ORIGINAL RESEARCH ARTICLE

Evaluation of the Krio Language Version of the London Measure of Unplanned Pregnancy in Western Area, Sierra Leone

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Abstract

New ways of measuring pregnancy planning/intention such as the London Measure of Unplanned Pregnancy (LMUP), which recognise the complexity of the construct, are being adopted worldwide. The aim of this study was to evaluate the psychometric properties of the Krio version of the LMUP in Sierra Leone. An interviewer-administered version of the LMUP was translated into Krio and pre-tested with 12 pregnant women. Field testing involved 172 pregnant women aged 15–42, with 87 completing a re-test. Completion rates of LMUP items were 100%. LMUP scores 1-12 were captured. Reliability: the scale was internally consistent (Cronbach's alpha 0.84) and stable (weighted Kappa 0.93). Construct validity: all hypotheses were confirmed. Principal components analysis revealed five items (items 2-6) related to one construct. Mokken scaling procedure selected the same five items. Removal of item 1 (which had 97% endorsement of the 'no contraception' response option) brought about only a very slight improvement in LMUP performance, therefore we recommend retaining all six items. The Krio LMUP is reliable, valid and suitable to use in Sierra Leone. *(Afr J Reprod Health 2019; 23[4]:81-91).*

Keywords: Pregnancy, psychometric validation, Sierra Leone, unplanned pregnancy, Krio

Résumé

De nouvelles façons de mesurer la planification / l'intention de la grossesse telles que la Mesure de Londres de la grossesse non planifiée (MLGNP), qui reconnaissent la complexité de la construction, sont adoptées dans le monde entier. Le but de cette étude était d'évaluer les propriétés psychométriques de la version Krio de la MLGNP en Sierra Leone. Une version de la MLGNP administrée par un intervieweur a été traduite en Krio et pré-testée auprès de 12 femmes enceintes. Les tests sur le terrain ont impliqué 172 femmes enceintes âgées de 15 à 42 ans, dont 87 ont effectué un nouveau test. Les taux d'achèvement des articles MLGNP étaient de 100%. Les scores MLGNP 1-12 ont été capturés. Fiabilité: l'échelle était cohérente en interne (alpha 0,84 de Cronbach) et stable (Kappa pondéré 0,93). Validité de construction: toutes les hypothèses ont été confirmées. L'analyse des composantes principales a révélé cinq éléments (éléments 2 à 6) liés à une construction. La procédure de mise à l'échelle Mokken a sélectionné les cinq mêmes éléments. La suppression du point 1 (qui avait approuvé à 97% l'option de réponse «sans contraception») n'a entraîné qu'une très légère amélioration des performances de la MLGNP, nous recommandons donc de conserver les six points. La version Krio de la MLGNP est fiable, valide et adaptée à une utilisation en Sierra Leone. *(Afr J Reprod Health 2019; 23[4]: 81-91).*

Mots-clés: Grossesse, validation psychométrique, Sierra Leone, grossesse non planifiée, Krio

Introduction

As of 2017, 885 million women of reproductive age (15–49) living in low and middle income countries (LMICs) wanted to avoid a pregnancy, yet 214 million of these women were not using a modern contraceptive method[1], i.e. they have an unmet need for modern contraception. Data for 2015 show that the highest level of unmet need is in West and Central Africa (24%)[2] where unmet need has not declined, unlike other areas[2]. Of the estimated 206 million pregnancies in 2017 in LMICs, 43%, or nearly 89 million, were unintended[1]. Also in 2017, an estimated 308,000 women in LMICs died from pregnancy-related causes, and 2.7 million babies died in the first month of life[1]; sub-Saharan Africa carries a disproportionate burden of maternal and neonatal deaths and teenage pregnancy. Up to 44% of maternal deaths could be averted through full access to certain vital services: contraceptive care to help women avoid unintended pregnancies, and maternal and newborn health care to help mothers and newborns through pregnancy, delivery and the postnatal period[1,3].

Unintended pregnancy is high on the agenda of many countries globally and particularly in LMICs. Reduction of unintended pregnancy is key for achieving Sustainable Development Goals 3 (Good Health and Wellbeing) and 5 (Gender Equality) by 2030[4]. Unintended pregnancy exposes women unnecessarily to the risks of morbidity and mortality associated with pregnancies in general, and risks that are linked directly to unintended pregnancy, such as adverse effects due to unsafe abortion[5], delayed antenatal care[6,7] and reduced educational opportunities and financial situation for the woman[7]. The health of the child may also be affected as adverse pregnancy outcomes appear to be more common in unintended pregnancies[6]. Furthermore the child is less likely to complete vaccination during childhood, and more likely to have poor child growth (stunting)[7]. Meeting girls' and women's need for contraception and improving their access to sexual and reproductive health care will increase their chances for education, ensure healthy lives and promote well-being for them, their children

and their families and provide a foundation for sustainable development at local, national and global levels[8-10].

A better understanding of women's behaviour and their reproductive intentions is needed to improve the sexual and reproductive health (SRH) and rights of women and young people and meet their need for family planning[4]. Now, estimates of the level of unplanned pregnancy in LMICs are based on a two-part question in the Demographic and Health Survey (DHS). However, there is increasing acceptance of the need to use more sophisticated methods to measure this complex construct[11-18].

A tool to measure pregnancy intention has been developed by researchers in the United Kingdom; the London Measure of Unplanned Pregnancy (LMUP)[11]. It has already been translated, validated and used in several countries around the world[19-28]. The LMUP consists of six questions covering contraceptive use, timing, intention, desire for a baby, discussion with the partner and pre-conception preparation (see http://www.lmup.org for the full English version). The answers to those questions are converted into a total score from zero to 12, with 0 meaning most unplanned and 12 most planned[11]. Importantly, the LMUP allows women to express ambivalence, mixed feelings or contradictory ideas, rather than forcing women to categorise their pregnancy as planned or unplanned. The scale's world-wide usage has shown that the LMUP is a simple and reliable method for assessing unplanned pregnancies and can be used to measure pregnancy intention in a wide range of settings. However, any measure needs to be translated and validated before being used in a new context.

Sierra Leone is one of the least developed countries in the world, ranking 179 out of 188 countries in the Human Development Index[27]. It has the highest maternal mortality ratio globally at 1,165 deaths per 100,000 live births, making it one of the most dangerous places to give birth[29]. The contraceptive prevalence rate is low at 16 per cent and unmet need for contraception is 25 per cent[30], nearly half of all pregnancies reported as unwanted[30] and abortion is illegal. In Sierra Leone an estimated 28 per cent of adolescent girls

aged 15-19 years have either begun childbearing or are pregnant, the seventh highest rate among LMICs[30].

This research was conducted in Western Area, which is one of four principal divisions of Sierra Leone. Western Area is the most densely populated area in Sierra Leone and home to a third of the total population of the country. During and after the ten-year civil war, rural migrants escaping violence settled in Western Area creating large urbanised settlements with squalid living conditions. Extremely overcrowded, with low-quality housing, limited access to clean water and safe sanitation, these slums represent the most vulnerable neighbourhoods of Freetown. Western Area is divided into two districts: the Western Area Rural and the Western Area Urban, with a population of 444,270 and 1,055,964, respectively and with 25.7% and 27.5% of those populations being women of childbearing age[31]. The most widely spoken language in Sierra Leone and Western Area is Krio. In this study our aim was to translate and validate the LMUP for use in the Krio language in Sierra Leone using classical and modern test theories.

Methods

As the literacy level in Sierra Leone is low[30], it was not feasible to use the original version of LMUP, which was designed for self-administration. Therefore, we started with the Indian-English version that was adapted for interviewer administration[19] and question six was adapted to LIC setting context using our experience from Malawi[21]. We sent this version to a native Krio speaker (a female with extensive experience in health research) who translated it into Krio. Before she commenced the translation, we provided her with a synopsis of the LMUP. A working group was created to review the translation. The English and Krio versions of each question were read at a working group meeting. Each member of the group was asked to translate the question back from Krio to English and the translation was compared and corrected as necessary before agreeing and approving it. The working group consisted of the original translator, the District Medical Officer of Western Area (a medical doctor), a locally trained nurse-midwife, a Community Health Assistant (a qualified nurse), a Community Chief Deputy (a local leader) and three representatives of the public, (a local father, mother and a church pastor), plus NB from UCL.

Data collection was carried out at Waterloo Community Health Centre (WCHC) in Waterloo, the second largest city in Western Area after Freetown. This is the largest Health Centre in the area, covering both Rural and Urban areas. We pre-tested the Krio LMUP using cognitive interviewing techniques. Pregnant women and women with babies of up to six months old were recruited for these interviews from WCHC antenatal and under five clinics. The purpose of these interviews was to determine how easy it was for women and girls to understand the questions, to further check the translation and to see if the questions were acceptable.

After finalising the Krio LMUP[32], we field-tested it at antenatal and under five clinics at WCHC. The translator and two of her colleagues, all of whom were native Krio speakers and had experience in data collection, were trained by NB to conduct the interviews. All women who were either pregnant or had a baby under six months old, who were aged 15 or over and were attending any one of the clinics on 22nd, 25th, 29th September and 2nd October 2017 were invited to participate. Our target sample size was 100 with a minimum of 50 completing a re-test within 14 days[33].

The interviewers explained the research to women in the clinic, using a written information sheet, which was then given to the women to keep. Before completing the questionnaire, we asked all participants to sign or put a thumbprint on a consent form and this was immediately separated from the questionnaire to maintain anonymity. All women were asked a short set of demographic and obstetric history questions, the six LMUP questions and three questions about contraceptive use history that were added because of the cognitive interviews. They were then invited to return to the same clinic the next or following week, to complete the re-test. Women who were completing LMUP the first time on the last day of data collection were not invited to come back for re-test. Those who returned for retest were reimbursed to cover their transport costs and all

women in the clinic were offered drinking water while waiting to be interviewed. We gave participants a unique identification number on a card and asked them to bring it with them on their return. We used this number to link the test and re-test data, as their questionnaires were completely anonymised.

We recorded the respondent's answers on a paper version of questionnaire. Data was inputted into a password protected Excel spreadsheet that was saved on the UCL drive, 30% records were cross-checked at random to check for and eliminate data entry errors.

Analysis of psychometric properties

To assess acceptability, we used feedback from the cognitive interviews as well as examining missing data rates, with no missing data indicating greater acceptability[34]. To assess item discrimination, we checked the item-endorsement values to ensure that no item had endorsement of over 80%[33]. We evaluated targeting of the scale and confirmed the range of scores by reviewing the total score distribution.

To assess reliability, we evaluated internal consistency by calculating the standardised Cronbach's α (alpha) statistic using the standard cut off point of 0.7[35]. Furthermore, we examined all item-rest correlations and we considered a minimum correlation of 0.20 to be acceptable[36]. We assessed test-retest stability with weighted kappa, a score above 0.60 was considered substantial[37]. These cut off points are the same as those used in previous validations[20,21,23].

We examined construct validity by two methods: hypothesis testing and principal component analysis. We generated the hypotheses by adapting those that were previously used in LMUP validations to suit the Sierra Leone context[11,19-23]. The three main hypotheses were: pregnancies will be reported as more unplanned (i.e. LMUP score will be lower) in women 1) with three or more live children; 2) who are unmarried; or 3) who are aged under 22 (the median age in our sample) or over 30. We tested the hypotheses using non-parametric testing (Mann Whitney U). To evaluate the internal structure of the LMUP we used Principal Component Analysis (PCA).

If all items loaded onto one component with an Eigenvalue larger than one (i.e. are measuring the same construct), the scale would be considered valid[34]. Based on our findings, we decided to conduct a sensitivity analysis to see if, by removing the first question (contraception use), the validity of the scale would be affected.

In addition, we performed further analysis based on modern test theory. To examine the full dataset, we carried out a Mokken scaling procedure (monotone homogeneity assumption). Items with a Loevinger H coefficient >0.3 were eligible for scaling[38,39]. We used Loevinger H coefficient to assess the whole scale (Loevinger H <0.4 meaning the scale is "weak", 0.4 to 0.49 meaning the scale is "medium", and ≥0.5 meaning the scale is "strong")[38].

We used STATA 14 (Stata Corp. 2005. Statistical Software: Release 9.0. College Station, TX: Stata Corporation) for all analyses.

Results

Pre-testing

We conducted cognitive interviews on twelve women attending the WCHC antenatal or under five clinics. The women's median age was 23 (range 18 – 37) and one quarter of the women were married. Two of them reported 'no education', three 'primary' and seven 'secondary' as highest education; the number of previous pregnancies was between zero and four, and women were between six and nine months pregnant (n=8) or had a baby between three and six months old (n=4).

Most of the women found it 'easy' to follow the instructions and understand the questions. During cognitive interviewing it became clear that women were not answering the first question (contraceptive use in the month they became pregnant) as we expected. It emerged that women who had ever used any modern method of contraception were reporting using contraception in the month that they became pregnant, or that the method had failed. On probing, it transpired that they had stopped using any form of contraception much longer than one month before they became pregnant. To help us reach an accurate answer we

Table 1: Characteristics of women completing the London Measure of Unplanned Pregnancy (LMUP) field test and re-test compared to the general population of Sierra Leone[30]

Socio-demographic characteristics	LMUP field test n = 172	LMUP retest n = 87	LMUP non-retest n = 85	Comparison of retest and non-retest groups	SL Census 2015, %
Age					
Mean (SD)	23.6 (5.9)	23.1 (5.4)	24.1 (6.3)		
Median (IQR)	22 (19;26.5)	22 (19;25)	23 (19;28)	P = 0.441	
Range	15 – 42	16 - 42	15- 40		
Age group	**N (%)**	**N (%)**	**N (%)**		
15-19	49 (28.5)	26 (30.0)	23 (27.1)	P=0.516[1]	
20-24	64 (37.2)	35 (40.2)	29 (34.1)		
25-29	30 (17.4)	15 (17.2)	15 (17.6)		
30-34	17 (9.9)	7 (8.0)	10 (11.8)		
>=35	12 (7)	4 (4.6)	8 (9.4)		
Parity					
0	45 (26.2)	23 (26.4)	22 (25.9)	P=0.934	
1+	127 (73.8)	64 (73.6)	63 (74.1)		
Children					
0	68 (39.5)	32 (36.8)	36 (42.3)	P = 0.487	
1	48 (27.9)	29 (33.3)	19 (22.4)		
2	28 (16.3)	14 (16.1)	14 (16.5)		
3	14 (8.1)	5 (4.7)	9 (10.6)		
4-6	14 (8.1)	7 (8.1)	7 (8.2)		
Marital status					
Married	97 (56.4)	48 (55.2)	49 (57.7)	P = 0.744	61%[4]
Unmarried	75 (43.6)	39 (44.8)	36 (42.3)		39%[4]
Education					
None	74 (43.0)	41 (47.1)	33 (38.8)	P = 0.646[1]	49%[3]
Primary	39 (22.7)	20 (23.0)	19 (22.4)		51%[3]
Secondary	57 (33.1)	25 (28.7)	32 (37.6)		
Tertiary	2 (1.2)	1 (1.2)	1 (1.2)		
Partner's occupation					
Unemployed/Student	31 (18.1)	19 (22.1)	12 (14.1)	P = 0.446	36%[2]
Casual worker	22 (12.9)	8 (9.3)	14 (16.5)		64%[2]
Driver	23 (13.5)	13 (15.1)	10 (12.8)		
Salaried worker	44 (25.7)	21 (24.4)	23 (27.0)		
Small business	51 (29.8)	25 (29.1)	26 (30.6)		
Religion					

Socio-demographic characteristics	LMUP field test n = 172	LMUP retest n = 87	LMUP non-retest n = 85	Comparison of retest and non-retest groups	SL Census 2015, %
Christianity	56 (32.6)	27 (31.0)	29 (34.1)	P=0.666	
Islam	116 (67.4)	60 (69.0)	56 (65.9)		
Tribe					
Temne	75 (43.6)	37 (42.5)	38 (44.7)	P=0.853	
Mende	34 (19.8)	16 (18.4)	18 (21.2)		
Limba	26 (15.1)	13 (14.9)	13 (15.3)		
Other	37 (21.5)	21 (24.2)	16 (18.8)		
Residence					
Western Rural	127 (73.8)	70 (80.5)	57 (67.1)	**P=0.046**	
Western Urban	45 (26.2)	17 (19.5)	28 (32.9)		

[1]*Fisher exact test, the rest are Chi sq test*
[2]*% is given as a proportion of total working age (15-64) males unemployed/full time students vs employed*
[3]*% is given as a proportion of total females 3 years and above never vs ever attended any school level.*
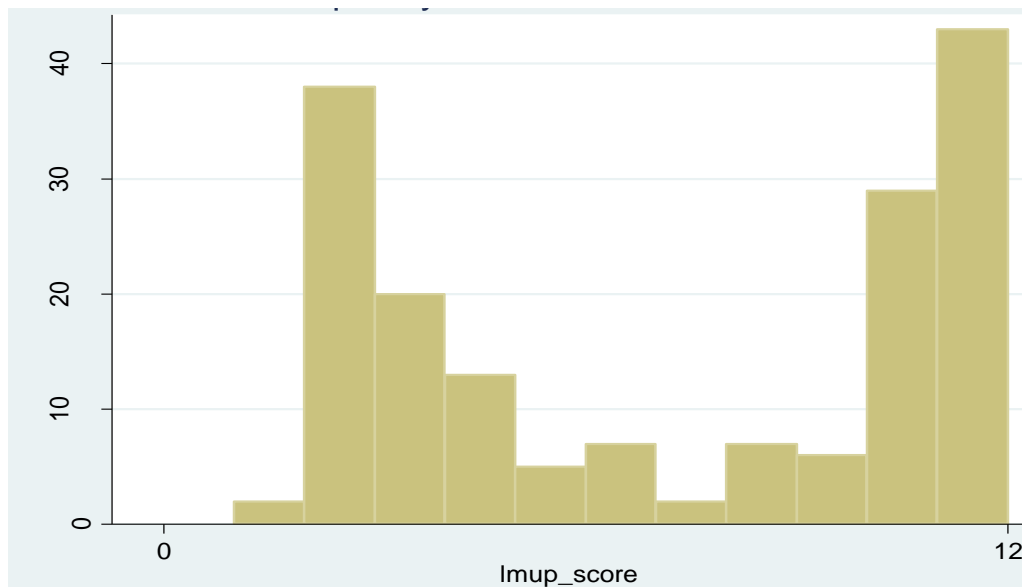[4]*% is given as a proportion of total females 10 years and above ever vs never married*

Figure 1: Frequency distribution of Krio LMUP score

added the following prompt questions after the first question: what contraception method did you use? when did you stop using it? and why did you stop using it? Based on these questions the interviewer then agreed with the woman which the correct response was.

We also altered some options of question six on pre-pregnancy preparations. Firstly, most women were not aware of folic acid specifically. After some further discussion with women and local midwifes we rephrased this option to 'took folic acid or any other vitamins' Secondly, we added more contextually relevant option 'kept money, bought clothes for the baby', similar to the Malawi version of LMUP.

Field-test: women's characteristics

We collected data from 172 women, which was much higher than our target of 100. Women were aged from 15–42 (median 22, mean 23.6) and

almost two-thirds had primary education or less. Over half of women (56%) were married and they had between zero and six live children (median 1) (see Table 1).

Field test: psychometric properties

We had no missing data and all items apart from item one had responses with less than 80% endorsement. Item one (contraception in the month before pregnancy) had 97% endorsement of the response option of not using contraception. The range of LMUP scores from one to twelve was captured in the field test (see Figure 1). The median score was seven.

The whole scale Cronbach's α was 0.84 The item-rest correlation was low for question one (0.04), above 0.7 for questions two to five and acceptable for question six (0.49) (see Table 2).

Just over a half of the sample (87 women) returned for the re-test. There was no significant difference in terms of age, parity, number of live children, marital status, education, partner's occupation, religion or tribe between groups of women that returned and did not return for re-test (see Table 1). These two groups were found to be significantly different by residence (p=0.046). This may be because we had a limited amount to offer to cover transport cost and for those women who lived further from the Health Centre it may not have been enough.

The test-retest interval ranged from 5-10 days and mean was seven days. The median difference in the scores at test and re-test was zero (mean 0.08). The stability was excellent (weighted κ = 0.92).

All our hypotheses were confirmed: women who already had three or more children alive (p = 0.0046), unmarried women (p=0.0001), and women who were below 22 or over 30 (p = 0.0136) were all more likely to report their pregnancies as more unintended (see Figure 2).

PCA showed that five items were measuring one construct as they loaded onto one component which had an Eigenvalue of 3.7. There was a second component which was of borderline significance as it had an Eigenvalue of 1.00. This component mainly represented item one (contraception), with a loading of 0.99 from this item (as shown in Table 2).

Field test: sensitivity analysis

We re-analysed the LMUP without item one (contraception) because of the low item-rest correlation and PCA findings. Removing this item meant that the LMUP scores reduced to zero to 10 and the median score fell to four. There was an increase in Cronbach's α from 0.84 to 0.91 and on PCA the first component had an Eigenvalue of 3.73 with no significant second component. All hypothesis tests were still statistically significant (data not shown).

Field test: scaling

The Mokken analysis showed that items differed in their 'difficulty', with item one (contraceptive use) being easiest to endorse, followed by items two, four, five, and three, and item six (pre-conceptual preparations) as hardest to endorse. The items conformed to a basic Guttmann structure (Table 2). The Mokken scaling procedure selected five items into the scale (H=0.81 for whole scale), as item one missed selection with a Loevinger H coefficient =0.21. However, even with item one included, the Loevinger H coefficient for the overall 6-item scale was still strong at 0.80.

Discussion

There were several areas of minor deviation from the pre-set criteria for the validation of the Krio LMUP, all related to item one (contraception). There was high endorsement of one option on this item, with 97% of women reporting not using contraception (scoring two points) and the remaining 3% reported occasional use or failure of the method in the month before becoming pregnant (scoring one point), therefore the item had very little discrimination. Since no women reported using contraception in the month they became pregnant, no women scored zero on this question and therefore it was not possible to have a total score of zero, meaning we did not capture the full range of LMUP scores. This also led to item one having a low item-rest correlation and to the borderline second component on the PCA, which almost entirely represented item one.

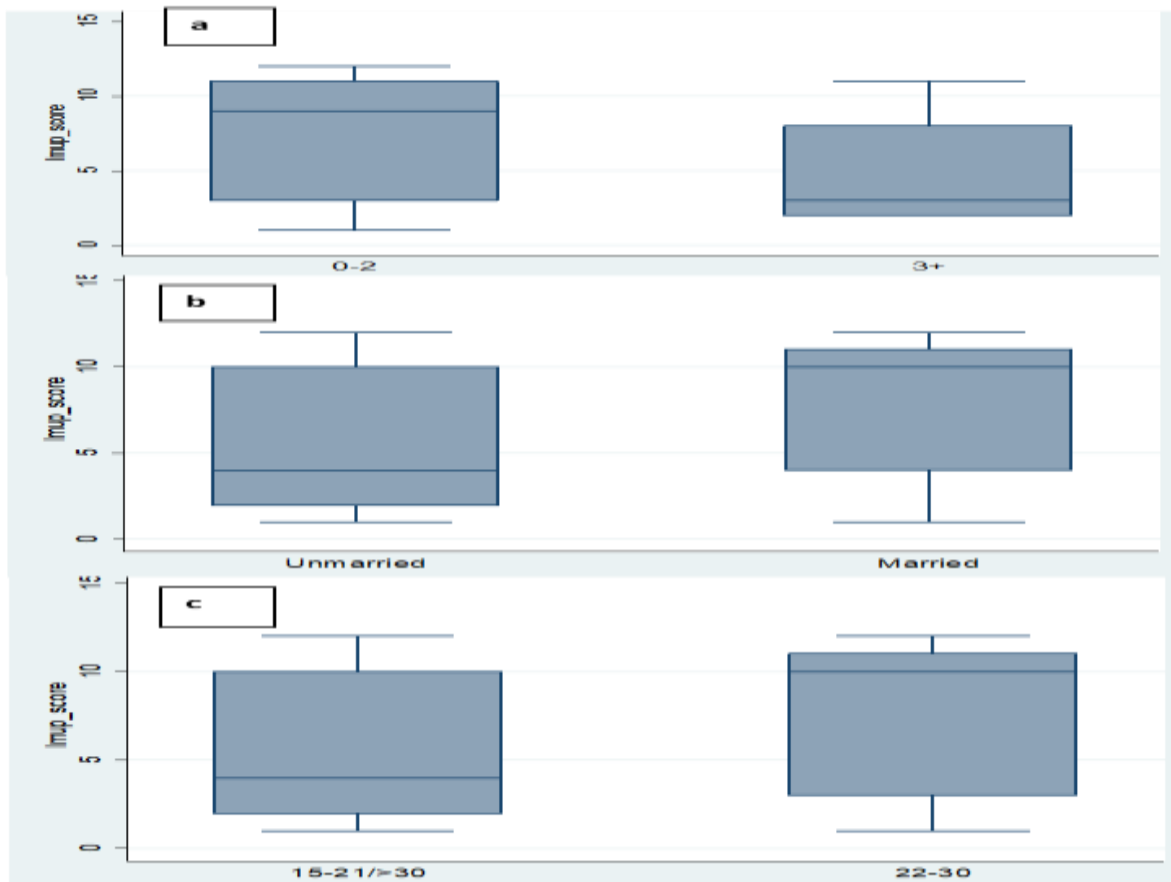Item one had high endorsement of one response option because most of the women, regardless of

Figure 2: Total LMUP score by - a) number of living children; b) marital status;   c) age group

Table 2: Principal component and Mokken analysis of Krio London Measure of Unplanned Pregnancy

	PCA			
		Component 1 (Eigenvalue = 3.7)	**Component 2 (Eigenvalue = 1.0)**	**Mokken**
Items	**Item-rest correlations**	**Item loadings**	**Item loadings**	**Loevinger H**
1 – Contraception	0.045	0.03	*0.99*	**0.21**
2 – Timing	0.882	*0.48*	-0.03	0.83
3 – Intention	0.882	*0.48*	-0.04	0.83
4 – Desire	0.878	*0.48*	-0.05	0.85
5 – Partner	0.774	*0.45*	-0.03	0.76
6 - Preparation	0.492	*0.31*	0.14	0.68

their pregnancy intentions did not use contraception in the month before pregnancy. This reflects very low use of contraceptive use in Sierra Leone (16%), with a high proportion of girls 15-19

who have never used any modern method of contraceptives in their life (86%)[40] and very high discontinuation rate among women (76%)[41] due to fear of infertility, unavailability and misunderstanding of side effects.

There is now mounting evidence that item one (contraception) has a weaker association with intention to become pregnant than was seen in the original development study. This is likely to be due to the higher levels of unmet need for family planning in these settings, which means that many women are not using contraception (and score two on item one) but are otherwise not planning a pregnancy (and score lowly on the other questions). This leads to results like ours of low item-rest correlation and a second component on PCA. The sensitivity analyses in our study and the Malawi evaluation[21] and the Mokken analyses in our study and the USA evaluation[20] all show an improvement in the psychometric properties of the scale with item one removed. However, they also show that the measure is still strong if item one remains in. Furthermore, item one is one of the two items relating to the behaviour component of the conceptual model underpinning the development of the LMUP. The qualitative groundwork showed that behavioural items did have content validity; indeed, the fact that there is variability in these items across different contexts shows their relevance to the concept. This leads us to conclude that item one should remain in the scale.

Ethical Approval

The ethical approval for this study was granted by the University College London Research Ethics Committee (Ethics Application 10663/00) and Ministry of Health and Sanitation of Sierra Leone Research Ethics Committee. The District Medical Officer and the Community Health Officer in charge of the WCHC gave approval to conduct the research in Western Area antenatal clinics.

Limitations

The main limitation of this study was that we were not able to test Krio LMUP on women who were planning to have or had had an abortion, because

abortion is illegal in Sierra Leone. However, as the original UK version of LMUP development and validation included abortion as an outcome, the Krio LMUP could be used in these women[11]. Another possible limitation was that, because 3% of women do not attend antenatal care during pregnancy[28], we may have missed women who are different in important ways because we recruited our women during antenatal clinics. In particular, we may have missed those with the most unplanned pregnancies (leading to birth), as these women are known to be less likely to attend antenatal care[42], and this may also explain why we had no women with an LMUP score of zero. However, since we also recruited from postnatal baby clinics (which 97% of women attend), this limitation may be partially mitigated.

Conclusion

Our results show that the Krio LMUP is a valid and reliable measure of pregnancy intention that can be used in Sierra Leonean women. It has a slightly weaker performance than the original UK version, however, it performs as well or better than most other translations to date. This successful validation of the Krio LMUP contributes to a wider body of work relating to the LMUP, continuing to demonstrate its relevance and utility worldwide. The LMUP is a comprehensive measure covering all aspects of pregnancy intention that allows us to 'draw' a fuller picture of pregnancy intention and planning. It can provide critical insight for studies on unmet need for family planning, understanding of pregnancy planning behaviour and intention, relationships between pregnancy intentions and maternal and neonatal health outcomes and abortion in Sierra Leone and can be used to help the government of Sierra Leone to tailor national programmes for provision of family planning services in the country.

Contribution of Authors

NB conceived the idea and initiated collaboration with Sierra Leonean colleagues. NB and JH secured funding, with additional funding support provided by JS, and NB, JH and GB wrote the

protocol, data collection tools and analysis plan. NB led and co-ordinated in-person all in-country activities under the supervision of JH. AY and TTS translated and contributed to pre-testing the questionnaire. AY co-ordinated the field work, NB and AY, with support of two data collectors, conducted the interviews, TTS provided technical advice and local expertise and facilitated in-country arrangements with MoH and health facilities. NB analysed the data under the supervision of GB and JH. NB and JH wrote the first draft and all authors commented on successive drafts of the paper and approved the final version.

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