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## Psychometric properties of the Ndetei–Othieno–Kathuku (NOK) Scale: A mental health assessment tool for an African setting

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### Abstract

**Background:** Research suggests that psychiatric conditions in children and adolescents are highly debilitating, with sparse resources for assessment and treatment in low- and middle-income countries (LMICs).

**Objectives:** The primary aim of this study was to evaluate the reliability, validity, and latent factor structure of an ethnographically-grounded assessment instrument for detecting common mental health complaints among rural Kenyan children and adolescents.

**Methods:** The Ndetei–Othieno–Kathuku Scale (NOK) was delivered to 2 282 children aged 10 to 18 years old. Exploratory factor analysis identified four latent factors. This structure was confirmed in subsequent confirmatory factor analyses. External validity was explored by investigating associations among NOK factors and Youth Self-Report DSM-oriented scales.

**Results:** Findings suggest the NOK possesses good internal reliability and a four-factor latent structure corresponding to depression, anxiety, somatic complaints, and a mixed factor. Significant associations ranging from small to medium effect sizes were noted between NOK factors and YSR DSM-oriented scales.

**Conclusions:** Exploratory findings suggest that the NOK possesses adequate psychometric properties among this population. This ethnographically-grounded instrument may be uniquely suited to screening for mental health complaints among Kenyan children and adolescents.

Active debate regarding the role of culture in mental disorders is as old as psychiatry itself, and is no less active today (Bass, Bolton, & Murray, 2007; Breslau, Javaras, Blacker,

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Murphy, & Normand, 2008; Hinton & Lewis-Fernandez; Kleinman, 1977; Summerfield, 2008). Yet several findings suggest that using psychiatric diagnostic approaches in different cultures than the ones that they were developed in can be problematic due to underreporting of reliability and validity of tools used (Hollifield et al., 2002), uncertainty over the degree of congruence between locally congruent syndromes and Western diagnostic categories (Bass, Bolton, & Murray, 2007; Kleinman, 1977), and lack of norms and clear diagnostic clinical thresholds across different cultures (Tausig et al., 2011). Taken together, further research on cross-cultural assessment of psychiatric conditions appears warranted.

Concluding that assessment instruments designed in high income settings may not be valid in other contexts, several researchers have developed ethnographically-grounded instruments that better reflect local idioms of distress and beliefs about common psychiatric complaints (Rasmussen et al., 2015; Kohurt et al., 2013; Kaiser et al., 2015). In East Africa specifically, some effort has been made to develop instruments containing local idioms to assess common mental health complaints among various populations including Northern Ugandan youth (Betancourt et al., 2009) and Kenyan community-dwelling adults (Ndeti et al., 2006). Preliminary research has suggested that these ethnographically-grounded instruments facilitate accurate identification of common mental health complaints (Betancourt et al., 2014; Ndeti et al., 2006).

The present report contributes to the existing literature by investigating the psychometric properties of the Ndeti-Othieno-Kathuku Scale (NOK; Ndeti et al., 2006), an ethnographically-grounded instrument developed to assess common mental health problems typically seen in a Kenyan setting. While other similar scales, such as the Acholi psychosocial assessment instrument (APAI; Betancourt et al., 2009), have been developed for use in Uganda; studies have not yet been conducted on its cross-cultural applicability to the Kenyan setting. The NOK was developed as a culturally sensitive instrument for the Kenyan setting and for similar socio-cultural situations to promote rapid identification of mental health disorders, enhance mental health awareness, and promote health-seeking behaviours. The scale authors developed the instrument by compiling a list of symptoms that they commonly encountered in the course of their clinical work among psychologically distressed individuals. Given that somatization is common among this population, it contains a number of items addressing somatic complaints (Ndeti et al., 2008; Ndeti & Muhangi, 1979).

Preliminary psychometric analyses of the NOK have shown adequate reliability, test-retest reliability, as well as convergent validity when administered among adult survivors of a bomb blast, child and adult survivors of a fire disaster in a rural school, and parents of deceased children (Ndeti et al., 2006). The mean item reliability among these samples was high ( $\alpha = 0.97$ ). The NOK also showed expected positive correlations with Post Traumatic Stress Disorder (PTSD) assessed using the civilian version of the Mississippi PTSD Scale (Vreven et al., 1995) ( $r = 0.61$ ) and general psychiatric symptoms ( $r = 0.79$ ) assessed using the Hopkins Symptom Checklist (SCL-90; Derogatis et al., 1974) among secondary school aged children (Ndeti et al., 2006).

While prior research has provided preliminary evidence of the validity of the NOK, prior studies had relied on relatively small sample sizes and no study has investigated the factor structure of this instrument. Furthermore, scale properties had not yet been examined in a sample of rural adolescents. Given that research suggests mental health needs among children and adolescents in LMICs is often neglected (Kieling, 2011), instruments that can reliably contribute to identifying those most in need are warranted.

## The present study

The present study aims to assess the reliability, validity, and factor structure of the NOK among adolescents in a rural Kenyan setting. The NOK (Ndetei et al., 2006) was administered to school children aged 10 to 18. Internal reliability, factor structure, and confirmatory factor analyses were conducted to better understand the reliability and validity of this instrument. Finally, comparisons were made between NOK factors and the Youth Self Report DSM-IV oriented scales (YSR; Achenbach, 1991; American Psychiatric Association, 1994) to examine external validity. The YSR was selected to examine convergent validity because it has previously been validated in several cross-cultural settings (Achenbach, Rescorla, & Ivanova, 2012; Ivanova et al., 2007; Rescorla et al., 2005), and represents an integration of an empirically derived ‘bottom-up’ strategy with an expert-rated ‘top-down’ approach to designating taxonomies of childhood mental disorders (Achenbach, Dumenci, & Rescorla, 2002; 2003). This approach to taxonomic construction has shown greater generalizability to diverse populations. On the basis of these considerations, we considered the following study hypothesis. Given prior studies demonstrating associations among items on the NOK and depression and anxiety (Ndetei et al., 2006), we hypothesized that the NOK would demonstrate expected significant associations with Affective and Anxiety Problem subscales of the YSR.

## Method

### Participants

Participants ( $N = 2\,282$ ) were enrolled in a larger study on school adjustment in two rural districts of eastern Kenya. All children enrolled in the study attended school and were registered in standard (grades) five through seven. The mean age of the sample was 12.63 years ( $SD = 1.53$ ) with an age range from 10 to 18 years. The gender composition was divided equally among boys ( $n = 1\,092$ ; 47.9%) and girls ( $n = 1\,189$ ; 52.1%) (Note: percentages do not add up to total  $N$  due to missing data for one participant).

### Measures

**Ndetei-Othieno-Kathuku Scale**—This is a 33-item questionnaire that assesses self-reported common mental health problems such as depression and anxiety symptoms routinely seen in local outpatient clinical care in the Kenyan setting (Ndetei et al., 2006). The complete scale is reproduced in Appendix 3. Responses are rated on a 5-point likert scale ranging from 0 (*not at all*) to 4 (*extreme*). Item instructions state: “*Over the last one-week and even today, how much were you distressed by: ...*” Sample items include: “*Feeling as if insects or ants are crawling under your skin,*” “*Feeling your heart has fallen down*” and

“Getting frequent attacks of malaria.” The reliability coefficient for the current sample was  $\alpha = 0.94$ .

**Youth Self Report**—The YSR is a self-report instrument that assesses emotional and behavioural concerns among children aged 6 to 18 years (Achenbach, 1991). The scale contains 112 items that are scored on a 3-point scale ranging from 0 (*not true*), 1 (*somewhat or sometimes true*), and 2 (*very or often true*). Numerous studies have investigated the reliability and validity of this instrument among children aged 11 to 18 years, which has shown remarkably stable properties (Achenbach et al., 2002; van Lang et al., 2005), as well as generalizability to diverse cultural groups and both male and female genders (Ivanova et al., 2007; Rescorla et al., 2012). *The DSM-oriented scales* provide an alternative scoring approach developed by expert agreement methods, and subsequent research has suggested these scales also demonstrate strong psychometric properties (Achenbach et al., 2003). The DSM-oriented subscales used in this study include Anxiety Problems, Affective Problems, Somatic Problems, Attention Deficit/Hyperactivity Problems, Oppositional Defiant Problems, Conduct Problems, Obsessive-Compulsive Problems, and Post-Traumatic Stress Problems.

## Procedure

Participants were enrolled at schools in the Makindu and Machakos districts in an eastern province of Kenya. The study was approved by Kenya Medical Research Institute Ethics Review Committee and the research ethics board at the Centre for Addiction and Mental Health in Toronto, Canada. Surveys were translated into Kiswahili and Kikamba following a forward and backward translation procedure. First, an experienced health professional translated instruments from English to the local dialect, and then an independent team blind to the original instrument translated the instruments back into English. Any discrepancies were then reconciled by an expert committee of at least six multilingual experts in English, Kiswahili, and Kikamba. Panel members then suggested alternatives and agreed on acceptable solutions. In the final step, the translated scale was administered to a pilot sample and examined for accuracy. Simple random sampling was used to select schools that were subsequently enrolled in the study. Recruitment proceeded by making information about the study available to children in the classrooms through verbal description. Participation was voluntary and confidential and all research personnel were trained in research with vulnerable subjects. After child and parent consent was obtained, participants completed surveys in hard copy that were subsequently collected by research assistants. All field research assistants had completed a high school education, at a minimum. A field supervisor responsible for quality control then reviewed all completed forms. Data from hard-copy surveys was double-entered into SPSS Version 17 and cross-checked for discrepancies. Where noted, original hard-copy forms were referenced to make corrections as needed.

## Approach to statistical analysis

We first conducted initial exploratory analyses to detect excessive skewness or high inter-correlation among items. We then used a two-step procedure to examine the factor structure of the 33 symptom items identified in the NOK. First, we split the sample using randomized selection procedures, reserving one half ( $N = 1\ 109$ ) for exploratory factor analyses (EFA),

and the second random half for use in subsequent confirmatory factor analysis (CFA) ( $N=1173$ ). We used this approach to avoid the biased upward fit that can occur when models are estimated using the same data from which they are derived. All analyses were conducted in R, version 3.2.3, using the 'psych' (Revelle, 2012) and 'lavaan' packages (Rosseel, 2012).

Secondly, parallel analysis, a Monte Carlo stimulation technique, was conducted to guide factor retention decisions for subsequent EFAs, which compares the eigenvalues of the observed data with that of a random data matrix of the same size as the original (Hayton et al., 2004; Revelle & Rocklin, 1979). Our models were specified with the number of iterations set to 50 and principal axis factor method. We selected the default settings for missing data in the parallel analysis, which included removing missing values and finding pairwise correlations.

Based on the findings from the parallel analysis, we conducted EFAs fit to the observed data using principal axis factoring given that this method does not entail an assumption of multivariate normality (Fabrigar et al., 1999). All EFAs were fit specifying Geomin rotation given the likely inter-correlation among factors, and to achieve a balance between factor interpretability and complexity (Sass & Schmitt, 2010; Wright et al., 2013).

In order to assess the relative fit for the hypothesized factor structure underlying the NOK, we carried out a CFA on the second random half of our split data ( $N=1173$ ). Our model was specified using maximum likelihood estimation with unrestricted mean and covariance models. The model was fit to the observed data matrix, and the latent factors' mean was fixed at zero and the variance at one, with correlated factors. Finally, model estimation was specified to include missing data values; thus missing values were estimated using standard maximum likelihood estimation and not imputed. We adhered to the following conventions for determining quality of model fit. First we followed conventions established by Bentler (1990) for the Comparative Fit Index (CFI) wherein a CFI value of  $> 0.90$  is considered marginally acceptable and any value  $> 0.95$  is considered excellent. Ranges for the Root Mean Square Error of Approximation (RMSEA) (Mueller, 2000) of  $< 0.08$  were considered acceptable, and values of  $< 0.05$  considered excellent for the Standard Root Mean Square Residual (SRMR) (Schumacker & Lomax, 2010).

## Results

### Exploratory factor analysis (EFA)

Exploratory analyses and frequency examination of the 33 scale items failed to detect excessive skewness. Inter-correlation among items was not excessively high, with values ranging from 0.20 to 0.57 with the majority of values in the 0.2 to 0.3 range. Therefore all items were retained for further analyses. We then conducted a parallel analysis and results suggested retaining five factors. The first observed eigenvalue (10.15) exceeded the first simulated eigenvalue (0.37). The second observed eigenvalue (1.05) exceeded the second simulated eigenvalue (0.30), the third observed value (0.52) exceeded its simulated value (0.27), the fourth observed value (0.44) exceeded the fourth simulated value (0.24), and finally the fifth observed eigenvalue (0.27) exceeded its simulated eigenvalue (0.22) by a small margin.

Results of our initial EFA showed that the first five eigenvalues were 3.82, 2.62, 2.71, 2.12, and 1.70, and the RMSEA = 0.031 [90% CI = 0.027, 0.033], suggesting excellent fit. Tucker Lewis Index of factoring reliability was excellent (0.96). Subsequent examination of the loadings for the five-factor solution revealed that only two items loaded on the fifth factor, “*Feeling a pressure on the top of your head*”, and “*Feeling as if you are carrying a heavy load on your head.*” Because these two items were not interpretable as a factor, as well as the tendency of parallel analysis using large sample sizes to lead to overestimation of the number of factors as a function of increasing sample size; we elected to run a four-factor model. This four-factor EFA (using similar parameters as the five-factor EFA) returned eigenvalues of 3.47, 3.18, 3.30, and 2.59. The RMSEA index increased slightly, RMSEA = 0.034 [90% CI = 0.03, 0.036] but remained in the excellent range. The Tucker Lewis Index of factoring reliability was also excellent (0.95). The four-factor solution resulted in a model with theoretically and clinically meaningful factors and was adopted for subsequent analyses. Item means, standard deviations, and loading values are presented in Table 1.

The factor loadings for the four-factor solution showed moderate to high loadings a single factor, with cross-loadings on four items. Items had loadings that ranged from |0.27| to |0.80|. All factors had at least four items loading at a value greater than |0.40|. Taken together, EFA results yielded a factor pattern consistent with clinically meaningful taxonomies. The first factor demonstrated a pattern consistent with depressive disorders. An item cross-loaded on factors 1 and 2 (*Passing hard stools*), but since clinically meaningful rationale for determining its best factor fit could not be determined this item was not included when generating sub-scales for validity comparisons. We labelled this first factor ‘Depression’. The second factor appeared to reflect a mixed profile that was not readily interpretable. One item (*Feeling as if insects or ants are crawling under your skin*) was retained on factor 2 given its slightly higher loading. We labelled this factor ‘Mixed.’ The third factor contained items clinically reflective of anxiety conditions. One item (*Feeling your blood is running too fast*) cross-loaded on factor 1, but was retained on factor 3 for further analyses given its clinical relationship to general anxiety conditions. We labelled this third factor ‘Anxiety’. Finally, a fourth factor appeared to contain items grouped meaningfully into somatic complaints, which we labelled as such. One item cross-loaded on factor 1 (*Often getting treatment for chest pains*). For theoretical reasons, this item was included in factor 4 given its commonality with somatic complaints. Correlations among the four factors, presented in Table 2, ranged from  $r = 0.55$  to  $0.73$ .

### Confirmatory factor analyses

Results of the 4-factor CFA suggested excellent fit ( $X^2 = 13\ 115.25$ ,  $df = 496$ ,  $p < 0.001$ ; CFI = 0.93; TLI = 0.92; RMSEA = 0.041, 90% CI 0.038–0.043; SRMR = 0.037), with an acceptable range identified for the Comparative Fit Index (CFI). In this final model the correlations among the higher-order factors were: 0.32 (Depression with Mixed), 0.54 (Depression with Anxiety), 0.53 (Depression with Somatic), 0.32 (Mixed with Anxiety), 0.37 (Mixed with Somatic), and 0.54 (Anxiety with Somatic).



### Internal reliability

Internal reliability estimates for each of the four factors ranged from good to acceptable (where good = 0.8–0.9 and acceptable = 0.7–0.8) (Nunnally & Bernstein, 1994): Depression:  $\alpha = 0.83$ ; Mixed:  $\alpha = 0.84$ ; Anxiety:  $\alpha = 0.83$ ; and Somatic:  $\alpha = 0.77$ . Item-item correlations are not reported here due to space limitations but can be provided by the first author upon request. Item-item correlations ranged from the lowest value of 0.17 to the highest value of 0.53, with most falling in the 0.3–0.4 range.

### External validity

To examine the external validity of the NOK, comparisons were made between its four factors and a DSM-related measure of clinical psychopathology. Correlations between the YSR (Achenbach, 1991) and the NOK are presented in Table 2.

Results suggested significant associations among the four NOK factors and all eight YSR-DSM oriented scales. Specifically, correlations between the *Depression* NOK factor and YSR scales ranged from 0.21 to 0.45; with the lowest magnitude of association noted between NOK Depression and YSR Attention Deficit-Hyperactivity problems (0.21); and the highest magnitude of correlation between NOK Depression and YSR Affective problems (0.45). This was in line with theoretical expectations. Associations among the NOK *Mixed* factor and YSR scales ranged from 0.22 to 0.43, with the lowest magnitude of association with Attention Deficit-Hyperactivity Problems (0.22); and the highest magnitude of correlations found between Affective Problems and Somatic Problems (0.43). Next, correlations between the NOK *Anxiety* factor and YSR scales ranged from 0.24 to 0.43, with the lowest correlation with Attention Deficit-Hyperactivity Problems (0.24); and the highest magnitude of correlations with Affective Problems (0.43). Finally, the range of correlations between NOK *Somatic* factor and YSR scales ranged from 0.15 to 0.38, with the lowest correlation with Attention Deficit-Hyperactivity Problems (0.15); and the highest magnitude of correlation with Somatic Problems (0.38), as would be expected. Taken together, patterns of correlations between NOK factors and YSR scales yielded mixed results. While all scales revealed associations in the low to moderate effect size range, the Depression and Somatic NOK factors showed the highest agreement with concordant YSR scales.

### Discussion

The primary aim of this study was to explore the reliability, validity, and latent factor structure of an ethnographically-grounded assessment instrument designed to inventory common mental health concerns, such as depression and anxiety complaints, among a rural population of school-aged children. Preliminary findings suggested that the NOK (Ndetei et al., 2006) demonstrated good internal reliability and appears to have a four-factor latent structure; best described as Depression, Mixed, Anxiety, and Somatic factors. Each factor had at least four items with loadings greater than  $|0.40|$ , which is the suggested minimum loading value to ensure replicable factor pattern structures (Guadagnoli & Velicer, 1988). Confirmatory factor analysis converged, supporting the latent four factor structure for the scale with good to excellent fit. These four factors were correlated with YSR derived DSM

scale disorders in the small to medium effect size range; where small = 0.2, medium = 0.5, and large = 0.8 (Cohen, 1988). The largest effect sizes, falling in the medium range, were between NOK Depression and Anxiety factors and YSR Affective and Anxiety problems, which is consistent with prior research suggesting that several items on the NOK are sensitive to symptoms of depression and anxiety according to DSM-IV (American Psychiatric Association, 1994) criteria (Ndetei et al., 2006). Notably, the magnitude of this effect size was also similar to previous cross-cultural construct validation studies on resiliency (Alessandri et al., 2012), as well as cross-cultural studies on anxiety and depression (van Lang et al., 2005). Furthermore, findings are also in line with previous studies noting correlations among NOK items and depression and anxiety assessed using Self-Rating Questionnaire (SRQ; Harding et al., 1980), the Beck Depression Inventory (BDI; Beck, 1961), and the Hopkins Symptom Checklist (SCL-90; Derogatis et al., 1974). Taken together, findings suggest that the NOK is a culturally-sensitive instrument that may be useful as a screening tool for depression and anxiety among school-aged children.

The NOK could be suitable for screening for mental health complaints in rural Kenyan settings where individuals suffering from these disorders tend to present with somatic complaints. Prior studies among this population suggest that somatic complaints often mask underlying symptoms of psychological distress, leading to delays in treatment and inaccurate diagnoses (Ndetei & Muhangi, 1979). This research has suggested that in rural areas, many patients will fail to endorse subjective symptoms of fearfulness or apprehension in the case of anxiety, or sadness or guilt in the case of depression. Rather, complaints may be focused on concerns related to the abdomen or head, given the importance of these areas to health and well-being. These factors highlight the utility of an ethnographically-grounded instrument that can facilitate effective diagnosis. Furthermore, study findings suggest that further qualitative research on socio-cultural explanations of the etiology, presentation, and experiences related to mental health diagnoses is warranted. This body of research is essential for evaluating the local meaning of the diagnostic categories gleaned from the NOK among the population evaluated.

There are several limitations to this study that suggest caution when interpreting the primary findings. Firstly, several items cross-loaded on more than one factor; suggesting that further research into the underlying latent factor structure of the NOK is warranted. Ideally each factor would have at least four items loading at values greater than  $|0.60|$  (Guadagnoli & Velicer, 1988); however our study findings did not obtain this pattern of factor loadings, suggesting the possibility of an unstable factor structure and indicating the need for further research to confirm reproducibility of factors in other samples. Secondly, while the study benefited from drawing on a large sample size and may be generalizable to other community-dwelling school-aged children in these districts, it is not possible to generalize the findings from this study to a clinical sample.

Thirdly, the scale that was used in this study to investigate convergent validity, the YSR, has not been formally validated in this population. Two factors are relevant to this limitation. First, several previous cross-cultural and international epidemiological studies have demonstrated that the YSR has stable psychometric properties across more than 50 societies (Achenbach, Rescorla, & Ivanova, 2012; Rescorla et al., 2012). Second, the translated YSR

was administered to a pilot sample as part of the procedures to evaluate accurate translation. These precautions notwithstanding, the lack of formal validation of the YSR among this Kenyan population does suggest further caution when interpreting the present findings. Additional data on the properties of the YSR among Kenyan youth would aid in interpreting the pattern of correlations noted in the present report. Finally, information about mental health symptoms was gathered exclusively using self-report methods, a notable methodological limitation. Multi-method approaches to assessing mental health, including knowledgeable informant-rated and expert opinion, are important aspects of future research on the utility of this screening measure in clinical practice.

In summary, the present report aimed to assess the reliability, validity, and factor structure of an ethnographically-grounded mental health screening instrument among rural Kenyan school-aged children and adolescents. This approach to characterizing mental health complaints aims to reflect locally derived idioms of distress and commonly held beliefs about mental health to facilitate access to care. In addition to the clinical and practical utility of an instrument that incorporates local idioms and concepts of distress; this tool could also facilitate research that aims to distinguish between syndromes with psychogenic origins vs. culturally interpreted/labelled disorders among children, adolescents, and adults (Tseng, 2006).

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## Appendix

### Appendix 1: NOK (Ndetei, Othieno, Kathuku) Inventory (Symptom check list – SCL) for depression and anxiety

Please read the following statements and circle the answer that best describes you feeling for the past one week including today.

Over the last one week and even today, how much were you distressed by:

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Feeling as if insects or ants are crawling under your skin	0	1	2	3	4
2. Feeling a pressure on the top of your head	0	1	2	3	4
3. Feeling as if you are carrying a heavy load on your head	0	1	2	3	4
4. Feeling a lot of pressure between your shoulders	0	1	2	3	4
5. Often having joint pains	0	1	2	3	4
6. Often having pain in your bones	0	1	2	3	4

	Not at all	A little bit	Moderately	Quite a bit	Extremely
7. Sweating a lot even when it is cold outside	0	1	2	3	4
8. Feeling as if your blood is slowed down	0	1	2	3	4
9. Your blood running too fast	0	1	2	3	4
10. Often having a ringing feeling/sensation in your ears	0	1	2	3	4
11. Thinking your illness is due to bewitchment	0	1	2	3	4
12. Feeling your heart is heavy	0	1	2	3	4
13. Feeling your heart has fallen down	0	1	2	3	4
14. Getting frequent attacks of malaria	0	1	2	3	4
15. Feeling pains in the upper part of your stomach/abdomen	0	1	2	3	4
16. Getting disturbed by noise	0	1	2	3	4
17. Crying until you can cry no more	0	1	2	3	4
18. Feeling you look older than you really are	0	1	2	3	4
19. Feeling your desire for sex is much decreased	0	1	2	3	4
20. Feeling there are worms/snakes crawling through your body and making you ill	0	1	2	3	4
21. Passing hard stools	0	1	2	3	4
22. Passing loose stools	0	1	2	3	4
23. Often getting treatment for malaria	0	1	2	3	4
24. Often getting treatment for stomachaches	0	1	2	3	4
25. Often getting treatment for headaches	0	1	2	3	4
26. Often getting treatment for chest pains	0	1	2	3	4
27. Often getting treatment for heart disease	0	1	2	3	4
28. Having too little sleep	0	1	2	3	4
29. Finding it difficult to wake up/get out bed in the mornings	0	1	2	3	4
30. Getting bad dreams	0	1	2	3	4
31. Having trouble with your vision	0	1	2	3	4
32. Feeling as if the eyes are being drawn inside the head	0	1	2	3	4
33. Feeling a terrible pain migrating to different parts of the body	0	1	2	3	4

Also answer the following questions:

1. For how long have you had this disease?
2. Have you been previously treated for this same disease by: Tick correct answer(s)
  - (a) self
  - (b) hospital
  - (c) other medical person
  - (d) traditional medicine – persons
  - (e) other (specify)
3. Any other symptoms?

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**Table 1:**Factor loadings of the NOK on first random half of study sample ( $N = 1\,109$ )

Item	Mean (SD)	Depression/ F1	Mixed/ F2	Anxiety/ F3	Somatic/ F4
18 Feeling you look older than you really are	0.52 (1.11)	<b>0.67</b>	0.12	-0.05	-0.02
27 Often getting treatment for heart disease	0.46 (1.09)	<b>0.56</b>	-0.09	0.07	0.11
13 Feeling your heart has fallen down	0.51 (1.10)	<b>0.48</b>	-0.06	0.30	-0.01
17 Crying until you can cry no more	0.61 (1.18)	<b>0.42</b>	0.07	0.23	0.01
12 Feeling your heart is heavy	0.55 (1.12)	<b>0.40</b>	-0.01	0.35	0.00
11 Thinking your illness is due to bewitchment	0.59 (1.20)	<b>0.39</b>	0.06	0.25	0.02
19 Feeling your desire for sex is much decreased	1.61 (1.35)	<b>0.38</b>	0.16	0.16	-0.03
21 Passing hard stools	1.21 (1.47)	0.34	0.33	0.02	0.02
29 Finding it difficult to wake up/get out of bed in the mornings	1.10 (1.51)	0.05	<b>0.56</b>	-0.01	0.03
30 Getting bad dreams	1.32 (1.60)	-0.03	<b>0.53</b>	-0.03	0.11
10 Often having a ringing feeling/sensation in your ears	1.13 (1.49)	-0.09	<b>0.48</b>	0.24	0.02
33 Feeling a terrible pain migrating to different parts of the body.	0.87 (1.42)	0.23	<b>0.43</b>	0.07	0.00
16 Getting disturbed by noise.	0.87 (1.38)	0.10	<b>0.40</b>	0.18	0.00
20 Feeling there are worms/snakes crawling through your body and making you ill	1.46 (2.12)	0.07	<b>0.37</b>	0.10	0.15
31 Having trouble with your vision	0.78 (1.30)	0.31	<b>0.35</b>	-0.02	0.05
28 Having too little sleep	0.79 (1.30)	0.30	<b>0.35</b>	-0.05	0.04
32 Feeling as if the eyes are being drawn inside the head	0.87 (1.41)	0.19	<b>0.35</b>	0.08	0.08
15 Feeling pains in the upper part of your stomach/abdomen	1.03 (1.44)	0.06	<b>0.31</b>	0.18	0.16
1 Feeling as if insects or ants are crawling under your skin	0.66 (1.21)	-0.11	<b>0.28</b>	0.27	0.01
2 Feeling a pressure on the top of your head	0.68 (1.20)	0.02	-0.02	<b>0.63</b>	0.10
3 Feeling as if you are carrying a heavy load on your head	0.66 (1.22)	0.02	0.10	<b>0.61</b>	0.01
8 Feeling as if your blood is slowed down	0.49 (1.08)	0.27	-0.03	<b>0.46</b>	0.01
4 Feeling a lot of pressure between your shoulders	0.75 (1.24)	0.07	0.22	<b>0.41</b>	-0.02
6 Often having pain in your bones	0.70 (1.25)	0.14	0.13	<b>0.37</b>	0.09
5 Often having joint pains	0.92 (1.37)	0.00	0.29	<b>0.35</b>	0.00
7 Sweating a lot even if it's cold outside	0.76 (1.31)	0.17	0.02	<b>0.30</b>	0.15
9 Your blood is running too fast	0.62 (1.18)	0.32	0.05	<b>0.32</b>	0.04
23 Often getting treatment for malaria	1.48 (2.18)	0.01	-0.14	0.03	<b>0.80</b>
24 Often getting treatment for stomach-aches	1.14 (1.49)	0.07	0.03	-0.09	<b>0.70</b>
25 Often getting treatment for headaches	1.34 (1.57)	-0.02	0.16	-0.01	<b>0.57</b>
14 Getting frequent attacks of malaria	1.22 (1.51)	-0.08	0.09	0.16	<b>0.55</b>
26 Often getting treatment for chest pains	0.76 (1.34)	0.33	0.04	0.03	<b>0.33</b>
22 Passing loose stools	1.52 (2.31)	0.11	0.04	0.01	<b>0.30</b>

Note: Principal axis factoring, geomin rotation with Kaiser Normalization. Bolded items indicate inclusion in subsequent subscale generation for confirmatory factor analyses. All items are introduced with the statement: "Over the last one week and even today, how much were you distressed by..."



**Table 2:**

Intercorrelations among NOK factors and YSR DSM-oriented scales ( $N = 2\,203$ )

NOK	1	2	3	4	5	6	7	8	9	10	11	12
1. Depression	0.83											
2. Mixed	0.67**	0.84										
3. Anxiety	0.73**	0.71**	0.83									
4. Somatic	0.55**	0.65**	0.59**	0.77								
YSR-DSM oriented scales												
5. Affective	0.45**	0.43**	0.43**	0.30**	–							
6. Anxiety	0.30**	0.25**	0.27**	0.20**	0.47**	–						
7. Somatic	0.31**	0.43**	0.39**	0.38**	0.50**	0.34**	–					
8. Attention/hyperactivity	0.21**	0.22**	0.24**	0.15**	0.32**	0.30**	0.23**	–				
9. Oppositional-defiant	0.27**	0.24**	0.27**	0.18**	0.37**	0.31**	0.21**	0.28**	–			
10. Conduct	0.39**	0.35**	0.37**	0.24**	0.59**	0.43**	0.37**	0.38**	0.38**	–		
11. Obsessive-compulsive	0.33**	0.30**	0.31**	0.21**	0.59**	0.50**	0.36**	0.23**	0.33**	0.55**	–	
12. Post-traumatic stress	0.38**	0.36**	0.35**	0.26**	0.64**	0.61**	0.41**	0.36**	0.40**	0.56**	0.61**	–

Note:

\*  $p < 0.05$ ;

\*\*  $p < 0.01$ ; reliability coefficients for the NOK factors are noted on the diagonal