



Assessing pragmatic competence in 18-to 47-months-old Norwegian children. A pilot study with the Language Use Inventory (LUI)

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ABSTRACT

The aims of the present study were to carry out a first evaluation of the psychometric qualities of the Norwegian adaptation of the Language Use Inventory (LUI) and to investigate pragmatic language development and possible gender based differences in Norwegian children aged 18-47 months. The LUI was completed by the parents of 139 children. The results indicate that the questionnaire presents with acceptable psychometric qualities, confirming its potential to serve as a screening tool for assessing pragmatics in Norwegian children. Rapid and steady growth in pragmatic competence with age was found and gender based differences were rare and only evident in two subscales.

KEYWORDS

Language Use Inventory, Norwegian adaptation, pragmatic language development, psychometric qualities, gender differences

1. Introduction

The acquisition of language is perhaps the greatest feat in children's development. Within the first years of life, language normally develops from gestures and the emergence of first words to the ability to construct complex sentences, express feelings, share ideas and engage in meaningful discourse with others (Lust 2006). Pragmatics refer to the appropriate and effective use and interpretation of language in context, beyond understanding and expressing word meanings in correct forms (Fujiki & Brinton 2009; Turkstra et al. 2017). Pragmatic competence traditionally includes the ability to initiate conversation, provide relevant responses, produce and understand utterances by drawing on context, produce coherent narratives, follow the rules of politeness and conversational exchange, understand non-literal language and convey information through facial expression, gesture and prosody (Fujiki & Brinton 2009; Matthews, Biney &

Abbot-Smith 2018). Furthermore, pragmatic competence overlaps with social competence and is of vital importance for children's ability to function well at home, with their peers and in educational contexts (Beitchman & Brownlie 2014; Im-Bolter & Cohen 2007). Some children experience impairment at the level of pragmatics, even in the presence of intact vocabulary and grammatical language skills (Fujiki & Brinton 2009; Poletti 2011). Long before a child has uttered her/his first word, pragmatic communication skills emerge. By 3-4 months children are able to follow the gaze of another person and establish joint attention which is crucial for the development of pragmatics (Turkstra et al. 2017). As young as 9-10 months, children start using gestures and vocalisations for requesting, greeting and protesting, and gradually they use single and paired word utterances to supplement and replace communicative gestures (Dale 1980; Turkstra et al. 2017). Although considerable variation exists, basic communicative use of language is commonly mastered by age two and children become increasingly able to engage in short dialogues and to use language in imaginative ways. Pragmatic language skills continue to increase during the preschool years, as for instance in telling stories, jokes or in teasing others, as well as making conversational repairs when not understood (O'Neill 2007; Turkstra et al. 2017).

The extent of gender based differences in language acquisition has been investigated for decades, the common finding being that the performance of boys lags behind girls (Bornsteine, Hahn & Haynes 2004; Fenson et al. 2007; Zubric, Taylor, Rice & and Slegers 2007; Helland, Jones & Helland 2017; Kristoffersen, Simonsen, Eiesland & Henriksen 2012). However, a recent literature review by Etchell and colleagues (2018) argues that gender differences are not as consistent or large as previously thought. Studies focusing on gender differences in pragmatic development are sparse and have provided mixed findings. Collins, Lockton and Adams (2014), Law, Rush and McBean (2014) and Longobardi, Lonigro, Laghi and O'Neill (2017) found no significant differences in pragmatic skills based on gender, while other studies report significant differences in favour of girls (Ash, Redmond, Timler & Kean 2017; Bialecka-Pikul, Filip, Stepien-Nycz, Kus & O'Neill 2019; Geurts et al. 2009; Ketalaars, Cuperus, Jansonius & Verhoeven 2010).

By definition pragmatics is context dependent, and pragmatic impairments tend to be more apparent in daily communication than in more structured test situations (Botting 2004). Parents observe their children in a variety of settings and are found to provide valid and reliable information of children's communicative skills. Thus parent reports are considered especially useful for the assessment of pragmatics (Helland, Biringer, Helland & Heimann 2012; O'Neill 2007). The Language Use Inventory (LUI; O'Neill 2009) is designed to assess pragmatic language skills and to identify deficient use of language in a variety of everyday settings. Furthermore, LUI has shown to be a useful instrument in identifying children at risk for or with autism spectrum disorders (ASD). It is recommended as one of several tools to evaluate outcomes of verbal language interventions in children with ASD (O'Neill 2007). The inventory is developed for English speaking children with a standardization based on a Canadian sample of 3563 children aged 18-47 months (O'Neill 2009). The LUI has been translated and adapted to Portuguese (da Silva Guimarães, Cruez-Santos & Almeida, 2013), French (Pesco & O'Neill 2016), Italian (Longobardi et al. 2017) and Polish (Bialecka-Pikul et al. 2019). In Norway tests and other tools for the assessment of language are sparse. To our knowledge only one standardized and

age normed instrument for assessing language in children younger than four years exist; the Mac-Arthur Bates Communicative Developmental Inventories (CDI I and II; Fenson et al. 2007; Kristoffersen & Simonsen 2012). Recently, Garmann and colleagues (2019) reported pilot data on CDI III aimed at three year-olds. However, the main focus of these inventories is on language content and grammar rather than on pragmatics. Previous work provided a Norwegian adaptation of the Children's Communication Checklist Second Edition (CCC-2; Bishop 2011; Helland, Biringer, Helland & Heimann 2009; Hollund-Møllerhaug 2010). However, the CCC-2 is standardized for the age range of 4 to 16, and at present no instrument for assessing pragmatic language skills in children younger than 4 years is available. This lack of instruments motivated the present study, which reports on the Norwegian adaptation of the LUI. The aims of the study were threefold, 1) to carry out a first evaluation of the psychometric qualities of the Norwegian adaptation, 2) to investigate pragmatic development in Norwegian children aged 18-47 months, and 3) to explore possible gender based differences. In line with findings of cross-cultural studies with the LUI (Bialecka-Pikul et al. 2019; O'Neill 2009; da Silva Guimarães et al. 2013; Pesco & O'Neill 2016) we expected high reliability scores for the Norwegian adaptation. Furthermore, we expected growth in pragmatic competence with age. Mixed results regarding gender based differences are reported in studies with the LUI (Bialecka-Pikul et al. 2019; Longobardi et al. 2017; O'Neill 2009). However, the standardization study of the original English version (O'Neill 2009) reported significant differences in favour of girls, which in turn led to different norms for boys and girls. Thus, based on the original standardization study, we hypothesized that girls in the present study would show higher pragmatic language scores compared to boys.

2. Method

2.1. Procedure and participants

Information about the study and a consent form to be filled out was distributed to parents of children in the age range 18-47 months from a major city and two rural municipalities in Western Norway. When written consent was obtained, the parents received and completed the Norwegian adaptation of the LUI. This procedure resulted in a total of 173 respondents. Thirty-four questionnaires were excluded due to diagnosed medical conditions likely to affect language development ($n=4$), combined occurrence of prematurity greater than two weeks and birth weight of less than 2500g ($n=5$), exposure to languages other than Norwegian exceeding 20 % ($n=14$) (information given as part of the LUI) and missing data ($n=11$). This left a final sample consisting of 139 children (51 girls and 88 boys) in the age range 18 - 47 months ($M = 33.4$; $SD=7.6$). 71.2 % of the questionnaires were completed by mothers, 7.9 % by fathers and 20.1 % of the parents together (for one questionnaire this information was not obtained). At the time of the initial invitation a subsample ($n=40$) received two copies of the LUI and were asked to complete and return the second copy two weeks after the completion of the first. Twenty four parents returned two completed copies of the LUI and 21 of these were included in the study. From this subset, two questionnaires were excluded due to exposure to languages other than Norwegian exceeding 20 % and one due to combined occurrence of prematurity greater than two weeks and birth weight of less than 2500 g. In line with the procedure used by O'Neill (2007) the age

range of 18-47 months was divided into five age groups with 6 months' intervals. See Table 1 for descriptive statistics.

The study was approved by the Norwegian Regional Ethical Committee on Medical Health Research, University of Bergen

Table 1 Descriptive characteristics of the participants in each age group

AGE GROUP (IN MONTHS)	N	MEAN AGE	GIRLS/BOYS (N)
1. 18-23	19	21.3	5/14
2. 24-29	22	26.4	8/14
3. 30-35	40	32.2	14/26
4. 36-41	33	38.5	14/19
5. 42-47	25	44.4	10/15
Total	139		

2.2. The inventory

The LUI provides a detailed picture of the order of emergence of pragmatic skills in young children in the age range 18 to 47 months. The emergence of these skills are measured through 180 items distributed across 14 subscales (see Table 2). The subscales are organized into three parts: Part 1 focuses on how the child communicates with gestures, Part 2 focuses on the child's communication with words and Part 3 focuses on the child's longer sentences, thus covering major milestones of pragmatic development. The inventory addresses pragmatics in a variety of situations and functions i.e. directing attention, sharing interests, commenting or asking about other persons' behaviours or using mental state terms. The majority of items are asking parents about discrete, possibly single instances. For example, whether a child uses a certain word, asks about a certain specific thing or teases others by calling them silly names. The items that have greater than two options ask parents for a more general impression with respect to an aspect of their child's communicative functioning/development. For example, whether parents finds it fairly easy to know when their child and they are both talking about the same thing, whether the child's questions and comments usually are appropriate and relevant or whether the child uses language in a spontaneous and natural way.

Subscales E and L are not given a numerical score and are therefore not included in the LUI total score. In response to these scales, assessing the child's interests in play activities and the possible presence of atypical interests, the parents are asked to give written answers. The information provided here may be particularly valuable if one evaluate that the child needs further in depth assessment for ASD. The LUI total score is calculated from the sum of all items in the scored subscales of Parts 2 and 3 (subscales C and D, F through K and M and N). Additionally, included as part of the LUI, parents provide information related to birth, the child's health and exposure to languages other than Norwegian. For the original English version O'Neill (2007)

reports internal consistency values ranging from .80 to .99 (Cronbach's alpha) and test-retest stability with Pearson correlations between .85 and .96 (except subscale B). The LUI have been found to distinguish between language impaired and typically developing children with sensitivity and specificity levels above 95% (O'Neill 2007).

2.3. Scoring

The questionnaire is scored by an automated scoring programme according to the guidelines given in the manual (O'Neill 2009). Each item is scored on a 2-point scale, with responses of *yes*, *sometimes* and *often* scored as 1 and *never* and *rarely* scored as 0. The maximum score for each subscale equals the number of items in the subscale, leading to a maximum LUI total score of 161. High scores indicate good performance. However, it should be noted that subscales E and L are not included in the LUI total score since written responses and additional descriptions of the child's play and talk interests are required.

2.4. Missing data

If a response is missing for two items within one of the 10 subscales making up the LUI total score or a response is missing for more than two items over all these subscales, the LUI total score is not calculated. In the present study, questionnaires with missing data exceeding these limits were excluded.

2.5. Translation procedure

Solely translating an instrument developed in one culture/language into a different culture/language would usually not be sufficient to provide equivalent version of the instruments (Bialeca-Piku et al 2019). Thus a more extensive adaptation process is required, and the guidelines on these issues given by the World Health Organization (WHO 2015) were followed. Written permission for adapting the LUI into Norwegian for research purposes and for conducting a first evaluation of the psychometric qualities of the inventory was given by the author Daniela O'Neill and the publisher Knowledge in Development Inc. A two-way translation procedure was administered. First, the LUI was translated into Norwegian by the authors. To ensure the quality of the adaptation, a panel of experts (linguists, psychologists and speech-language therapists) took part in this process. Some items to exemplify the tasks were altered due to connotation differences or linguistic differences between English and Norwegian. All items in the original English version were retained in the final Norwegian version. A native English speech and language therapist, who also speaks Norwegian fluently, then translated the Norwegian version back to English. Both versions, the Norwegian and the English, were reviewed by the author, Daniela O'Neill.

2.6. Statistical and psychometric analyses

Internal consistency was measured by Cronbach's alpha. Alpha scores between 0.60 and 0.80 are considered satisfactory, with scores above 0.80 indicating a highly internally consistent scale (Prince, Stewart, Ford & Hotopf 2004). Test-retest reliability was measured by Pearson *r*.

Intercorrelations between subscales were measured using Pearson r , controlling for age in months. The sum score of each subscale of the LUI was subjected to principal component analysis (PCA) with varimax rotation. Group differences were tested by 5 (age groups) \times 2 (gender) analysis of variance. All statistical analyses were performed using SPSS version 24.

3. Results

3.1. Internal reliability

Cronbach's alpha for all subscales and each of the three parts of the inventory together with the values reported for the original English version are presented in Table 2. The alpha values ranged from .74 (subscale B) to .99 (Part 3). The alpha value for the LUI total score (Parts 2 and 3 combined) was .99.

Table 2 Cronbach's alphas for the three parts and the subscales of the LUI Norwegian adaptation (N=139) and the LUI Original English version

	ALPHA ENGLISH VERSION ¹	ALPHA NORWEGIAN ADAPTATION	NUMBER OF ITEMS
Part 1: How your child communicates with gestures	.88	.86	13
A: How your child uses gestures to ask for something	.89	.88	11
B: How your child uses gestures to get you notice something	.53	.74	2
Part 2: Your child's communication with words	.95	.94	28
C: Types of words your child uses	.93	.93	21
D: Your child's requests for help	.88	.77	7
E: Your child's interests	Not scored	Not scored	2
Part 3: Your child's longer sentences	.99	.99	133
F: How your child uses words to get you notice something	.81	.81	6
G: Your child's questions and comments about things	.90	.88	9
H: Your child's questions and comments about themselves/other people	.98	.98	36
I: Your child's use of words in activities with others	.93	.93	14
J: Teasing and your child's sense of humor	.79	.78	5
K: Your child's interest in words and language	.86	.84	12
L: Your child's interests when talking	Not scored	Not scored	4
M: How your child adapts conversation to other people	.93	.91	15
N: How your child is building longer sentences and stories	.98	.97	36

¹ Permission given by KID Inc
LUI= Language Use Inventory

3.2. Test-retest reliability

An evaluation of the extent to which scores remained stable across two administrations was carried out on a subsample ($N = 21$). All subscales, except subscale B, demonstrated significant ($p < .001$) Pearson r correlations between the test and retest scores ranging .66 (scale A) to .99 (Scale C, N). For the LUI total score a correlation of $r = 0.99$ was found. See Table 3.

Table 3 Test-retest correlation as measured by Pearson's r ($N=21$)

LUI SUBSCALES	r
A: How your child uses gestures to ask for something	.66*
B: How your child uses gestures to get you notice something	-.05
C: Types of words your child uses	.99*
D: Your child's requests for help	.91*
E: Your child's interests	Not scored
F: How your child uses words to get you notice something	.96*
G: Your child's questions and comments about things	.95*
H: Your child's questions and comments about themselves/other people	.95*
I: Your child's use of words in activities with others	.91*
J: Teasing and your child's sense of humor	.86*
K: Your child's interest in words and language	.95*
L: Your child's interests when talking	Not scored
M: How your child adapts conversation to other people	.95*
N: How your child is building longer sentences and stories	.98*

*= $p < .01$; LUI=Language Use Inventory.

3.3. Intercorrelations among subscales

Intercorrelations among all 12 scored subscales, controlling for age in months, are shown in Table 4. Scores on the two gesture subscales (A and B) were weakly but non-significantly positively correlated. Scores on subscale A were negatively and weakly ($r < .24$) correlated with scores on all other subscales. Subscale B did not correlate significantly with any of the other subscales. Significant intercorrelations, ranging from .25 to .86, were evident for all subscales forming Parts 2 and 3 of the inventory, indicating some overlap, but also that the subscales measure aspects of pragmatic competence that differ to some extent. The intercorrelations among the first five scored subscales (C,D,F,G,H) were higher, with r ranging from .68 to .86 than among the last five subscales (I,J,K,M,N), with r ranging from .25 to .79.

Table 4 Intercorrelations between LUI subscales controlling for age in months (N=139)

	A	B	C	D	F	G	H	I	J	K	M
B	.159										
C	-.130	.104									
D	-.163	.080	.863**								
F	-.136	.031	.716**	.673**							
G	-.181*	.064	.702**	.675**	.729**						
H	-.234*	-.011	.676**	.652**	.737**	.863**					
I	.050	.013	.279**	.280**	.322**	.359**	.384**				
J	-.229**	-.058	.251**	.280**	.322**	.567**	.623**	.261**			
K	-.247**	.001	.548**	.555**	.617**	.700**	.748**	.346**	.604**		
M	-.177*	-.055	.525**	.468**	.608**	.635**	.742**	.380**	.494**	.655**	
N	-.221**	.000	.426**	.438**	.569**	.656**	.793**	.381	.623**	.646**	.735**

* $p < .05$, ** $p < .01$

LUI=Language Use Inventory, For name of the subscales see Table 2

3.4. Principal component analysis (PCA)

Principal component analysis is used for identifying clusters of variables (Field 2009), and in order to investigate the underlying dimensions of the questionnaire, PCA with varimax rotation was conducted. Prior to performing PCA the suitability of the data for factor analyses was assessed. The Kaiser-Mayer-Olkin value was .94 indicating that the amount of data for the factor analysis was satisfied. Additionally, Bartlett's test of Sphericity reached significance ($p < .001$) indicating that the variables were correlated at a level sufficient for factor analysis. Two factors with eigenvalues exceeding 1 were identified. Factor 1 (eigenvalue 8.47) corresponded to the 10 subscales assessing verbal communication (the LUI total score) and factor 2 (eigenvalue 1.14) corresponded to the two gesture subscales. Subscales N, J and A overlapped in their loadings. Given this overlap, a closer inspection showed that subscale N and J loaded more strongly to Factor 1 and subscale A loaded more strongly to Factor 2. See Table 5. The two factors explained 80.1% of the total variance; 70.6% and 9.5% respectively. This being supportive of separating the subscales measuring gestures (Part 1) from verbal communication (Part 2 and 3) as in the English version.

Table 5 Principal Component Analysis with varimax rotation

LUI SUBSCALES	FACTOR 1	FACTOR 2
H. Your child's questions and comments about themselves/other people	.94	
I. Your child's use of words in activities with others	.93	
G. Your child's questions and comments about things	.93	
F. How your child uses words to get you notice something	.90	
C. Types of words your child uses	.89	
K. Your child's interest in words and language	.88	
D. Your child's request for help	.87	
N. How your child is building longer sentences and stories	.86	.33
M. How your child adapts conversation to other people	.86	
J. Teasing and your child's sense of humor	.74	.41
B. How your child uses gestures to get you notice something		-.86
A. How your child uses gestures to ask for something	-.42	-.56

LUI=Language Use Inventory.

3.5. Development of pragmatic competence with age

To examine children's development of pragmatic competence with age, a 5 (age groups) x 2 (gender) analysis of variance (ANOVA) was first conducted for the LUI total score (which includes all scored verbal scales) and thereafter for each subscale separately. As Levene's test was significant, violating the homogeneity of variance assumption across groups, a more stringent significance level of .01 (instead of .05) was set for evaluating these results. For the LUI total score a significant main effect of age group $F(4,129) = 47.25$, $p < .001$ was found, indicating that children's scores increased with age. Figure 1 illustrates growth in pragmatic competence with age.

When each subscale was analysed separately the same picture emerged. A significant main effect of age group ($p < .01$) was evident for all subscales (except subscale B). See Table 6. While the 10 subscales assessing verbal communication increased with age, the gesture subscale (A) decreased with age. No significant main effect of gender or interaction effect of gender and age group was evident.

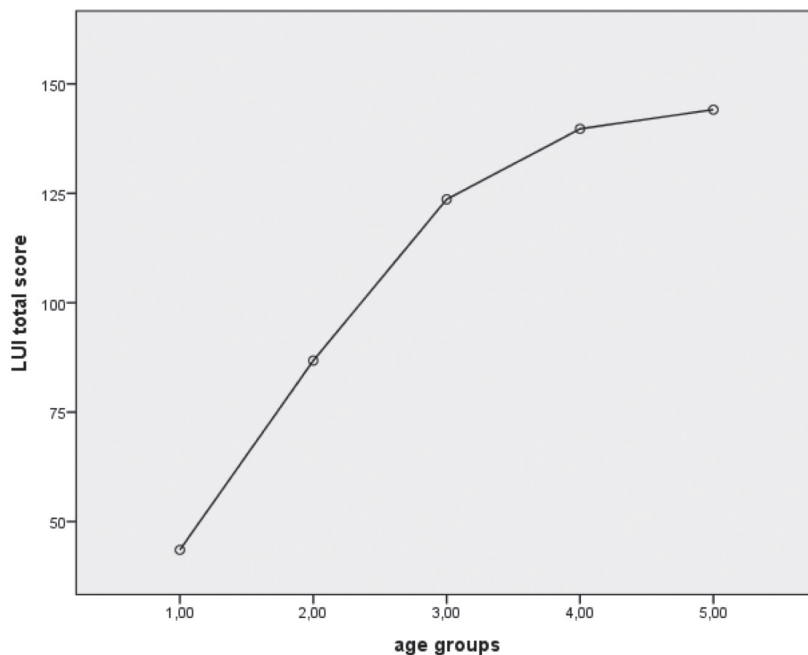


Figure 1 Development of pragmatic competence with age as measured by the LUI total score

Based on the results of Turkey's post hoc tests, Table 7 shows which of the age groups differed significantly on each subscale. Group 2 (24-29 months) and all older groups scored significantly higher than group 1 (18-23 months) on all subscales of part 2 and 3 (except for subscale I; use of words in activities with others where no significant difference was found between the two youngest groups). Furthermore, group 3 (30-35 months) performed significantly higher than group 2 (24-29 months) on all subscales except subscale C (types of words the child uses) and subscale I (use of word in activities with others). Group 4 (36-41 months) obtained significantly higher scores than group 3 (30-35 months) on subscale N (longer sentences and stories). No significant differences were found between the two oldest groups (36-41 and 42-47 months). These findings point to rapid growth in early pragmatic competence, furthermore ceiling effects at older ages are indicated.

TABLE 6 DESCRIPTIVE STATISTICS FOR LUI SUBSCALES FOR AGE GROUPS AND GENDER: MEAN SUM SCORES AND SD (IN BRACKETS)

LUI	Max score	Group 1			Group 2			Group 3			Group 4			Group 5			Main effect		
		Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total	F(4, 129)	p	η^2
A	11	9.40 (2.51)	9.64 (1.55)	9.58 (1.77)	9.38 (2.20)	9.71 (2.34)	9.59 (2.34)	5.29 (3.38)	6.42 (3.74)	6.03 (3.62)	6.50 (3.65)	5.05 (3.27)	5.67 (3.46)	4.00 (0.98)	5.20 (2.54)	4.75 (2.94)	11.59	.000	.26
B	2	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	1.93 (0.27)	1.95 (0.21)	1.71 (0.73)	1.92 (0.39)	1.85 (0.53)	1.86 (0.54)	1.84 (0.50)	1.85 (0.51)	1.90 (0.32)	1.86 (0.43)	1.72 (0.54)	1.06	.380	.03
C	21	17.40 (3.21)	13.50 (4.80)	14.53 (4.70)	19.13 (1.73)	18.07 (5.68)	18.45 (4.61)	20.86 (0.36)	20.27 (2.82)	20.48 (2.29)	21.00 (0.00)	20.84 (0.50)	20.91 (0.38)	21.00 (0.00)	21.00 (0.00)	21.00 (0.00)	13.23	.000	.29
D	7	6.40 (0.89)	4.43 (1.45)	4.95 (1.60)	6.25 (0.89)	5.64 (1.87)	5.86 (1.58)	6.93 (0.27)	6.62 (1.20)	6.73 (0.99)	6.86 (0.36)	6.89 (0.32)	6.88 (0.33)	7.00 (0.00)	6.87 (0.35)	6.92 (0.28)	9.17	.000	.22
F	6	4.00 (1.58)	2.21 (1.76)	2.68 (1.86)	4.50 (1.20)	2.21 (1.76)	2.68 (1.86)	5.50 (0.52)	5.15 (1.16)	5.28 (0.99)	5.93 (0.27)	5.42 (0.96)	5.64 (0.78)	6.00 (0.00)	5.87 (0.35)	5.92 (0.08)	23.17	.000	.49
G	9	3.60 (1.14)	2.64 (2.24)	2.89 (2.03)	5.88 (1.89)	5.50 (2.71)	5.64 (2.40)	7.93 (1.73)	7.62 (1.89)	7.73 (1.81)	8.64 (0.63)	8.47 (1.26)	8.55 (1.03)	8.70 (0.68)	8.27 (0.68)	8.44 (1.29)	33.21	.000	.51
H	36	10.40 (5.27)	4.50 (4.65)	6.05 (5.38)	18.88 (8.87)	18.57 (10.02)	18.68 (9.40)	31.29 (5.70)	28.00 (8.00)	29.15 (7.38)	34.64 (1.82)	31.42 (6.65)	32.79 (5.27)	34.80 (2.30)	32.87 (5.50)	33.64 (4.54)	55.31	.000	.63
I	14	5.80 (4.55)	3.21 (2.89)	3.89 (3.46)	9.93 (3.33)	7.93 (4.14)	8.59 (3.89)	12.71 (2.02)	11.88 (2.49)	12.18 (2.34)	13.50 (0.86)	12.86 (1.49)	13.15 (1.28)	13.60 (0.83)	13.27 (1.83)	13.40 (1.50)	42.84	.000	.57
J	5	0.60 (0.56)	0.50 (0.52)	0.53 (0.51)	1.25 (1.28)	1.79 (1.25)	1.59 (1.26)	3.36 (1.15)	3.00 (1.36)	3.12 (1.29)	4.14 (0.95)	3.32 (1.25)	3.67 (1.19)	4.30 (0.95)	3.80 (1.32)	4.00 (1.19)	33.17	.000	.51
K	12	4.40 (1.14)	3.14 (2.21)	3.47 (2.04)	6.00 (1.85)	5.29 (2.76)	5.55 (2.44)	8.79 (1.89)	8.08 (1.79)	8.32 (1.83)	9.07 (1.77)	8.79 (1.84)	8.91 (1.79)	10.20 (1.40)	9.53 (1.36)	9.80 (1.38)	34.23	.000	.52
M	15	4.20 (4.60)	2.79 (2.75)	3.16 (3.25)	7.13 (4.05)	7.14 (3.88)	7.14 (3.85)	11.43 (3.65)	10.42 (3.35)	10.78 (3.45)	13.07 (2.53)	11.63 (3.20)	12.24 (2.98)	13.50 (1.65)	13.00 (2.54)	13.20 (2.20)	30.22	.000	.48
N	36	3.00 (3.00)	0.79 (1.42)	1.37 (2.11)	11.00 (8.32)	10.07 (9.85)	10.41 (9.13)	23.86 (8.90)	21.08 (8.83)	22.05 (8.84)	29.50 (4.09)	25.16 (8.13)	27.00 (6.98)	28.40 (3.86)	27.73 (6.85)	28.00 (5.75)	46.84	.000	.59

LUI=Language Use Inventory. For name of the subscales see Table 2

Table 7 Summary of Turkey's Post hoc tests showing, for each age group, the older age groups with significantly different scores on separate subscales

AGE GROUPS COMPARISONS	SUBSCALES WITH SIGNIFICANTLY DIFFERENT SCORES
1 vs 2	C, D ,F ,G , H,-, J, K, M, N,
1 vs 3	A and all subscales from C to N
1 vs 4	A and all subscales from C to N
1 vs 5	A and all subscales from C to N
2 vs 3	Subscales A, D, F,G, H, J, K, M, N
2 vs 4	Subscales A, C, D, F, G, H, J, K, M, N
2 vs 5	Subscales A, C, D, F, G, H, J, K, M, N
3 vs 4	Subscale N
3 vs 5	Subscale J, K, M, N
4 vs 5	--

For name of the subscales see Table 2.

3.6. Gender differences

Descriptively, girls performed better than boys as can be seen in Table 6. However, a significant main effect of gender ($p < .01$), with girls outperforming boys, was only revealed for two subscales; subscale D (the child's request for help), $F(4,129) = 10.72$, $p < .01$, $\eta^2 = .08$, and subscale F (declarative use of words), $F(4,129) = 8.65$, $p < .01$, $\eta^2 = .06$.

4. Discussion

The main findings of this pilot study indicate that the Norwegian adaptation of the LUI presents with acceptable psychometric qualities, confirming its potential to serve as a screening tool for assessing pragmatic language skills. Our results showed rapid and steady growth in pragmatic competence in young Norwegian children confirming findings from previous cross-cultural studies with the LUI (Bialecka-Pikul et al. 2019; Longobardi et al. 2017; O'Neill 2009; Pesco & O'Neill 2016). Contrary to our expectations gender based differences in pragmatic development were rare in the present study.

Alpha values for each of the three parts of the inventory, the separate subscales and the LUI total score strongly confirm the internal consistency and reliability of the Norwegian adaptation. The alpha values for each of the three parts, as well as for the majority of the subscales, were all above .80, indicating highly internally consistent scales. Furthermore, the most clinically desirable level of .90 or above was met for five of the subscales, as well as for Parts 2 and 3 and the LUI total score. Overall, the alpha coefficients obtained in the present study were comparable to those reported for the original English version (O'Neill 2009) and also in line with more recent studies with the LUI (Bialecka-Pikul et al. 2019; da Silva Guimarães et al. 2013; Pesco & O'Neill 2016). When parents filled out the questionnaire on two different occasions, the LUI demonstrated good test-retest stability with all subscales (except subscale B),

showing significant Pearson correlations of .66 to .99 between the test and retest scores. As to subscale B, this subscale contains only two items and most children scored at ceiling at both times. Non-significant correlation for this scale is also reported in the original English version (O'Neill 2009). However, as these analyses were carried out on a small subsample, our results should be regarded as tentative.

The moderate r levels for the majority of the intercorrelations between the subscale scores in Parts 2 and 3 of the instrument indicate some overlap, but also that these subscales measure aspects of pragmatic competence that differ to a certain degree. The findings of higher intercorrelations between the first five subscales comprising the LUI-total score, reflect the relatedness of these subscales, indicating that the same underlying construct is measured. These findings are in line with O'Neill (2009) who also reports higher intercorrelations between subscales for the original English version. She argues that this could have led to their amalgamation, but this was not done as parents reported that shorter subscales with a greater focus were easier to complete. Furthermore, although high intercorrelations are evident in a group of typically developing children, different results may be found in children with language impairment (O'Neill 2009).

The LUI subscales are ordered based on theories of children's pragmatic development, with early-developing skills followed by later developing skills. Scores on the gesture subscales were weakly and positive correlated. Scores on subscale A were weakly and negatively correlated ($r < .30$) with all other subscales (except subscale I) indicating a decrease of gestures in relation to an increase in use of words and sentences as should be expected. Furthermore, principal component analysis (PCA) with varimax rotation, supported a two factor solution with the first factor corresponding to the verbal subscales and the second factor to the gesture subscales. These results are supportive of separating the gesture subscales from the language subscales; further they suggest that the ordering of the subscales is appropriate and aligned with the ordering of the subscales in the original English version based on developmental data.

Growth in pragmatic competence was investigated by comparing the results of the five age groups on the LUI-total score as well as on the separate subscales. In line with our expectations children's scores increased with age on the subscales assessing verbal language (Parts 2 and 3). In contrast, on subscale A (Part 1) assessing imperative use of gestures, the opposite pattern was found, reflecting that early gestures are replaced with verbal language. The fact that no effect of age was evident on subscale B (Part1) assessing declarative use of gestures may be because this scale contains only two items and most children scored at ceiling. While significant differences were evident on most subscales in the younger groups (older children scoring higher than younger children), the two oldest age groups (36-41 months and 42- 47 months) did not differ significantly on any subscale. These results, which are comparable to the results reported by O'Neill (2007), indicate that basic communicative use of language is commonly mastered by age two and that children continue to increase their pragmatic competence substantially up to age three. The fact that no differences were evident between the two oldest age group indicates ceiling effect at older ages, which are also reported in previous studies with the LUI (Bialecka-Pikul et al. 2019; O'Neill 2009). Furthermore, as the LUI was developed to capture pragmatics, our findings support the usefulness of the instrument in assessing pragmatic language development in young Norwegian children.

There was a trend for girls to outperform boys, but significant differences ($p > .01$) in favour of girls were only evident on two subscales; the subscale assessing request for help (subscale D) e.g. including items like use of “help”; and “requests for help with difficult tasks” and the subscale assessing declarative use of words (subscale F) e.g. including items like “asks you to “look!” or “watch me!”. However, the interaction effect (gender x age group) was not significant, indicating that gender differences were not evident in all age groups. These findings are partly consistent with previous studies. O’Neill (2007) reported significant differences with girls performing better than boys on two subscales, declarative use of words (subscale F) and the subscale on how children build longer sentences and stories (subscale N), while on the other hand, Longobardi and colleagues (2017) did not find any gender differences as to pragmatics in their sample of Italian children. One may speculate if our findings of gender differences on the subscales measuring request for help and declarative use of words may reflect a tendency for girls towards seeking their parents’ attention to a greater extent than is the case for boys. However, as our sample is gender imbalanced, with girls being in minority (especially in the youngest age groups), our findings should definitely be considered tentative. To determine more accurately whether gender differences exist on the different subscales, as well as within the different age groups, data from a much larger gender and age balanced sample is needed.

Some further methodological limitations should be considered when evaluating our results. The fact that no information regarding the socioeconomic status (SES) of the respondents was available might affect our findings. However, due to a relatively egalitarian income distribution and a universal social security system in Norway, few residents are poor, and significant differences in SES are not expected in the present sample (Halvorsen & Stjernø 2008). The small sample size, as well as the uneven distribution of children across age groups, obviously restricts the generalization of our findings. Furthermore, the lack of any other Norwegian instrument for assessing pragmatics in young children prevents the establishment of concurrent validity for the LUI. Preferably, studies should also be carried out to investigate the questionnaire’s ability to distinguish between language impaired children and children with typically developing language.

In sum, the results of this pilot study support the psychometric qualities of the Norwegian adaptation of the LUI. Furthermore, rapid and steady growth in early pragmatic competence is demonstrated. It is a challenge for further research to collect data from a sufficient number of children to develop Norwegian norms and make a standardization of the instrument available as well as to further investigate gender based differences in pragmatic language development in Norwegian children.

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