care" factor contained nine items and had a Cronbach's α of 0.882. "The family-centred care" factor contained nine items and had a Cronbach's α of 0.897. "The creating a healing environment" factor was measured using nine items, and "the individualised developmental care practices" factor was measured using eleven items. They were both found to be reliable, with respective Cronbach's α of 0.830 and 0.871. The item-total correlation of all items was slightly below 0.35. Since exclusion of an item did not result in significant change, in this phase, no item was excluded from the scale.

The lower and upper 27 % groups of the Individualised Developmental Care Knowledge and Attitude Scale indicated the distinctiveness of the items, and the difference was found to be statistically significant ($p < 0.05$) (Table 3).

The difference between the test-retest results of the of the Individualised Developmental Care Knowledge and Attitude Scale was found to be statistically significant ($p < 0.05$) (Table 4). The first and second measurements demonstrated that there was a medium level ($r = 0.712$) and positively correlated relationship between them.

Minimum, maximum and mean values for the participants' scores on the Individualised Developmental Care Knowledge and Attitude Scale were calculated. The mean score was 113.24 ± 14.14, and scores ranged from 76 to 136. As the total score and sub-scores of the scale increase, the individualised developmental care level of the nurses increases. The highest score was recorded for the item "I start kangaroo mother care (skin-to-skin contact) between mother and baby as soon as possible". The lowest score was recorded for the item "I give specific and clear briefings to families on all occasions about the health condition of preterm newborns."

4. Discussion

Scale development policies should be applied sequentially when creating a new scale. First, a relevant literature review should be conducted. The desired condition should be clearly determined. Once you have decided what a scale will measure, an item pool is created for that topic. The form of measurement is determined and presented to the field experts of the item pool. The clarity and authenticity of the items are evaluated by the field experts. The scale is given its first shape, then a sampling group is determined and a pilot test is performed. After the pilot test, the scale should be reviewed and finalized. Data is collected and item analysis begins to process. The scale is completed when validity and reliability are conducted (Boateng et al., 2018; DeVellis & Thorpe, 2021; Heale & Twycross, 2015; Morgado et al., 2017). In this study, an item pool of 148 candidate statements regarding the subject was created and submitted to the opinions of field experts. Following certain changes based on the feedback of the experts, the 43-item pool was reformulated and presented to the experts. The draft scale was decided to be a four point Likert type and a pilot test is already done. In line with the feedback received during the pilot test, corrections were made and data collection stage was started.

When developing a new scale, the two of the most important components are the validity and reliability of the scale (Vakili & Jahangiri, 2018). Firstly, the content validity was conducted. The field experts' opinions were obtained for the validity of the scale. These qualitative data from field experts needed to be converted into quantitative data. This was achieved by calculating the Content Validity Ratio (CVR) and the Content Validity Index (CVI). If the CVI value is greater than the CVR value (CVI > CVR), it indicates that the content validity of scale items is statistically significant (Ayre & Scally, 2014; Taherdoost, 2016; Yeşilyurt & Çapraz, 2018). The item pool, consisting of 43 statements, was presented to the experts of 11 fields. Using the Lawshe technique, CVR value is determined to be a minimum of 0.636 (Ayre & Scally, 2014; Yeşilyurt & Çapraz, 2018). The total content validity indices (CVI) for all items of the scale were determined as 0.930. It has been concluded that since CVI is greater than CVR, the content validity of the scale is statistically significant.

Before the factor analysis can be made, it is necessary to examine the Kaiser Meyer Olkin (KMO) analysis and the Bartlett's test results, which indicates the sampling adequacy. The KMO coefficient must be <0.60 and Barlett's test of Sphericity result must be meaningful ($p < 0.05$) to enable factor analysis with sample data (Bursal, 2019). In the study, KMO value is 0.906, Bartlett test result is $x2 = 4691.061$, $p = 0.000$. These values show that the sample size is adequate for factor analysis.

The structure's validity should be evaluated to see whether the measuring instrument accurately measures a theoretical property. This is statistically accomplished through factor analyses. Two distinct factor analyses are utilized for this purpose: explanatory and confirmatory (Bursal, 2019; Esin, 2020). The study used scale development concepts to ascertain the scope's and structure's validity.

In ensuring the reliability of a scale, the internal consistency and

Table 1
Factor analysis of Individualised Developmental Care Knowledge and Attitude Scale items.

Item	Factor loading	Factor name	Explained variance (%)
I pay attention to proof-based applications while planning nursing care.	0.724	Factor 1 Nursing care	10.541
I plan nursing care according to the developmental needs of each preterm newborn.	0.789		
I plan nursing care according to the gestational week of each preterm newborn.	0.772		
I plan nursing care according to the postnatal week of each preterm newborn.	0.792		
I plan nursing care according to the birth weight of each preterm newborn.	0.731		
I accept the parents as members of the caring team and cooperate with them.	0.657	Factor 2 Family-centred care	15.177
I allow parents to actively participate in making decisions about their babies.	0.748		
I give specific and clear briefings to families on all occasions about the health condition of preterm newborns.	0.774		
I persuade parents to share their emotions and thoughts.	0.712		
I encourage and support parents to play a role in preterm newborn care.	0.761		
I educate parents about topics such as preterm newborn care, safety, nutrition and vaccination.	0.649		
I provide support for mothers to gently touch, fondle and talk softly to their babies to build a sense of trust in preterm newborns.	0.568		
I start kangaroo mother care (skin-to-skin contact) between mother and baby as soon as possible.	0.587		
I support the mother-baby connection by encouraging the mother to massage/ therapeutically touch her baby.	0.675		
I take control of environmental stimuli (e.g., light, sound, scent, heat and contact) to facilitate the development of each preterm newborn and their adaptation to extrauterine life.	0.471	Factor 3 Creating a healing environment	12.437
I create a lowlight environment by covering the incubator with appropriate material to increase the newborns' sleeping time and decrease their stress and crying time.	0.523		
I minimise the light in the of unit at certain hours to create a day-night cycle for preterm newborns.	0.460		
I decrease high volume speech in the unit to prevent loud noise in the unit.	0.681		
I decrease the volume of equipment alarms to prevent loud noise in the unit.	0.513		
I avoid touching and bumping the incubator during procedures to prevent internal noise in the incubator.	0.729		
I avoid using solutions with unpleasant/sharp scents (e. g., alcohol, perfume, betadin, antiseptic and skin solutions) as they can provoke physiological stress (e.g., sneezing, scowling and crying).	0.502		
I control the body temperature of preterm newborns according to pregnant state and adaptation capacity.	0.691		
I touch less and observe more in order to not cause panic in preterm newborns.	0.672		
I position the preterm newborn in an environment that is similar to the intrauterine environment to increase the comfort of the baby.	0.444	Factor 4 Individualised developmental care practices	15.002
I carefully observe pain and stress indications in preterm newborns.	0.624		
I carefully observe the positions in which preterm newborns are stressed and comfortable.	0.612		
I use a pain evaluation scale that is appropriate for gestational age to measure both behavioural and physiological responses to pain in preterm newborns.	0.511		
I carefully observe behaviours that preterm newborns use to calm themselves (e.g., hand-to-mouth reflex, hand-to-face reflex, sucking, holding finger and flexion of extremities).	0.626		
I apply certain techniques to calm preterm newborns, such as wrapping, surrounding with foldable bumpers, teat, placing a blanket on their legs and holding their feet after care.	0.623		
I apply all non-emergency care and procedures while the preterm newborn is awake.	0.721		
I arrange initiations and practices according to the newborn's sleep patterns.	0.608		
I integrate practices that support sleep (e.g. bath, massage, wrapping, kangaroo care) into the daily care plan of preterm newborns.	0.678		
I apply nursing initiations collectively by dividing resting periods into 3–4 h.	0.627		
I observe the physiological, behavioural and situational features each preterm newborn during every	0.613		

(*continued on next page*)

Table 1 (*continued*)

Item	Factor loading	Factor name	Explained variance (%)
initiation (before, during and after procedures).			
Total scale	–		53.157

Table 2
Fit index values (Çapık, 2014).

Index	Normal value	Accepted value	Values obtained from data
x^2/SD	<2	<5	4.35
GFI	>0.95	>0.90	0.97
AGFI	>0.95	>0.90	0.97
CFI	>0.95	>0.90	0.97
RMSEA	<0.05	<0.08	0.057
SRMR	<0.05	<0.08	0.062

rigidity are benefited. The internal consistency coefficient must be calculated in order to ascertain the consistency of the measurement equipment (Bursal, 2019; Esin, 2020; Tang et al., 2014). If the scale contains a rating, i.e. if there are more than two score categories, the most commonly used internal consistency coefficient of Cronbach Alpha should be employed (Bursal, 2019; Pallant, 2020). The Cronbach Alpha Coefficient is a numeric value between 0 and 1 (Pallant, 2020). The Cronbach Alpha coefficient was obtained, which represents the internal consistency of the Individualised Developmental Care Knowledge and Attitude Scale. The coefficient of internal consistency is calculated to be 0.937. As a result of this, it can be concluded that the Individualised Developmental Care Knowledge and Attitude Scale is perfectly reliable.

The test-retest method is the most frequently used method to measure the reliability of a construct over time. The test-retest method aims to evaluate changes in a construct over time and the relationship between two applications. To determine test-retest reliability, the correlation coefficient between the two applications is calculated, and the value should be at least 0.70 (Esin, 2020). In this study, the test-retest results were statistically significant, and the relationship between the two measurements was moderate and positively associated ($r = 0.712$, $p = 0.000$) (Table 4). The test-retest analysis results showed that the measurements will remain consistent over any brief periods in which the Individualised Developmental Care Knowledge and Attitude Scale is applied.

In this study, the "Individualised Developmental Care Knowledge and Attitude Scale" was developed. The items of this scale were created based on the fundamental components of individualised developmental care that Coughlin et al. (2009) and Altimier and Phillips (2016) mentioned in their studies (Altimier & Phillips, 2016; Coughlin et al., 2009). It takes advantage of individualised developmental care, a comprehensive care program, to maximize the neurological development of the newborn (Sood et al., 2016). Nurses have important roles and responsibilities for the successful implementation of individualised developmental care (Park & Kim, 2019). Therefore, a measurement tool was needed to evaluate the knowledge and attitudes of nurses in individualised developmental care. As seen in the findings, this scale is a valid and reliable measurement tool for nurses in neonatal intensive care units who provide care for preterm newborns to evaluate the level of knowledge and attitude toward individualised developmental care. The scale developed in this study consists of 4 sub-dimensions and 34 items. These sub-dimensions focus on the core areas of individualised developmental care, including "nursing care", "family-centred care", "creating a healing environment" and "individualised developmental care practices". Ranked from "Never = 1" to "Regularly = 4", this scale measures the knowledge and attitudes of nurses' individualised developmental care and indicates the frequency of items being applied. Soleimani et al. (2016) developed a 76-item scale consisting of 5 sub-dimensions to evaluate developmental care in the neonatal intensive care unit in Iran. Rated between "Not important at all=1" and "definitely important = 5", this scale helps measure the items' importance. This scale developed by Soleimani et al. (2016) is in line with the scale developed by researchers of this article regarding the subject matter, but it varies in measurement (Soleimani et al., 2016). Kim and Shin (2016) developed the Developmental Support Competency Scale for nurses caring for preterm infants. This scale consists of six sub-dimensions out of 19 items and is made up of four points Likert type. The Cronbach α coefficient of scale developed by Kim and Shin (2016) is 0.83, and our study calculated Cronbach's Alpha coefficient as 0.937. Kim and Shin (2016) developed a scale that addresses the same issue as our scale but is developed in Korean (Kim & Shin, 2016). On the other hand, our work is written in universal English, and we think it will make it easier for researchers to read and use. They differ in this respect. Shrestha and Bista (2021) developed a measurement tool for nurses to evaluate preterm baby care applications in newborn care units (Shrestha & Bista, 2021). A preliminary test was performed for 30 neonatal intensive care unit nurses. Although it seems relevant in terms of the subject, it differs from our work as part of the validity and reliability process. Our study conducted structural equation modeling using the Lisrel software. In addition, validity and reliability were calculated through statistical tests such as KMO and Bartlett tests, fit indices, upper and 27 % subgroups, Cronbach's α coefficient, *t*-test, and test-retest analysis.

This scale will aid in determining the developmental care levels of nurses caring for preterm neonates on an individual basis. It may be planned for hospital and nursing service administrators to establish the level of individualised developmental care required of nurses working in neonatal critical care units and to give training in this area. It may be recommended to build programs to improve nurses' knowledge and attitudes about individualised developmental care and to evaluate the results using the individualised developmental care knowledge and attitudes scale.

4.1. Limitations of the study

To achieve proper sampling, the research was conducted with nurses in four neonatal critical care units that care for preterm infants. The trustworthiness of nurses' responses is contingent upon the correctness of the information provided.

5. Conclusion and implications for practice

The findings suggest that the Individualised Developmental Care Knowledge and Attitude Scale is a valid and reliable tool for determining the individualised developmental care levels of nurses who care for preterm newborns. Given that the scale has not previously been used in clinical practice, it is critical to incorporate it into future research on individualised developmental care and to evaluate its implementation outcomes. This scale is anticipated to be beneficial for neonatal intensive care providers since it will allow them to objectively assess nurses' knowledge and attitudes toward individualised developmental care. Scale is easily adaptable for other communities due to its universal elements and user-friendly structure.

Explanations

This research was written in the format of a doctoral thesis conducted at Ataturk University, Health Sciences Institution, Department of Child Health and Diseases Nursing.

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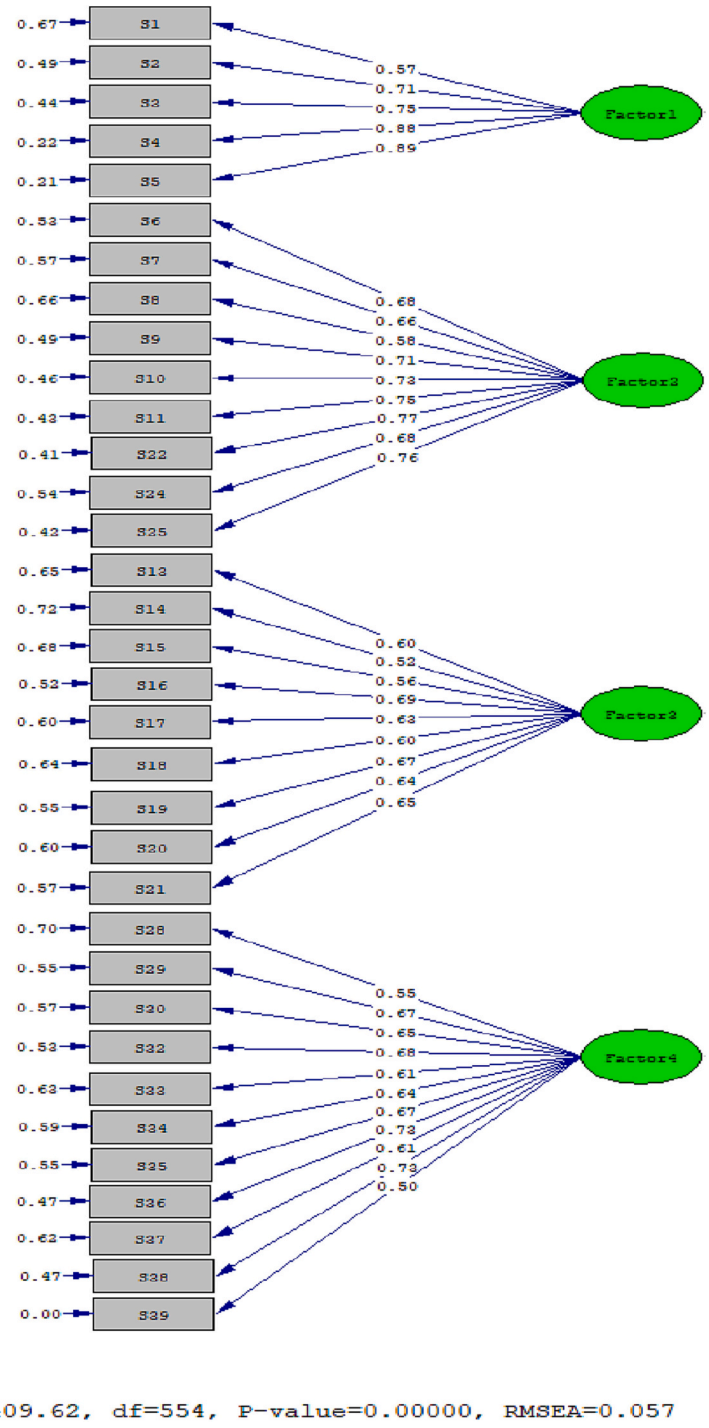

Fig. 2. The final structural model showing the path results.

Table 3
Comparison of upper and lower 27 % groups.

	N	Mean	SD	Significance
Lower 27 %	70	40.15	3.64	t = −44.868
Upper 27 %	70	76.59	5.75	p = 0.000

Table 4
Comparison of test-retest results.

		Retest (second measurement)
Test (first measurement)	r	0.712
	p	0.000

CRediT authorship contribution statement

Kamile Akça: Conceptualization, Methodology, Software, Writing – review & editing, Visualization, Investigation, Validation, Supervision.

Fatma Kurudirek: Conceptualization, Methodology, Software, Writing – review & editing, Visualization, Investigation, Validation, Supervision.

Declaration of competing interest

The authors clarify that they have no conflicts of interest and guarantee that the research has not been published before and is not under consideration for publication elsewhere.

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