Mental health screening in refugees - Assessing the needs of the vulnerable seeking asylum

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Abstract

Background: A substantial number of refugees present with psychiatric disorders. This appears particularly acute in the currently increasing refugee populations in Europe. Although EU guidelines demand the identification and support of vulnerable individuals such as survivors of trauma, there are as yet no adequately validated and comprehensive mental health screening instruments for refugees residing in Europe.

Objective: We studied the feasibility, validity, and reliability of the Refugee Health Screener – 15 (RHS-15) - a time-efficient and easy-to-implement screening which has been developed by Hollifield et al. (2013) - as a self-rating and interview instrument, and sought to obtain an estimate of the current prevalence of mental health problems in current refugees.

Methods: A sample of refugees (N = 86), representative of those who had arrived around the turn of the year 2015/2016 in Germany, filled in the RHS-15 on their own. A semi-structured clinical interview was later conducted with a random subsample (n = 56).

Results: Fifty-two percent of the refugees examined screened positive in the RHS-15, indicating current mental health problems. The RHS-15 showed excellent psychometric properties in both the self-rating and the interview version. It detected clinically relevant mental health problems when PTSD, depression, anxiety, or somatization problems were present. A shorter 13-item version proved to be equally valid.

Conclusions: Together with previous research on the RHS in US refugees, this suggests that the RHS is a time-efficient and accurate instrument, able to detect common mental health disorders in a wide range of refugees. Generally, we recommend the screening of all refugees, e.g. by integrating the RHS into the initial medical examination conducted in the host community.

Keywords: refugee, asylum seeker, screening, mental health, psychiatric disorder, psychometric, Europe, Germany

Highlights of the article

- Around half of the examined refugees who recently arrived in Germany presented mental health problems and emotional distress.
- The Refugee Health Screener, a short screening instrument, shows excellent psychometric properties in detecting common mental health problems in a heterogeneous refugee sample in Germany – as a self-rating and interview instrument.
- It can be recommended as a screening tool and should be part of the initial medical examination of refugees.

Introduction

War, persecution, and violence have lead to record-high numbers of people being forcibly displaced, with numbers estimated at 65.3 million people in 2015 (United Nations High Commissioner for Refugees [UNHCR], 2016). In Europe, the number of first time asylum applications in 2015 has more than doubled in many countries, with Germany being the largest recipient (Eurostat, 2016). The majority of refugees came from current or former war populations like Syria, Afghanistan, Iraq, and Kosovo (Eurostat, 2016). Mental health problems are overrepresented in refugee compared to non-refugee populations (Porter & Haslam, 2005; Priebe, Giacco, & El-Nagib, 2016). Given the refugees' heterogeneity and differences in pre-flight, flight, and postmigrational experiences, it is unsurprising that reviews found a high intersurvey variability (e.g. Miller, Elbert, & Rockstroh, 2005; Steel et al., 2009). However, prevalence rates of 30% for posttraumatic stress disorder (PTSD) and depression are a typical estimate (Miller et al., 2005; Steel et al., 2009). Studies examining the mental health of the present groups of refugees report comparable rates (e.g. Alpak et al., 2015; Führer et al., 2016). The ever-growing number of refugees with traumatic experiences (Porter & Haslam, 2005; UNHCR, 2016) and the associated high rates of mental health problems have been termed a "mental health crisis" (Schauer, 2016). Hence, there is a strong imperative to integrate an assessment of mental health needs into the initial medical examination already in place in many countries (e.g. Elbert, Wilker, Schauer, & Neuner, 2016; Rhema, Gray, Verbillis-Kolp, Farmer, & Hollifield, 2014). For EU states, this is underlined by the directive of the European parliament and of the council (directive 2013/33/EU) stating that EU states have to assess refugees' special needs within a reasonable time period and accordingly address these needs in providing medical and psychological treatment, especially for vulnerable persons. This includes, amongst others, minors, victims of severe violence or human rights violations, and those suffering from mental illnesses.

Given the substantial rates of mental illness in refugees, the high use of primary health care and hospitalization rates is not surprising – however, access to mental health services is very low (Bell & Zech, 2009; Hadgkiss & Renzaho, 2014). This is partly due to legal restrictions in the use of health services and barriers like communication problems, poor health literacy, limited available care, and stigmatization associated with use of mental health services (Kluge et al., 2012; Norredam, Mygind, & Krasnik, 2005). There is no systematic knowledge on the advantages of including an offer of mental health screening in the health plan of refugees. However, the ample amount of data and scientists and non-governmental organizations recommending the inclusion of preventive care and assistance for asylum seekers with special needs, in order to document vulnerabilities during the asylum process, point to the need to do so (e.g. Katsapaou, 2013; Porter & Haslam, 2005; Priebe et al., 2009). In accordance with this, Bozorgmehr & Razum (2015) found that refugees with restricted access to health care had 40% higher health care costs compared to refugees with no restrictions. Further studies found that receiving appropriate and timely treatment is connected with enduring improvements in refugee's mental health and a lower use of emergency care (Lamkaddem et al., 2014; Song, Kaplan, Tol, Subica, & de Jong, 2015). State-wide programs in the United States combining mental health screening with the initial medical examination showed good results in the feasibility and acceptability of mental health screenings in the public health system (e.g. Hollifield et al., 2016; Savin, Seymour, Littleford, Bettridge, & Giese, 2005). Potential barriers in screening and acceptance of referral to mental health services include problems in communication, confidentiality, stigma, literacy, limited care capacities, and difficulties in contacting the refugees (e.g. Al-Obaidi, West, Fox, & Savin, 2015).

In spite of existing research indicating the feasibility and usefulness of mental health screening, valid mental health screening instruments detecting common mental health problems in refugees are scarce (Hollifield et al., 2002, 2013). There are several mental health

screening instruments for refugees available. However, these are either insufficiently validated, not validated at all, or test only a limited range of mental illnesses. Common and widely used screening instruments for specific disorders include the Vietnamese Depression Scale (VDS; Kinzie et al., 1982) and the Harvard Trauma Questionnaire (HTQ; Mollica et al., 1992). To our knowledge, there are only two screening instruments assessing general mental health problems and indicating good psychometric properties across multiple refugee populations: The Cumulative Trauma Disorder Scale (CTD) showed good psychometric properties as a general mental health screening tool in refugee populations (Kira et al., 2012). The Refugee Health Screener – 15 (RHS-15) assesses PTSD, depression, and anxiety symptoms and has been demonstrated to be an efficient and valid screening instrument in several refugee subgroups in the United States (Hollifield et al., 2013, 2016; Johnson-Agbakwu, Allen, Nizigiyimana, Ramirez, & Hollifield, 2014; Polcher & Calloway, 2016). The only screening which has been validated in refugees who have fled to Europe is the Health Leaflet (HL; Söndergaard, Ekblad, & Theorell, 2003), a screening instrument for PTSD. Furthermore, there is no study specifically examining whether a mental health screening can be self-administered, thereby requiring less resources for wide-scale implementation. We therefore evaluated the feasibility, reliability, validity, and the mode of implementation of the Refugee Health Screener – 15 (RHS-15) and its shorter version, the RHS-13, for refugees who have come to Germany. We chose the RHS because it screens for multiple disorders, shows good psychometric properties, and is feasible in public health settings (e.g. Hollifield et al., 2013, 2016). The study was conducted in Germany because its refugee characteristics are comparable to those of other EU countries (Bundesamt für Migration und Flüchtlinge [Federal Office for Migration and Refugees], 2016; Führer et al., 2016; Gäbel, Ruf, Schauer, Odenwald, & Neuner, 2006; Richter, Lehfeld, & Niklewski, 2015).

Method

Sample

Refugees in Germany are usually randomly assigned to refugee accommodation centers. We investigated all refugees (N = 86 of 89) living in one such refugee center in a rural area in Southern Germany. The average age of the total sample was *M* = 28.76 (*SD* = 11.23, range 12.08 - 65.83, *N* = 86) and 64% (*n* = 55 of 86) were male. The majority came from Syria (58%), followed by Afghanistan (9%), Albania (8%), Kosovo (7%), Serbia (7%), Iraq (4%), Macedonia, Somalia, and Georgia (each 2%). The length of stay in Germany was *M* = 6.53 months (*SD* = 2.99, range 3 - 24, *N* = 86). Participants reported an average of *M* = 10.44 years (*SD* = 4.01, range 0 – 20, *N* = 86) of formal education, 7% (*n* = 6 of 84) were illiterate. No significant differences could be detected between the participants who participated only in the screening and those who additionally participated in the validation interview (see Supplementary file 1).

Study design

The study consisted of two consecutive parts: 1.) Screening: Respondents completed the Refugee Health Screener – 15 (RHS-15) as a self-rating questionnaire in their respective first language. In cases of illiteracy, an interpreter read the questions word-for-word to the participant. Screenings took between 10 and 30 minutes. 2.) Semi-structured clinical interview: A randomized subsample was selected for semi-structured clinical interviews. The interviews were conducted approximately 1-2 weeks after the screening and took 1.5 h on average. Based on power calculations, we decided that a minimum of 50 interviews should be conducted (Terwee et al., 2007). We expected a drop-out rate of 20-30% because of experiences in previous studies. We first generated a randomized sequence of all participants and selected the first 70 persons in this sequence for the interviews. Out of this group, 80% (*n*

= 56 of 70) participated in the interview. For further information on the study design see Figure 1.

Sampling procedures

The refugees were originally randomly referred to the particular accommodation center by government authorities. All refugees above the age of 12 years (N = 89) were invited to participate in the study. To keep the sample as representative and realistic as possible, the only exclusion criterion was suffering from severe cognitive deficits.

Refugees were informed of the upcoming study and its purpose in a general house meeting, with posters, and by knocking on every door and informing the inhabitants personally. Screenings and interviews began with a comprehensive explanation of the study and a written informed consent for the participant. For minors, the consent of the legal guardian was obtained as well. Participants were assured that participation was voluntary, that all data collected would be confidential, and that no monetary compensation would be offered. In case of a positive screening, treatment options were discussed with the participant and if desired, participants were referred to appropriate services. The Ethical Review Board of the University of XXX approved the study.

Setting

Data collection was completed over 3 weeks in 2016. Screenings and interviews were conducted by clinical psychologists trained and experienced in the work with refugees and the detection of mental health problems. All psychologists (N = 13) were assisted by interpreters of the respective languages. The psychologists conducting the validation interviews were blind to the previous screening results of the participants. The study took place in a building close to the refugee accomodation.

Measures

Refugee Health Screener. The Refugee Health Screener – 15 (RHS-15; Hollifield et al., 2013) is a 15-item instrument screening for emotional distress in refugees. It was developed by selecting the most significant items from several diagnostic measures using a statistical multiple method approach (Hollifield et al., 2013). Previous studies have shown a good feasibility, validity, and reliability in detecting mental health problems in refugee populations in the United States of America (Hollifield et al., 2013, 2016; Johnson-Agbakwu et al., 2014; Polcher & Calloway, 2016). The screening instrument can be administered as an interview or a self-rating and is available in several languages. Recently, Hollifield et al. (2016) reported that a 13-item version, excluding items 14 and 15, is also valid and reliable as a screening tool.

The RHS-15 is organized as follows: The first 13 items (RHS-13) comprise symptoms relating to the spectrum of depression, anxiety, and posttraumatic stress disorder. The items are rated for the last month on a 5-point Likert scale (0 = *not at all* to 4 = *extremely*), visualised through pictures of bottles. Additionally there is one coping item assessing the general ability to handle stress on a 5-point Likert scale and a distress thermometer (DT) for the last week ranging from 0 – 10. For a positive screening result, Hollifield et al. (2013) recommend a sum score of items 1 to 14 ≥12, and/or a distress thermometer ≥5. For the RHS-13 a total score ≥11 is recommended (Hollifield et al., 2016).

Self-rated screening. The self-rated screening consisted of the RHS – 15 described above. Nearly all languages were already available, only translations for Albanian, Kurdish, and Serbian had to be obtained. To ensure a valid and precise translation, a written translation was generated, followed by a blind back-translation. Adequacy and differences between the translations were intensively discussed to guarantee an accurate translation. After the RHS-15, we included some sociodemographic questions as well as one feedback question about how difficult the refugees found the task of filling in the RHS – 15 themselves on a 5-point Likert scale.

There was a psychologist present at all times, who was available for any additional questions during the screening. Additionally they filled in an observational questionnaire about the amount of support needed by each person and the understanding of the questions.

Semi-structured diagnostic interview. The first part of the interview consisted of the RHS-15 administered as an interview. Additionally, sociodemographic questions were asked.

The Brief Symptom Inventory – 18 (BSI-18; Derogatis, 2000) assesses depression, anxiety, and somatization as well as a global score for psychological distress. It shows good psychometric properties and has been used in various countries (e.g. Asner-Self, Schreiber, & Marotta, 2006; Spitzer et al., 2011). It consists of 18 items, 6 for each scale. The symptoms are rated on a 5-point Likert scale. Following a previous study (Zabora et al., 2001), we used a cutoff score ≥ 10 for male and ≥ 13 for female as an indication for psychological distress. The BSI revealed good internal consistency in this sample ($\alpha = .93$). Additionally, Module C of the Mini International Neuropsychiatric Interview (MINI, version 5.0.0; Sheehan et al., 1998) was used to assess suicidality in the past month.

Daily functioning was assessed with 8 self-constructed items rated on a 4-point Likert scale selected because of their relevance for refugees. Cronbach's α for the present sample was .79.

The Posttraumatic Stress Disorder Checklist – 5 (PCL-5; Weathers et al., 2013) was used to assess PTSD symptom severity and PTSD diagnosis according to DSM-5. Sub-syndromal PTSD was defined as fulfilling criterion A and 2 or 3 of the criteria B – E of DSM-5. Studies showed a good validity and reliability of the PCL-5 (e.g. Blevins, Weathers, Davis, Witte, & Domino, 2015). The PCL-5 consists of 20 items, rated on a 5-point Likert scale. PCL-5 is designed as a self-rating instrument, however, in this study it has been administered as a semi-structured clinical interview, rating both severity and frequency of the symptoms. Cronbach's α was .91 for this study.

To assess trauma exposure, the Life Events Checklist (LEC-5; Weathers, Blake, et al., 2013) was used. Gray, Litz, Hsu, & Lombardo (2004) showed that the LEC has good psychometric properties. The questionnaire lists 17 categories of traumatic events.

To assess the refugees' acceptance of the RHS-15 as a self-rating instrument, 2 questions rated on a 5-point Likert scale were constructed (*How did you find the screening questionnaire?* and *Do you find such a screening for refugees helpful?*).

Data Analysis

The following versions of the RHS were examined in detail: (1) RHS-15 case (Items 1-14 ≥12 and/or DT ≥5), (2) RHS-13 case (Items 1-13 ≥11), (3) RHS-15 score ($\sum_{\text{z-transformed items 1-15}}$), (4) RHS-14 score ($\sum_{\text{items 1-14}}$), and (5) RHS-13 score ($\sum_{\text{items 1-13}}$). All analyses were carried out with SPSS, version 23. Independent t-tests and Pearson correlations were computed for variables meeting the preconditions for parametric analyses. Mann-Whitney U and Spearman correlations were used for variables deviating from the preconditions (West, Finch, & Curran, 1995). Categorical and dichotomous variables were calculated with likelihood ratio χ^2, Fishers Exact test, and McNemar. Correlations and phi were classified with .10 as a small, .30 as a moderate, and .50 as a large effect. We used an alpha level of 5% in all calculations. Missing values accounting for < 10% of a scale were set as 0, participants with missings > 10% of a scale were excluded from the corresponding analyses. One outlier was detected in the RHS-15 self-rating, however we did not exclude this outlier, owing to content-related considerations.

Principal axis factoring analyses were only conducted for the RHS-15 and RHS-13 self-rating versions because the subject-to-variable ratio of the RHS self-rating (5.73:1) is adequate, however, it is deficient for the RHS interview version (3.73:1; Arrindell & Van der Ende, 1985). We used Kaiser's eigenvalue (EV) criterium (>1), the scree plot, and parallel analysis (Patil, Singh, Mishra, & Donavan, 2007) to determine the factor structure. To assess the homogenity of the RHS, item-total and inter-item correlations were calculated. Item-total

correlations above .20 are seen as appropriate (Streiner, Norman, & Cairney, 2015). Inter-item correlations between .2 - .4. are seen as an optimal level of homogeneity, values above .5 indicate the redundance of some items because of equality (Briggs & Cheek, 1986).

To assess the reproducibility of the RHS self-rating and interview version, both agreement and reliability were measured. Agreement was measured with the smallest real difference (*SRD*) following de Vet, Bouter, Bezemer, & Beurskens (2001). Change scores of the participants between RHS interview and self-rating were compared with the SRD. Higher or lower scores than the *SRD* were interpreted as "real" change, i.e. above measurement error. The reliability was calculated with intraclass correlation coefficients (ICC) estimates based on a mean-rating, absolute-agreement, two-way random effects model (Koo & Li, 2016; McGraw & Wong, 1996). ICC estimates were interpreted as < .5 poor, .5 - .75 moderate, .75 - .90 good, and > .90 excellent reliability (Koo & Li, 2016).

To assess the predictive validity of the RHS, sensitivity, specificity, negative predictive value (NPV), positive predictive value (PPV), and Fisher's exact tests were calculated. Positive cases were defined as participants with a PTSD diagnosis based on the PCL-5 or a symptom score above the cut-off of the BSI-18. The area under the receiver operating characteristics (ROC) curve (AUC), a measure of responsiveness, was calculated for the different RHS versions (Hajian-Tilaki, 2013). According to Terwee et al. (2007) an AUC of at least .70 is adequate.

Results

RHS, mental health, and traumatic experiences

Table 1 summarizes the mental health and traumatic experiences of the studied sample. Of the whole sample, 52% had a positive screening result in the RHS-15 and 42% in the RHS-13. In the self-rating and interview version, the RHS-15 detected significantly more positive cases compared to the RHS-13 (self-rating: McNemar $\chi^2(1) = 7.11$, $p < .01$, $\varphi = .29$, $n = 86$; interview: $\chi^2(1) = 5.14$, $p < .05$, $\varphi = .30$, $n = 56$). No differences in the amount of positive cases were found between the self-rating and interview version.

Feasibility of the RHS – 15 as a self-rating instrument

The majority (72%, $n = 62$ of 86) of the participants reported no difficulties in filling in the RHS, small difficulties were reported by 20% ($n = 17$ of 86), moderate difficulties by 6% ($n = 5$ of 86), and extreme difficulties by 2% ($n = 2$ of 86; $M = .40$, $SD = .76$, range 0 – 4, $n = 86$). External report from the psychologists' perspective was comparable, with the majority showing no need for support or difficulties in understanding: Need for support was rated with $M = 1.00$ ($SD = 1.23$, range 0 – 4, $n = 81$; 0 = *no support needed* to 4 = *very high support needed*), and the understanding of the questions was rated with $M = .59$ ($SD = .86$, range 0 – 3, $n = 81$; 0 = *no difficulties* to 4 = *extreme difficulties*). Support was mostly needed for those participants who where illiterate. Most common understanding difficulties were problems in the understanding of question 14 and 15, as well as the comprehension of the general scaling.

Participants with a higher school education showed less need for support ($r = -.47$, $p < .001$, $n = 81$) and fewer difficulties in the understanding of the questionnaire ($r = -.50$, $p < .001$, $n = 81$). No relationship between the amount of required support or difficulties in understanding with age or gender was found. Participants who had been in Germany for a

longer period of time in Germany showed less need of support (r = .36, p < .01, n = 53), however no significant differences in the understanding of the questions were found.

Reliability

Internal consistency. Prinicipal axis factoring analysis for the RHS-15 self-rating version showed 2 factors with EV > 1, the first factor (EV = 7.51) accounted for 50%, the second factor (EV = 1.24) for 8%. However, the scree plot, the parallel analysis, as well as a content-related analysis of the 2 factors revealed a one factor structure. For the RHS-13 self-rating version, all criteria revealed a one-factor structure accounting for 54% of the variance (EV = 7.00). All RHS versions showed excellent internal consistency with Cronbach's α ranging between .91 - .93. The internal consistency could only be slightly improved by item deletion.

Item-total and inter-item correlations. All RHS item-total correlations were significant at p < .01 ranging between .39 - .88, with *M* between .68 - .73 for the different RHS versions. Inter-item correlations of the RHS versions were slightly high, but acceptable (range *M* = .42 - .49, range -.06 - .75).

Reproducibility – comparison of self-rating and interview version. Agreement was measured with the smallest real differences, *SRD* = 13.38 for RHS-15 and *SRD* = 15.93 for RHS-13. Changes between the interview and self-rating version higher than the *SRD* were found in 6% (*n* = 3 of 55) in the RHS-15 and 5% (*n* = 3 of 56) in the RHS-13. Additionally we calculated a McNemar test, showing that there are no significant differences in the positive RHS cases between self-rating and interview version (RHS-13: $\chi^2(1) = .00$, $p = 1.00$; RHS-15: $\chi^2(1) = .10$, $p = .75$, $n = 56$). Intraclass correlation coefficients (ICCs) indicated a good reliability for RHS-15 (ICC = .86, CI [.76 - .92]) and RHS-13 (ICC = .85, CI [.75 - .92]). At the item-level, moderate to good reliabilities (ICC range .56 - .84) were found for most of the items, however, 3 items (5, 12, 14) showed a poor reliability.

Validity

Face validity. Participants rated the usefulness/adequacy of the RHS to be very good (45%, *n* = 24 of 53), good (38%, *n* = 20 of 53), and moderate (17%, *n* = 9 of 53) with *M* = 3.28 (*SD* = .74, range 2 – 4). Most of the participants found a screening for refugees to be helpful (*M* = 3.59, *SD* = .75, range 0 – 4): Sixtyseven percent (*n* = 35 of 51) found it extremely helpful, 26% (*n* = 13 of 51) quite helpful, 4% (*n* = 2 of 51) moderately helpful, and 2% (*n* = 1 of 51) not at all helpful.

Predictive validity. Table 2 shows the sensitivity, specificity, PPV, and NPV of the RHS versions predicting cases detected with the BSI-18 measuring depression, anxiety, and somatization and/or the PCL-5 measuring PTSD. All RHS versions, both self-rating and interview do an excellent job of predicting cases of depression, anxiety, somatization, and PTSD. The interview version shows slightly higher sensitivity, specificity, PPV, and NPV than the self-rating version. Comparing the 15-item and the 13-item version, the RHS-13 showed a slightly higher specificity and PPV compared to the RHS-15. On the other hand, the RHS-15 showed a slightly higher sensitivity and NPV than the RHS-13. The RHS-13 and 15 version predicted both PCL and BSI cases well, however, specificity and PPV for PTSD cases were low. The AUC of the ROC measuring the responsiveness of the RHS showed adequate results for all versions (range AUC .89 - .98). For alternative cut-off values see Supplementary file 2.

Convergent validity. See Table 3 for an overview of the correlations between the RHS and other mental health measures. All RHS versions correlate highly with depression, anxiety, and somatization (see Figure 2). This relation held when controlling for PTSD symptoms (range *pr* = .63 - .84, $p < .001$). The RHS versions also correlated with PTSD (see Figure 2). However, when controlling for the BSI-18, correlations with the PTSD symptoms were only significant for the interview version (RHS-15: *pr* = .37, $p < .05$; RHS-13: *pr* = .30, $p < .01$;). In general, correlations were higher for the interview version than for the self-rating version.

Discussion

Despite EU regulations mandating the identification and support of vulnerable individuals, there are no adequately validated screening instruments available to detect the full range of mental health problems of the current refugee populations in Europe. This study examined the feasibility and validity of a candidate screening instrument, the Refugee Health Screener, in a refugee sample in Germany. Results are promising: The RHS successfully predicted clinically relevant symptoms of PTSD, depression, anxiety, and somatization, thereby detecting the most common mental health problems in refugees (Steel et al., 2009). Consistent with research conducted on refugee samples in the US (Hollifield et al., 2013, 2016; Johnson-Agbakwu et al., 2014; Polcher & Calloway, 2016), the RHS showed an excellent feasibility, validity, and reliability in the examined sample. It was not only applicable as an interview, but also showed good psychometric properties when carried out as a self-rating instrument, thus making it accessible for a larger variety of settings. The RHS-13, a shorter version consisting of the first 13 items is even more time-efficient and equally valid.

In contrast to most other studies (e.g. Hollifield et al., 2016; Söndergaard et al., 2003), we did not focus on specific nationalities but included all refugees with the aim of providing a real-world study. Notwithstanding the heterogeneity of the sample, the psychometric properties of the RHS are excellent, with a high predictability in the detection of mental health problems. The positive screening rates of previous RHS studies showed figures ranging from 23 to 46%. The comparably higher rate of 52% in our study (Hollifield et al., 2013, 2016; Johnson-Agbakwu et al., 2014; Polcher & Calloway, 2016) is not surprising given the heterogeneity of refugees and the different characteristics of refugees in the US and Europe (Miller et al., 2005). The high positive screening rate and the similarly high rates for specific mental health disorders in this study are comparable to prevalence rates found in studies with similar refugee populations (e.g. Alpak et al., 2015; Führer et al., 2016). However, the PTSD

rate of 13% found in the semi-structured clinical interviews is comparatively low (Führer et al., 2016; Richter et al., 2015), with a high number of participants showing a sub-syndromal PTSD (22%). Since PTSD and its remission depends on the cumulative exposure to traumatic stressors (Kolassa et al., 2010; Neuner et al., 2004), the PTSD rate will vary with the severity and frequency of life-threatening experiences, refugees have survived in their home country and during their flight. Further, most refugees in our sample had arrived quite recently in Germany. Manifest PTSD symptoms in refugees often appear after some time, when the so-called 'honeymoon phase' of euphoria and relief has passed (e.g. Sachs, Rosenfeld, Lhewa, Rasmussen, & Keller, 2008), but it can be detected quite early using the predictive utility of early depression and anxiety symptoms (Smid, Lensvelt-Mulders, Knipscheer, Gersons, & Kleber, 2011).

Consistent with Hollifield et al. (2016), our study found the RHS to be a good general screening measure for PTSD, depression, and anxiety. Additionally we found correlations with somatization symptoms and daily functioning. The non-existent correlation of the RHS with PTSD symptoms when controlling for depression, anxiety, and somatization might be due to the high comorbidity – all refugees with a PTSD diagnosis also reported clinically relevant depression, anxiety, and somatization symptoms. Results of factor analysis in our study and from Hollifield et al. (2016) show that a one-factor solution represents the RHS items best. Hence the RHS measures general mental health problems, not specifying between different disorders. We further agree with Hollifield et al. (2016) that the RHS-13 is more time-efficient and feasible, with a gain in specificity and only a minor loss in sensitivity. The two excluded items were most often the reason for understanding problems and showed the poorest results in scale analyses. Further, the distress thermometer overestimated the number of refugees with mental health problems – it seemed to detect any kind of stress, partially unconnected to mental health problems. We therefore suggest the use of the RHS-13, especially in settings with low resources.

In addition, the present study examined the RHS conducted as a self-rating as well as an interview. The majority of refugees were able to fill in the RHS on their own, with only a small loss in its predictability and a high reproducibility between interview and self-rating version. This finding is especially important, as a self-rating instrument could be more easily integrated into an initial medical screening or be used by people working with refugees, e.g. social workers or teachers. Similarly, Söndergaard et al. (2003) showed that a mental health screening can be administered by lay persons. However, we recommend that an interpreter is present in case of a positive screening or if problems in filling in the questionnaire arise. Further, illiteracy and education level should be considered when deciding upon the mode of administration. People using the RHS should be trained in culturally sensitive ways of introducing a mental health screening, offering psychoeducation to those with a positive screening result, and if desired, referring the refugees to mental health institutions.

Refugees' acceptance of the screening in the presented study was very high – with a denial rate of 3% and the vast majority of the participants reporting the screening to be a good experience and a helpful tool for refugees. This goes in hand with other studies reporting similarly high acceptance rates (e.g. Hollifield et al., 2016). To reach a high acceptance rate we tried to minimize problems reported in earlier studies (Al-Obaidi et al., 2015). For example, by ensuring the continuous presence of an interpreter and by providing a confidential setting. We introduced the RHS in a culturally sensitive way, using general health vocabulary, avoiding potentially stigmatizing meanings of terms connected with mental illnesses (Al-Obaidi et al., 2015; Hollifield et al., 2013).

The validation of the RHS for refugees in Europe is both suitable for use in further studies, as well as a practical tool for screening in existing health systems. Based on experiences of large-scale programs in the US (e.g. Hollifield et al., 2016; Savin et al., 2005), we recommend the inclusion of a mental health screening such as the RHS in the initial medical examination. Refugees with a positive screening result should be offered

psychoeducation and when necessary, a referral to mental health services should be organized. Consequences of the implementation of such a mental health plan for health systems and refugees have not been studied systematically. Accordingly, future research should include large-scale studies implementing an all-embracing mental health plan for refugees (see e.g. Elbert, Wilker, Schauer, & Neuner, 2016), thereby specifying the validity and reliability of the RHS for refugees with different nationalities, referral rates, the use of mental health services, and its consequences for the refugees' mental health and the health system.

There are limitations in the present study: The sample size of the various ethnicities did not allow a meaningful differentiation between the refugees' nationalities. Both the self-rating and the interviews rely on the subjective reports of the participants. Potential bias, such as social desirability or assumptions about a potential connection to the asylum procedure may have added noise or biases despite intense explanation of the study aims to each participant.

Conclusion

The presented study tackles the lack of valid mental health screening instruments for current refugees in Europe. The Refugee Health Screener, which has already shown to be a valid screening instrument in refugee populations in the US, also shows excellent feasibility, validity, and reliability in the examined refugee sample in Germany. It detects clinically relevant mental health problems such as PTSD, depression, anxiety, and somatization, and is feasible and valid both as a self-rating questionnaire and as an interview. The shorter 13 item version is even more time-efficient and equally valid. As refugees frequently present with serious mental health problems, thereby preventing integration into the host community, we suggest the inclusion of a mental health screening in the initial medical examination. In the case of a positive screening result, a referral to mental health services for in-depth diagnostic and treatment is mandatory. Because of its excellent psychometric properties, its simple

feasibility, and the high acceptance of even vulnerable refugees, we recommend the RHS as such a screening instrument. However, the capacities for supporting and treating a large number of refugees in need of mental health care within the host countries also need to be established, as suggested e.g., by Elbert et al. (2016). Based on existing evidence, we hold that early detection and evidence-based treatment of mental health problems is imperative, both on humanitarian grounds, and as a cost-effective measure, as it can substantially improve psychosocial functioning and enhance integration (Bozorgmehr & Razum, 2015; Lamkaddem et al., 2014; Schick et al., 2016; Song et al., 2015).

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Competing interests

The authors declare that they have no competing interests.

Author's contributions

EK developed the study concept and design, collected data, performed the data analyses and interpretation of findings, and drafted the manuscript. EH collected data, supported the data analyses, and contributed to the manuscript. KH developed the study concept and design, contributed to the data analysis, and revised the manuscript. MS developed the study concept and design, collected data, and revised the manuscript. TE developed the study concept and design, supervised data analysis and interpretation, and revised the manuscript. All authors read and approved the final manuscript.

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Table 1. RHS, mental health, and traumatic experiences

	%	(*n*)	*M (SD)*
RHS-15 self-rating	52	(45) [c]	$\sum_{1\text{-}14}$:14.09 (12.51) / DT: 3.29 (3.13)
RHS-15 interview	54	(30) [b]	$\sum_{1\text{-}14}$:12.59 (12.24) / DT: 3.93 (2.97)
RHS-13 self-rating	42	(36) [c]	13.00 (12.11)
RHS-13 interview	41	(23) [b]	11.55 (11.92)
Psychological distress (BSI-18)	35	(19) [a]	10.75 (13.46)
Suicidal thoughts (MINI)	16	(9) [a]	
PTSD (PCL-5)	13	(7) [a]	9.85 (11.58)
Sub-syndromal PTSD	22	(12) [a]	
Exposure to traumatic events (LEC-5) ≥ 2	100	(56) [b]	9.79 (4.93)

Notes. [a] = 55, [b] = 56, [c] = 86, RHS = Refugee Health Screener, DT = distress thermometer, BSI – 18 = Brief Symptom Inventory – 18, MINI = MINI International Neuropsychiatric Interview, Module C Suicidality, PTSD = Posttraumatic stress disorder, PCL-5 = Posttraumatic Stress Disorder Checklist – 5, LEC-5 = Life Events Checklist – 5.

Table 2. Predictive validity of RHS-13 and RHS-15 cases

		Comparison RHS self-rating to clinical rating						Comparison RHS interview to clinical rating					
		BSI and/ or PCL case		PCL case		BSI case		BSI and/ or PCL case		PCL case		BSI case	
		Positive	negative	positive	negative	positive	negative	positive	negative	positive	negative	positive	negative
RHS-13 case	positive	15	8	6	16	15	8	18	5	7	15	18	5
	negative	4	29	1	32	4	28	1	32	0	33	1	31
	Statistic	LR χ^2=17.65, p < .001		p < .05 [a]		LR χ^2=17.07, p < .001		LR χ^2=38.70, p < .001		p < .001[a]		LR χ^2=37.92, p < .001	
	Effect size	ϕ = .55		ϕ = .36		ϕ = .55		ϕ =.78		ϕ = .47		ϕ = .78	
	PPV/ NPV	.65 / .88		.27 / .97		.65 / .88		.78 / .97		.32 / 1.00		.78 / .97	
	Sens/Spec	.79 / .78		.86 / .67		.79 / .78		.95 / .87		1.00 / .69		.95 / .86	
RHS-15 case	positive	17	11	6	21	17	11	19	11	7	22	19	11
	negative	2	26	1	27	2	25	0	26	0	26	0	25
	Statistic	LR χ^2=19.81, p < .001		p = .051[a]		LR χ^2=19.13, p < .001		LR χ^2=32.31, p < .001		p < .05[a]		LR χ^2=31.48, p < .001	
	Effect size	ϕ = .57		ϕ = .28		ϕ = .56		ϕ =.67		ϕ = .36		ϕ = .66	
	PPV/ NPV	.61 / .93		.22 / .96		.61 / .93		.63 / 1.00		.24 / 1.00		.63 / 1.00	
	Sens/Spec	.90 / .70		.86 / .56		.90 / .69		1.00 / .70		1.00 / .54		1.00 / .69	

Notes. [a] Fisher's exact test. RHS = Refugee Health Screener, BSI = Brief Symptom Inventory – 18, PCL = Posttraumatic Stress Disorder Checklist – 5.

Table 3. Correlations between RHS and other mental health measures

	RHS-13 self-rating	RHS-15 self-rating	RHS-13 interview	RHS-15 interview
BSI-18	.74*** [d]	.77*** [e]	.91*** [d]	.90*** [d]
Depression	.65*** [d]	.69*** [e]	.86*** [d]	.87*** [d]
Anxiety	.69*** [d]	.72*** [e]	.85*** [d]	.84*** [d]
Somatization[1]	.57*** [d]	.59*** [e]	.72*** [d]	.72*** [d]
Daily functioning	.52*** [c]	.58*** [d]	.62*** [c]	.64*** [c]
PCL-5	.37** [d]	.42*** [e]	.62*** [d]	.65*** [d]
LEC-5	.36** [c]	.38** [d]	.39** [c]	.41** [c]

Notes. [a] $n = 81$, [b] $n = 79$, [c] $n = 56$, [d] $n = 55$, [e] $n = 54$, * $p < .05$, ** $p < .01$, *** $p < .001$, [1] Spearman rank order correlation, RHS = Refugee Health Screener, BSI = Brief Symptom Inventory – 18, PCL-5 = Posttraumatic Stress Disorder Checklist – 5, LEC-5 = Life Events Checklist – 5.

Figure 1. Flow of Participants

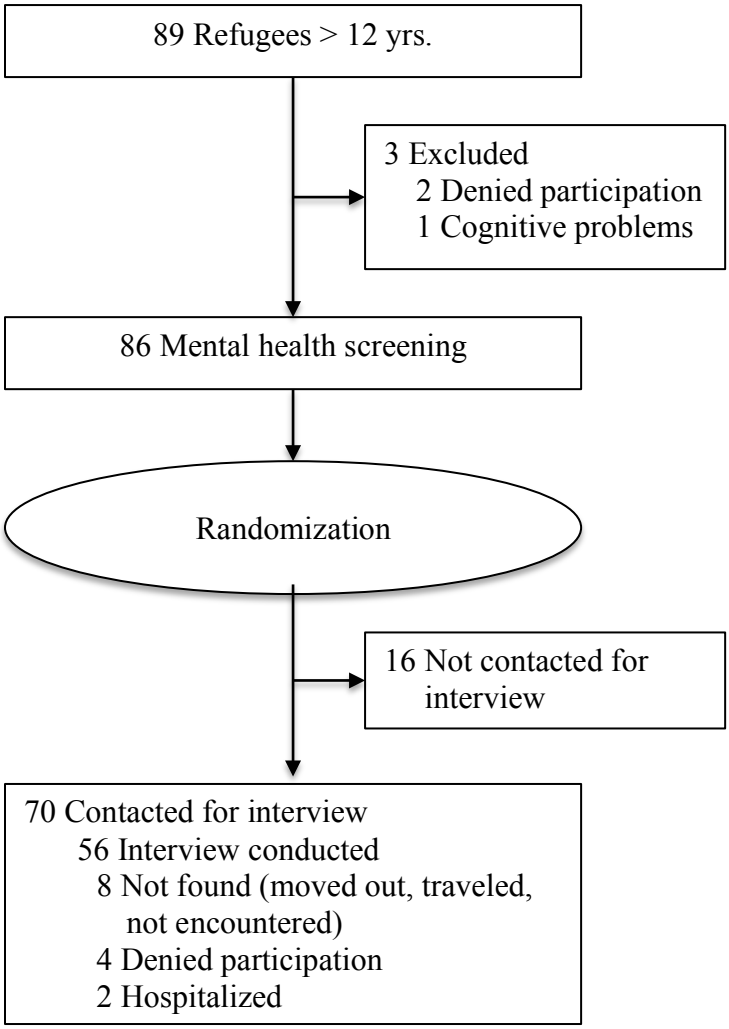
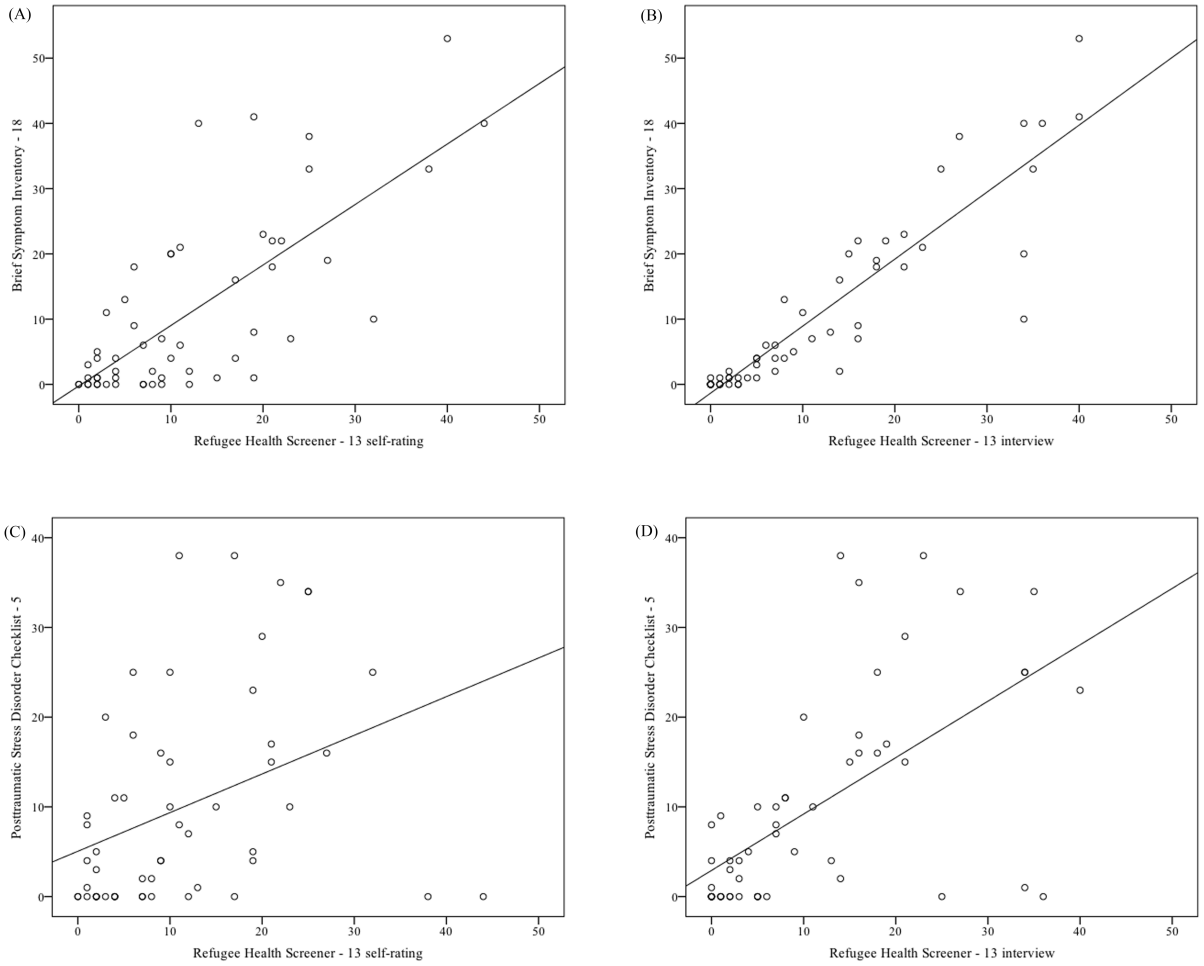


Figure 2. Correlations between the Brief Symptom Inventory – 18 (BSI-18) and the Refugee Health Screener – 13 (RHS-13) self-rating (A) and interview version (B), and between the Posttraumatic Stress Disorder Checklist – 5 (PCL-5) and the RHS-13 self-rating (C) and interview version (D)



Supplementary file 1. Sociodemographic characteristics and group differences

Characteristic	Total sample (N = 86)	Screening only (*n* = 30)	Screening and interview (*n* =56)	Statistic	*p* value
Female sex, No. (%)	31 (36)	11 (37)	20 (36)	LR χ^2=.01 [d]	1
Age, *M* (*SD*, range), y	28.76 (11.23, 12.08 –65.83)	28.62 (9.09, 17.17 – 47)	28.84 (12.32, 12.08-65.83)	t(83)=-.09 [c]	.933
Education, *M* (*SD*, range), y	10.44 (4.01, 0 – 20)	10.48 (4.82, 0 – 20)	10.41 (3.57, 0 – 17)	t(83)=.08 [c]	.938
Country of origin, No. (%)				LR χ^2=13.98 [d]	.159
Syrien, No. (%)	50 (58)	14 (47)	36 (64)	LR χ^2=2.48	.168
Afghanistan, No. (%)	8 (9)	2 (7)	6 (11)	[a]	.708
Albanien, No. (%)	7 (8)	3 (10)	4 (7)	[a]	.691
Kosovo, No. (%)	6 (7)	3 (10)	3 (5)	[a]	.416
Serbien, No. (%)	6 (7)	3 (10)	3 (5)	[a]	.416
Irak, No. (%)	3 (4)	0 (0)	3 (5)	[a]	.549
Mazedonien, No. (%)	2 (2)	1 (3)	1 (2)	[a]	1
Somalia, No. (%)	2 (2)	2 (7)	0 (0)	[a]	.119
Georgien, No. (%)	2 (2)	2 (7)	0 (0)	[a]	.119
Stay in Germany, *M* (*SD*, range), months	6.53 (2.99, 3 – 24)	7.43 (4.49, 3 – 24)	6.05 (1.59, 3 – 10)	U=735.5, z=-.97 [c]	.333
RHS-13 self-rating score, *M* (*SD*, range)	13.00 (12.11, 0 – 50)	15.5 (14.27, 0 – 50)	11.66 (10.68, 0 – 44)	U=719.5, z=-1.09 [d]	.274
RHS-14 self-rating score, *M* (*SD*, range)	14.09 (12.51, 0 – 53)	16.77 (14.65, 0 – 53)	12.66 (11.08, 0 – 46)	t(84)=1.46 [d]	.148
RHS-15 case, No. (%)	45 (52)	17 (57)	28 (50)	LR χ^2=.35 [d]	.652
RHS-13 case, No. (%)	36 (42)	13 (43)	23 (41)	LR χ^2=.04 [d]	1

Notes. [a] Fisher's Exact Test, [b] *n* = 83, [c] *n* = 85, [d] *n* = 86, RHS = Refugee Health Screener.

Supplementary file 2. Sensitivity, specificity, and AUC of the RHS

		RHS score														
BSI-18 / PCL-5 case		8	9	10	11	12	13	14	15	16	17	18	19	AUC	95% CI	*p*
RHS-13 Self-rating	Sensitivity	.90	.90	.90	.79	.74	.74	.68	.68	.68	.68	.63	.63	.89	[.81, .98]	< .001
	Specificity	.62	.68	.76	.78	.81	.87	.87	.87	.89	.89	.92	.92			
RHS-13 Interview	Sensitivity	1.00	.95	.95	.95	.95	.95	.95	.90	.84	.79	.79	.68	.98	[.95, 1.00]	< .001
	Specificity	.78	.81	.84	.87	.89	.89	.92	.95	.95	1.00	1.00	1.00			
RHS-14 Self-rating	Sensitivity	.90	.90	.90	.90	.84	.79	.74	.68	.68	.68	.68	.68	.90	[.82, .98]	< .001
	Specificity	.62	.62	.65	.76	.78	.81	.84	.87	.87	.87	.89	.95			
RHS-14 Interview	Sensitivity	1.00	1.00	.95	.95	.95	.95	.95	.90	.90	.90	.84	.84	.98	[.95, 1.00]	< .001
	Specificity	.76	.78	.81	.81	.87	.87	.89	.92	.95	.95	.97	.97			

Notes. AUC = Area under the curve, RHS = Refugee Health Screener, BSI-18 = Brief Symptom Inventory – 18, PCL-5 = Posttraumatic Stress Disorder Checklist – 5.