ORIGINAL ARTICLE

Developing a measure of adaptive stress arising from the psychosocial disruptions experienced by refugees based on a sample of displaced persons from West Papua

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Funding information

National Health and Medical Research Council, Grant/Award Numbers: RM83000 and RM083000; NHMCR Research Fellowship

Abstract

Objectives: We report the testing and refinement of the Adaptive Stress Index (ASI), a psychosocial assessment tool designed to measure the longer terms stressors of adapting to the psychosocial disruptions experienced by refugees.

Methods: The ASI is based on a theoretical model, the Adaptation and Development After Persecution and Trauma (ADAPT), which postulates that five psychosocial domains are disrupted by conflict and displacement, namely, safety and security, attachment, access to justice, roles and identities, and existential meaning. We used confirmatory factor analysis (CFA) and item response theory (IRT) to shorten and refine the measure based on data obtained from 487 refugees participating in a household survey in Papua New Guinea (response rate: 85.8%).

Results: CFA allowed the exclusion of low loading items (<0.5) and locally dependent items. A good fit was found for single models representing each of the five ASI domains. A graded response IRT model identified items with the highest discrimination and information content in each of the five derived scales.

Conclusions: The analysis produced a shortened and refined ASI for use amongst refugee populations. The study offers a guide to adapting measures of stress for application to diverse populations exposed to mass conflict and refugee displacement.

KEYWORDS

migration, psychometrics, stress, trauma

1 | INTRODUCTION

An unprecedented 65 million persons are currently displaced by mass conflict and persecution worldwide. In order to provide appropriate psychosocial programs for these populations, it is vital to identify the longer term adaptive stressors each group experiences within the particular context in which they reside (UNHCR, 2018). Most research attention has focused on the impact of short-term traumatic events and immediate living difficulties (or postconflict adversities) on mental health outcomes amongst refugees (Porter & Haslam, 2005). In comparison, much less attention has been given to measuring the longer

term adaptive stressors arising from disruptions to key psychosocial support structures that refugees experience. We report the second-stage development of an Adaptive Stress Index (ASI) for use amongst refugees, drawing on the established theoretical framework of the Adaptation and Development After Persecution and Trauma (ADAPT) model (Silove, 2013).

The ADAPT model identifies five interrelated psychosocial pillars undermined by mass conflict and displacement, that is, systems that support safety and security, attachment, access to justice, roles and identities, and existential meaning (Tay & Silove, 2016). The model postulates that the undermining of these support systems impacts

on the capacity of refugees to function in difficult environments, thereby increasing the risk of mental distress, and, in some cases, frank mental disorder. The model reflects a growing consensus in the field (Collins et al., 2011; Tol, Patel, et al., 2011) that the longer term conditions of the environment in which refugees live (comprising social, political, cultural, economic, and spiritual/religious elements) are vital to shaping the impact of discrete events such as traumas and shorter term stressors on mental health and functioning (Porter & Haslam, 2005; Silove, Ventevogel, & Rees, 2017). Whereas the core elements of the ADAPT model are considered to be universal, the manner in which the five pillars are undermined and the impact of the erosion of these support systems on mental health and functioning are context-specific, that is, dependent on the history, culture, and sociopolitical conditions experienced by each displaced population (Silove, 2013). For that reason, an important task is to modify measures of adaptive stress for each refugee population, while at the same time maintaining the conceptual foundation of the instrument. We previously reported the refinement of an instrument (now renamed the Adaptive Stress Instrument or ASI) based on data from West Papuan refugees living in settlements (shanty towns) in Port Moresby, the capital of Papua New Guinea. Qualitative research involved interviews with a purposively selected sample of West Papuan refugees in which we gathered a pool of candidate items that reflected the five ADAPT domains in a manner that was congruent with the culture and language. In the next step, we conducted focus groups comprising West Papuans of different genders and social status to refine the pool of ADAPT items by identifying those most salient to the history, experiences, and living context of the population. We then applied quantitative methods to assess the item pool (each rated on a severity scale) in a community-wide survey amongst West Papuan adults. Confirmatory factor analysis (CFA) supported a five-factor structure consistent with the ADAPT model (Tay, Rees, Chen, Kareth, Mohsin, & Silove, 2015). A structural equation model supported the theoretical underpinnings of the ADAPT model by indicating that the ASI had a moderating effect on indices of trauma exposure and ongoing adversity in pathways to posttraumatic stress disorder (PTSD) symptoms (Tay, Rees, Chen, Kareth, & Silove, 2015aa).

The long history of exposure to persecution and displacement experienced by West Papuan refugees offered a context for further development of the ASI. Indonesia invaded and then annexed West Papua over 50 years ago, a political transformation that led to a low-grade war of resistance waged by the indigenous population, a conflict which is ongoing (Brundige, King, Vahali, Vladek, & Yuan, 2004). During the course of the conflict, the Indonesian military has perpetrated widespread human rights violations in an effort to repress dissent amongst the indigenous people (Human Rights Watch, 2014). Successive waves of West Papuan refugees have crossed the border into neighboring Papua New Guinea, with a substantial population of displaced persons settling in the capital, Port Moresby (the site of our first study), and in the Kiunga area of the Western Province bordering West Papua, the location of the second study reported herein.

Foreign media and human rights organizations have detailed the extreme conditions of deprivation experienced by displaced West

Papuan communities in locations such as Kiunga. These include difficulties in accessing clean water, food, sanitation, basic health care, and education (Rees, Tay, Kareth, & Silove, 2016; Rees, Silove, Tay, & Moses, 2013). In the Kiunga area, chronic poverty and alternating droughts and floods add to the challenges refugees commonly confront. Fear of cross-border incursions by the Indonesian military and other hostile forces add to conditions of communal stress. In general, the size of Papua New Guinea and the inaccessibility of many areas, including Kiunga, intensify the sense of dislocation and isolation amongst the West Papuan community.

The aims of our study were (a) to apply qualitative methods to adapt the ASI to the specific history and living conditions of West Papuan refugees resettled in a remote rural setting of Papua New Guinea; (b) to apply CFA to reduce the item pool and re-examine the structure of the ASI; (c) once a structure was confirmed, to apply item response theory (IRT) to identify items exhibiting greatest discrimination and information content for each domain; and (d) as a test of concurrent validity, to examine whether persons with higher ASI scores exhibited greater functional impairment.

2 | METHODS

2.1 | Sample

Between March and September 2016, we conducted an epidemiological survey amongst West Papuan refugees living in nine settlements in Kiunga township. Although we included adolescents in the survey, we restricted the present analysis to the adult sample. Our sampling frame drew on government census data collected in 2016 identifying all West Papuans (including in the Kiunga area) in Papua New Guinea. Census data and information provided by key local informants converged in identifying nine settlements where West Papuans were concentrated in the Kiunga area, that is, Nemo Corner, Defence Camp, Kungim, Michael Corner, Bun Settlement, Kumbit 1 & 2, Komoka Corner, Selamat Corner, and Waterfront. We updated the census data by conducting a comprehensive door-to-door household survey in the nine settlements just prior to undertaking the main study. We defined in-scope persons either as those born in West Papua or having at least one parent born in that territory. For the present analysis, we included adults older than 18 years. Of the eligible adult West Papuans identified, we were unable to contact 157 (18.3%) because they were absent from the district during the entire duration of our study. All 486 adults with whom we made contact agreed to participate, yielding a response rate of 100% of those present in the nine villages at the time, or 81.7% if we counted absent residents.

2.2 | Ethics statement

Ethical permission for the study was provided by the University of New South Wales Human Research Ethics Committee and the Medical Research Council of PNG Ethics Committee.

3 | MEASURES

3.1 | Review of the first-stage ASI (previously referred to as the ADAPT index)

The original ASI applied in the earlier study amongst West Papuans residing in Port Moresby comprised 62 items, each rated on a four-point severity scale (0 = *not at all*; 1 = *a little bit*; 2 = *quite a lot*; 3 = *extremely*; Tay, Rees, Chen, Kareth, Mohsin, & Silove, 2015). Details of the sequence of qualitative and quantitative steps pursued to develop and test the cultural and contextual validity of the measure and its psychometric properties have been provided previously (Tay Rees, Chen, Kareth, & Silove, 2015a). The qualitative component involved an iterative process involving individual and focus group interviews. The information and feedback recorded during these inquiries allowed us to make serial modifications to the content and expression of items in the lingua franca, Bahasa Indonesian. Our guiding principle was to ensure that items reflecting the five psychosocial pillars of the ADAPT model were grounded in the concrete experiences of the West Papuan community in Port Moresby. Following our qualitative inquiries, we obtained quantitative data from a community-wide survey of the Port Moresby West Papuan population (Tay Rees, Chen, Kareth, & Silove, 2015a). The study revealed sound levels of internal consistency for the full pool of items ($\alpha = 0.97$) and for each of the five ADAPT scales (safety/security: $\alpha = 0.89$; attachment: $\alpha = 0.92$; access to justice: $\alpha = 0.94$; roles and identities: $\alpha = 0.87$; existential meaning: $\alpha = 0.88$). CFA supported a five-factor structure corresponding to the ADAPT pillars. The 62-item version of the ASI formed the basis for the second stage refinement of the measure amongst Kiunga-based West Papuans reported herein.

3.2 | Functional impairment

Functional impairment was assessed using the abbreviated version of the World Health Organization Disability Assessment Schedule (WHODAS 2.0), which is based on the International Classification of Functioning and Health (Ustun et al., 2010). The WHODAS assesses the six core domains of cognition/communication, mobility, self-care, interpersonal interaction, life activities, and participation in society. Items are rated on a 5-point Likert scale: *none* = 1; *mild* = 2; *moderate* = 3; *severe* = 4; *extreme* = 5. The WHODAS has been widely used across epidemiological surveys worldwide, yielding sound internal consistency (Cronbach $\alpha = 0.96$ for the entire scale) and test-retest reliability (with intraclass correlation coefficients ranging from 0.69 to 0.89 across items).

4 | METHOD

4.1 | Refinement of the ASI

4.1.1 | Qualitative data gathering

We conducted focus groups amongst the Kiunga West Papuan community to contextualize the ASI items to conditions in that setting

(Tay, Rees, Chen, Kareth, Mohsin, & Silove, 2015). Details of the corresponding procedure conducted with the West Papuan community in Port Moresby have been reported previously (Tay, Rees, Chen, Kareth, Mohsin, & Silove, 2015). In brief, we conducted two focus groups in Kiunga, each comprising 10 participants purposively sampled to ensure representation of all nine communities, a balance between men and women, and the inclusion of persons of varying ages and status/roles. A clinical psychologist, a project manager, and a West Papuan research assistant conducted the groups in Bahasa Indonesia, the lingua franca of the community. Facilitators encouraged an open discussion of the psychosocial changes that had occurred to the community, as well as current challenges and anticipated future threats, contextualizing these experiences within the culture, history, and current living circumstances of the Kiunga community. In the process, facilitators presented the theoretical structure of the five ADAPT domains, prompting discussion concerning the extent to which these support systems had been undermined in the community and the level of stress caused in each instance. We applied a widely used set of criteria to assess the transcultural validity of the ASI item pool, including content relevance (that is, whether the ASI items are relevant to the particular context of West Papuans living in Kiunga), correct interpretation of items, appropriateness of response scale, and equivalence of constructs (the extent to which each set of ASI items reflected each of the five underlying ADAPT constructs we sought to measure) (Kohrt et al., 2011). All qualitative data were recorded and analyzed using thematic content analyses (Vaismoradi, Turunen, & Bondas, 2013) in order to identify a core set of summary terms and responses associated with each ASI scale.

Community members emphasized issues of safety and security, given the ever-present risk of cross-border incursions by the Indonesian military and their proxies. Attachment issues were of major concern, relating to worries about families and the well-being of kinship groups left behind in West Papua. Unresolved grief and guilt (“duka cita”) were pervasive, arising from the inability of displaced refugees to perform culturally appropriate mourning ceremonies at burial sites in West Papua itself. Issues of justice were prominent, expressed in feelings of grievance (“tidak adil”) and anger (“sakit hati”) relating to the human rights violations perpetrated against individuals and the community during the conflict, consistent with past observations in studies amongst this population (Rees & Silove, 2011). The refugee experience had undermined personal, professional, and family roles and, more generally, challenged the sense of West Papuan identity within the community. The long period of persecution also has undermined systems of meaning (cultural, spiritual, communal) given the extent of the social changes, dispersal of communities, and loss of traditional structures. Following focus groups, individual participants who so wished were offered private sessions to discuss their personal experiences further.

4.1.2 | Field personnel training

We selected the field team (five men, three women) from the West Papuan refugee population residing in Kiunga. The selection was based on language proficiency in both Bahasa Indonesian and Pidgin (the PNG lingua franca), the positions of trust that candidates held in

the community, demonstration of a capacity to learn and apply the procedures needed to undertake the fieldwork, and a sense of commitment to the project. The field team received 3 weeks' intensive training under the supervision of a bilingual clinical psychologist in which the focus was on interviewing techniques, role-play, and piloting of the measures in vivo.

During the main survey, weekly supervision sessions were conducted via telephone or on-site by the research team leaders. Interviews were conducted verbally in Bahasa Indonesian, English, and Tok Pisin, depending on the participant's preferred language.

4.1.3 | Statistical analyses

Our multistep analytic procedure was based on IRT-derived structural equation models (Figure 1; Hambleton, Swaminathan, & Rogers, 1991; Krueger & Finger, 2001). The Supporting Information details the 62 items included in the original ASI and their modifications to ensure congruence with the local community experience in Kiunga.

We first applied CFA to test (a) five single-factor models, each corresponding to one of the five ADAPT domains (safety and security, attachment, access to justice, roles and identities, and existential meaning) and (2) a single five-factor model comprising five dimensions, which corresponded to the constituent ADAPT domains.

Modification indices guided iterative adjustments to the models tested. By convention (Kim & Mueller, 1978), we excluded items with factor loadings <0.5 from the CFA models. Model fit was assessed using the comparative fit index (CFI), Tucker–Lewis fit index (TLI), and the root mean square error of approximation (RMSEA). A good fit was judged by a CFI and TLI greater than 0.95 and an RMSEA equal to or less than 0.06. A moderate fit was indicated by a CFI and TLI exceeding 0.90 and an RMSEA equal to or less than 0.08 (Barrett, 2007). MLR was applied to estimate all models given the ordinal nature of all variables, their normal distribution, and the small amount of missing data for each scale (less than 2% for any scale) (Muthen & Muthen, 2014).

Finally, we identified pairs of items with large modification indices associated with significant residual correlations (≥ 0.3), removing one item from each pair based on examination of the content, wording, and ease of understanding of each of the paired items within the context. We re-estimated our models based on the reduced item pool, examining model fit and factor loadings. This process reduced the item pool to 25.

To identify the most discriminatory and informative items for each scale, we then progressed through the steps recommended for IRT

(Hambleton et al., 1991). All IRT models were estimated using MLR based on polychoric correlations in the absence of skewness and kurtosis amongst relevant variables. To assess local dependence, we examined modification indices of residual correlations amongst the items. A core assumption underlying IRT is that the items under study must be independent of one another to ensure that variations in individual responses to those items can be explained by the latent state.

In the final step, we applied linear regression analysis to test the relationship between the five derived ASI scales and functional impairment.

The analyses were conducted using Mplus (Muthen & Muthen, 2014) and STATA (StataCorp, 2013).

5 | RESULTS

5.1 | Sociodemographic characteristics

The sociodemographic characteristics of the sample are reported in Table 1. Our analytic sample of adults included 272 men (55.9%) and 215 women (44.1%) with a mean age of 35.8 ($SD = 0.65$) years. Over half (56.9%) originated from West Papua, and the remainder (43.1%) were born in Papua New Guinea to West Papuan parents.

5.2 | Assessing dimensionality of the ASI based on CFAs

Based on the 62 original ASI item pool, five preliminary CFAs were conducted by grouping items on theoretical grounds to correspond to each of the five ADAPT domains. All five models showed a poor fit according to conventional indices. We then excluded a total of 37 items from the five dimensions based on factor loadings <0.5 . The items removed included ASI 2, 4, 7, 9, 10 (the safety and security scale); ASI 11, 12, 13, 14, 15, 16, 17, 22, 24 (the attachment scale); ASI 25, 31, 33, 34, 35, 36 (the access to justice scale); ASI 37, 38, 39, 40, 41, 42, 44 (the roles and identities scale); and ASI 49, 50, 51, 52, 53, 54, 59, 60, 61, 62 (the existential meaning scale).

We also identified pairs of items with statistically significant residual correlations (≥ 0.30). We omitted one of each correlated pair based on considerations of content and relative ease of understanding. The following items were removed: ASI 9 (I am very worried about being evicted or forced to move somewhere unsafe), given an overlap with ASI 10 (I am worried that I may be put in a situation of danger), and

FIGURE 1 Analytic steps undertaken to refine the Adaptive Stress Index (ASI) item pool

TABLE 1 Sociodemographic characteristics of the West Papuan Kiunga community sample ($n = 487$)

Sociodemographic variables	Mean/N	SD/%
Age (in years)	Mean: 35.81	SD: 0.65
Sex		
Male	272	55.9
Female	215	44.1
Educational attainment		
None	28	5.8
Completed primary	227	46.6
Completed secondary	186	38.2
Completed university/college	46	9.5
Residency status		
Refugee	305	62.6
Permissive residency status (PRS)	111	22.8
Citizen of Papua New Guinea	71	14.6
Country of birth		
West Papua	277	56.9
Papua New Guinea	210	43.1
Mean time of residency in Kiunga (in years)	Mean: 15.57	SD: 0.48

ASI 40 (I am confused about what to do with my life now and in the future), which overlaps with ASI 41 (I feel a sense of loss of direction). The analyses yielded a reduced pool of 25 items (five items for the safety and security scale; five for the attachment scale; six for the access to justice scale; five for the roles and identities scale; and four for the existential meaning scale).

We then tested two ASI structures using CFA. In the first, we conducted five separate CFAs examining for a single-factor model for each individual ADAPT domain. All five models produced a good fit: safety/security: $\chi^2(5) = 12.1$, $P = 0.03$, CFI = 0.99, TLI = 0.99, RMSEA = 0.05; attachment: $\chi^2(4) = 11.73$, $P = 0.02$, CFI = 0.99, TLI = 0.99, RMSEA = 0.06; access to justice: $\chi^2(8) = 13.2$, $P = 0.11$, CFI = 0.99, TLI = 0.99, RMSEA = 0.04; roles and identities: $\chi^2(4) = 12.56$, $P = 0.01$, CFI = 0.99, TLI = 0.98, RMSEA = 0.01; existential meaning: $\chi^2(4) = 14.59$, $P < 0.001$, CFI = 0.99, TLI = 0.99, RMSEA = 0.01 (Table 2).

To assess the alternative model of a unitary ADAPT structure comprising five dimensions, we tested a single construct five-factor CFA based on the derived 25-item pool. The model produced a moderate fit based on our pre-established threshold criteria:

$\chi^2(265) = 923.74$, $P < 0.001$, CFI = 0.93, TLI = 0.92, RMSEA = 0.07. Given the superiority of the fit statistics, we therefore adopted the first structure in which the five ADAPT domains were represented as independent constructs (Table 3).

5.3 | Item discrimination and threshold parameters

We next tested a polytomous 2-PL graded response IRT model to examine the relative discrimination and information content of each item of the respective five ADAPT domains. Item discrimination or slopes (a) and item difficulty or thresholds (b) were estimated in the graded response model. The IRT parameter estimates are reported in Table 4. Figure 2a–e shows the item characteristic curves (ICCs) for individual items constituting the five ASI scales. Figure 3 displays the information curves for each scale.

The ICCs examine the probability of individuals endorsing each item as a function of the individual's underlying trait (or adaptive stress). Put simply, individuals with higher levels of adaptive stress will have a higher chance of endorsing each item at the corresponding thresholds (3 = *quite a lot* or 4 = *extremely*). Conversely, those with lower levels of adaptive stress will more likely endorse items at the lower end of the response scale (1 = *not at all*, 2 = *a little bit*). Figure 2a–e report the ICCs showing the probabilities of individuals endorsing category 4 (extremely) within each scale. Hence, for each scale, the underlying adaptive stress θ corresponds to each of the five psychosocial domains.

5.4 | The safety and security scale

Of the five constituent items of the safety and security scale, ASI 6 ($a = 3.53$, I am very worried that the future will be insecure) and ASI 3 ($a = 3.02$, I have serious concerns about whether my family will survive) were most discriminating. Lower levels of discrimination were found for the remaining three items: ASI 1 ($a = 2.36$, I feel very uneasy about going out alone), ASI 5 ($a = 2.96$, I have serious concerns about my family might die of hunger), and ASI 8 ($a = 2.97$, I feel very nervous about family members getting sick because we cannot afford medical care) in that those with the highest level of distress had an 80% chance of endorsing these items at the highest threshold (extremely). In addition, the same items produced the lowest information content for the safety and security scale (see Figure 3 for information curves for each scale).

TABLE 2 Single-factor and five-factor confirmatory factor analyses (CFAs) based on the ASI item pool

Model	Description	χ^2	Goodness-of-fit indices			
			P	CFI	TLI	RMSEA
1	Single-factor CFA model based on the safety and security scale	12.1	0.03	0.99	0.99	0.05
2	Single-factor CFA model based on the attachment scale	11.73	0.02	0.09	0.99	0.06
3	Single-factor CFA model based on the access to justice scale	13.20	0.11	0.99	0.99	0.04
4	Single-factor CFA model based on the roles and identities scale	12.56	0.01	0.99	0.98	0.06
5	Single-factor CFA model based on the existential meaning scale	14.59	<0.001	0.99	0.99	0.01
6	Five-factor CFA model based on the reduced 25 item pool	923.74	<0.001	0.93	0.92	0.07

Note. CFI: comparative fit index; RMSEA: root mean square error of approximation; TLI: Tucker–Lewis fit index.

TABLE 3 Single-factor confirmatory factor analytic models based on each Adaptive Stress index (ASI) scale with standardized factor loadings and standard errors

	Standard factor loadings	Standard errors	R ²
The safety and security scale			
1. I feel very uneasy about going out alone (ASI 1)	0.61	0.03	0.37
2. I have serious concerns about whether my family will survive (ASI 3)	0.85	0.02	0.73
3. I have serious concerns about my family might die of hunger (ASI 5)	0.88	0.01	0.77
4. I feel very worried that the future will be secure (ASI 6)	0.76	0.02	0.58
5. I feel very nervous about family members getting sick because we cannot afford medical (ASI 8)	0.85	0.02	0.72
The attachment scale			
6. I feel upset about not being to the deceased family member a proper burial (ASI 18)	0.86	0.02	0.74
7. I feel upset because of not being able to carry out traditionally indicated burial rituals (ASI 19)	0.89	0.88	0.78
8. I am concerned about not being able to visit the graves of families (ASI 20)	0.88	0.01	0.78
9. I worry a lot about family members who have gone missing (ASI 21)	0.77	0.02	0.59
10. I feel upset because of not being able to pay tribute to the death of family members (ASI 23)	0.78	0.02	0.60
The access to justice scale			
11. I think a lot about the unjust things that happened to me and my family in the past (ASI 26)	0.83	0.02	0.68
12. I think a lot about the unjust things that happened to the people of my community (ASI 27)	0.85	0.02	0.72
13. I feel strong urges to make those who treated me my family badly pay for what they have done (ASI 28)	0.81	0.02	0.66
14. I have lost trust in people because of the unjust things that happened to me and my family (ASI 29)	0.85	0.02	0.73
15. I become suspicious of authorities because of unjust things that happened to me and my family in the past (ASI 30)	0.86	0.01	0.73
16. I noticed that I have started to look at things and people differently (e.g. not trusting people) than I did in the past (ASI 32)	0.83	0.02	0.68
The roles and identities scale			
17. I am frustrated because of the communication difficulties I have been having (ASI 43)	0.72	0.03	0.48
18. I am frustrated because I am not able to contribute to the community (ASI 45)	0.83	0.02	0.31
19. I have difficulty trying to overcome cultural barriers (ASI 46)	0.81	0.02	0.34
20. I feel frustrated because I have to rely on others (ASI 47)	0.67	0.03	0.55
21. I have lost a sense of autonomy and control in my life (ASI 48)	0.66	0.03	0.57
The existential meaning scale			
22. I feel lost as if I have lost control of my life (ASI 55)	0.85	0.02	0.72
23. I have lost a sense of purpose or meaning in my life (ASI 56)	0.85	0.02	0.72
24. I have trouble making sense of the bad thing that happened in my life (ASI 57)	0.78	0.02	0.62
25. I feel frustrated because I do not have access to religious or spiritual practices (ASI 58)	0.69	0.03	0.48

TABLE 4 Item response parameters (a = discrimination; b = threshold) for the reduced 25 Adaptive Stress Index (ASI)-item pool

	Discrimination (slope)	First threshold	Second threshold	Third threshold
The safety and security scale				
1. I feel very uneasy about going out alone (ASI 1)	2.36	-0.36	0.73	1.52
2. I have serious concerns about whether my family will survive (ASI 3)	3.02	-0.74	-0.18	0.51
3. I have serious concerns about my family might die of hunger (ASI 5)	2.96	-0.60	-0.4	0.53
4. I feel very worried that the future will be secure (ASI 6)	3.53	-1.03	-0.23	0.35
5. I feel very nervous about family members getting sick because we cannot afford medical (ASI 8)	2.97	-0.48	0.02	0.55
The attachment scale				
6. I feel upset about not being to the deceased family member a proper burial (ASI 18)	3.92	-1.31	-0.45	0.41
7. I feel upset because of not being able to carry out traditionally indicated burial rituals (ASI 19)	4.46	-1.19	-0.35	0.60
8. I am concerned about not being able to visit the graves of families (ASI 20)	4.21	-0.96	-0.29	0.68
9. I worry a lot about family members who have gone missing (ASI 21)	3.13	-0.77	0.17	0.79

(Continues)

TABLE 4 (Continued)

	Discrimination (slope)	First threshold	Second threshold	Third threshold
10. I feel upset because of not being able to pay tribute to the death of family members (ASI 23)	3.24	-1.30	-0.20	0.80
The access to justice scale				
11. I think a lot about the unjust things that happened to me and my family in the past (ASI 26)	3.70	-0.81	-0.06	0.69
12. I think a lot about the unjust things that happened to the people of my community (ASI 27)	4.00	-0.77	-0.10	0.63
13. I feel strong urges to make those who treated me my family badly pay for what they have done (ASI 28)	3.35	-0.55	0.04	0.75
14. I have lost trust in people because of the unjust things that happened to me and my family (ASI 29)	4.01	-0.72	-0.11	0.46
15. I become suspicious of authorities because of unjust things that happened to me and my family in the past (ASI 30)	3.93	-0.40	0.17	0.78
16. I noticed that I have started to look at things and people differently (e.g., not trusting people) than I did in the past (ASI 32)	3.49	-0.67	-0.01	0.77
The roles and identities scale				
17. I am frustrated because of the communication difficulties I have been having (ASI 43)	2.18	-1.36	-0.33	0.76
18. I am frustrated because I am not able to contribute to the community (ASI 45)	2.84	-0.80	0.08	1.13
19. I have difficulty trying to overcome cultural barriers (ASI 46)	2.76	-1.15	-0.11	1.00
20. I feel frustrated because I have to rely on others (ASI 47)	2.36	-0.77	0.09	0.86
21. I have lost the sense of autonomy and control in my life (ASI 48)	2.52	-0.68	0.40	1.20
The existential meaning scale				
22. I feel lost as if I have lost control of my life (ASI 55)	2.24	-0.56	0.31	1.05
23. I have lost a sense of purpose or meaning in my life (ASI 56)	2.05	-0.61	0.28	1.03
24. I have trouble making sense of the bad thing that happened in my life (ASI 57)	2.69	-0.87	0.16	0.95
25. I feel frustrated because I do not have access to religious or spiritual practices (ASI 58)	3.50	-0.58	0.32	1.07

5.5 | The attachment scale

In relation to the attachment scale, the most discriminating of the five items were ASI 19 ($\alpha = 4.46$, I feel upset because I am not able to carry out traditional burial rituals) and ASI 20 ($\alpha = 4.21$, I am concerned about not being able to visit the graves of families). ASI 19 contributed the most information to that scale.

ASI 18 ($\alpha = 3.92$, I feel upset about not being able to give deceased family member a proper burial), ASI 21 ($\alpha = 3.13$, I worry a lot about family members who have gone missing), and ASI 23 ($\alpha = 3.24$, I feel upset because of not being able to pay tribute to the death of family members) were less discriminating of individuals in the higher and lower range of distress. Although those with lower levels of distress (related to losses and separation) had a 50% to 80% probability of endorsing the items at the lowest threshold, there was a 60% likelihood that they would also endorse the items at the highest threshold. These items also demonstrated relatively lower levels of information content compared with the remaining item pool.

5.6 | The access to justice scale

Overall, the ICCs for the access to justice scale comprising six items showed a consistent pattern of high endorsement probability, that is, individuals with lower levels of adaptive stress (related to challenges accessing justice) endorsed items at the lower severity thresholds ($1 = \text{not at all}$ or $2 = \text{a little bit}$). Specifically, those with the lowest

distress θ score had nearly 100% probability of endorsing all items at the lowest threshold ($1 = \text{none}$). Of the six items, ASI 27 (I think a lot about the unjust things that happened to the people of my community; $\alpha = 4.00$) contributed the most information to the scale. Notably, with the exception of one item (28), items of the access to justice scale contributed to the highest amount of information of all items across the five scales.

5.7 | The roles and identity scale

For the roles and identity scale, of the five items, ASI 45 ($\alpha = 2.84$, I am frustrated because I am not able to contribute to the community) and ASI 46 ($\alpha = 2.76$, I have difficulty trying to overcome cultural barriers) were the most discriminating. These two items also contributed the most information to that scale. In contrast, ASI 43 ($\alpha = 2.18$, I am frustrated because of the communication difficulties I have been having), ASI 47 ($\alpha = 2.36$, I feel frustrated because I have to rely on others), and ASI 48 ($\alpha = 2.52$, I have lost the sense of autonomy and control in my life) were less discriminating.

5.8 | The existential meaning scale

In relation to the existential meaning scale, of the four items, the items with the highest level of discrimination and with the most information included ASI 57 ($\alpha = 2.69$, I have trouble making sense of the bad thing that happened in my life) and ASI 58 ($\alpha = 3.5$, I feel frustrated because

FIGURE 2 (a) Item characteristic curves for the sense of safety and security subscale ($n = 5$), (b) item characteristic curves for the attachment subscale ($n = 5$), (c) item characteristic curves for the access to justice subscale ($n = 6$), (d) item characteristic curves for the role and identity subscale ($n = 5$), and (e) item characteristic curves for the existential meaning subscale ($n = 6$)

I do not have access to religious or spiritual practices). The other two items were less discriminating, that is, ASI items 55 ($a = 2.24$, I feel lost as if I have lost control of my life) and 56 ($a = 2.05$, I have lost a sense of purpose or meaning in my life).

5.9 | Concurrent validity of the ASI scales with functional impairment

Theory predicts that the stressors associated with each ADAPT domain can lead to functional impairment in the individual. We therefore compared each of the derived ADAPT scales with the total WHODAS 2 mean score. In each case, the WHODAS 2 score was statistically associated with the individual ADAPT scale: safety and security ($r = 0.15$; $\beta = 0.10$, $P < 0.001$); attachment ($r = 0.20$; $\beta = 0.15$, $P < 0.001$); access to justice ($r = 0.25$; $\beta = 0.17$, $P < 0.001$); roles and

identities ($r = 0.16$; $\beta = 0.12$, $P < 0.001$); and existential meaning ($r = 0.09$; $\beta = 0.13$, $P < 0.001$).

6 | DISCUSSION

The sequential application of CFA and IRT analysis yielded a reduced and refined item pool for the ASI, strengthening both the scientific foundations and the utility of the measure in assessing the stressors that arise for refugees in relation to the five dimensions of the ADAPT model. After removal of items that exhibited lower factor loadings on CFI or that were redundant, we achieved five good fitting models, each corresponding to the five dimensions of the ADAPT framework. In contrast, a unitary model comprising five domains produced only a moderate fit to the data. The even distribution of items across the five

FIGURE 3 Information curves for all five Adaptive Stress Index (ASI) subscales

derived scales provides sufficient score ranges while achieving the goal of brevity. In addition, IRT analysis indicated which items were most discriminating and information-rich in reflecting each of the ADAPT domains within the context.

Prior to discussing the implications of our findings, we consider the strengths and limitations of the study. We used all available information to undertake a systematic and comprehensive survey of West Papuans in Kiunga, achieving a conservative 85.8% response rate even when accounting for those temporarily absent from the catchment area. The sample was restricted to one setting, making it essential to replicate the analysis amongst West Papuans residing in other areas and in other refugee populations. We cannot discount the risk of errors in expression and translation in this transcultural setting, even though we applied rigorous principles of cultural adaptation in the process of iterative development of the measure. In that regard, we note that our qualitative inquiry based on focus groups supported the contextual, linguistic, and semantic congruence of items within the culture and context of life in Kiunga. Nevertheless, the analysis was based on a limited number of focus groups, and the heterogeneous composition may have inhibited some participants from speaking frankly in that setting.

Notwithstanding its limitations, our study illustrates the value of pursuing a sequential process of testing and refinement in the process of adapting and contextualizing measures such as the ASI and its constituent scales to the particular culture and conditions of life relevant to each refugee population. In that sense, our approach may serve as a guide to other researchers undertaking similar projects in complex cross-cultural fields, where achieving accuracy of assessment remains a major challenge (Betancourt, Yang, Bolton, & Normand, 2014). In pursuit of the dual objective of achieving theoretical and ecological validity of measures, our methodology may assist in developing and testing instruments that are both grounded in a general conceptual model and applied within a specific culture and context.

Our sequential analyses yielded 25 items from the initial 62 item pool. In relation to the safety and security scale, the most discriminating and informative items related to basic survival needs, reflecting the widespread scarcity of food and other deprivations confronted by the West Papuan community residing in Kiunga. These findings are

consistent with our qualitative data, which highlighted the extreme challenges of living in a setting where there is no material support from government or nongovernment agencies and where the vagaries of floods and extended drought threaten crop yields and create ongoing conditions of food insecurity.

In relation to the attachment scale, the discriminating and high information items reflected obstacles to visiting and conducting traditional ceremonies at burial sites of the deceased. The salience of difficulties in meeting cultural obligations to the dead has been observed amongst other refugee groups from traditional backgrounds (Tay, Rees, Silove, et al., 2015). In the West Papuan context, human rights organizations have highlighted the adverse impact on the culture when bodies of the disappeared cannot be recovered (Budiardjo & Liem, 1988; Human Rights Watch, 2014). For a traditional and religious society in which family and kinship ties are of paramount importance, it is not surprising that obstacles to conducting culturally appropriate mourning and remembrance ceremonies represent an enduring source of stress, an observation that is consistent with findings of several other studies in the refugee mental health field (Morina, Rudari, Bleichhardt, & Prigerson, 2010; Silove, Baker, et al., 2017; Tay, Rees, Lidell, et al., 2016).

It is notable that all six items constituting the access to justice scale reflected high levels of discrimination and information. The focus of concern was entirely on events and conditions in the homeland rather than on ongoing living difficulties in Papua New Guinea. One possible explanation is that West Papuans share a common Melanesian background with the indigenous PNG population, given that the border between the two territories represents an artificial boundary established during the period of colonization (Budiardjo & Liem, 1988). As a result, populations from the same tribal grouping commonly live on both sides of the border. In addition, PNG nationals are exposed to many of the deprivations and living challenges (such as lack of services) confronted by the West Papuans in Kiunga. In that context, it makes sense that the injustices perceived by West Papuans relate primarily to conditions of persecution in their homeland rather than to the immediate living situation in Kiunga. In addition, the focus is on the community rather than the self, as is expected for refugees

from a strong collectivist background, consistent with past research findings amongst this community (Rees & Silove, 2011; Tay, Rees, Chen, Kareth, & Silove, 2015b). For example, the item (ASI 37) "I think a lot about the unjust things that happened to the people of my community" contributed the most information to the justice scale. These findings also are consistent with observations made in neighboring Timor-Leste, which experienced a prolonged period of persecution of a similar nature under Indonesian rule (Modvig et al., 2000). In that setting, the persisting sense of injustice perpetrated against family, the kinship group, and the society as a whole, even after national independence was achieved, continued to be a source of distress and anger (Rees et al., 2013; Tay, Rees, Steel, et al., 2016).

In relation to the roles and identities scale, the items with the highest discrimination and information reflected the loss of autonomy and self-reliance associated with the status of being unemployed, which in turn exacerbated conditions of poverty and deprivation experienced by refugees (Tay, Rees, Chen, Kareth, Lahe, et al., 2015). For the existential meaning scale, the most discriminatory and information-rich items focused on making sense of the longstanding persecution experienced by the community and being forcibly separated from the homeland, traditional values, and cultural practices (Zocca, 2008).

7 | IMPLICATIONS

Our findings have implications for measurement, research, policy, and clinical practice in the field of refugee mental health and psychosocial well-being. Past studies have focused primarily on trauma and ongoing adversity in explanatory models relating to psychiatric disorders such as PTSD (Porter & Haslam, 2005; Steel et al., 2009). Previously, psychosocial measures used in the refugee field have tended to be generic in their focus (Betancourt et al., 2014; Hollifield et al., 2002; Steel et al., 2009). In our approach, we attempted to reconcile a universal theoretical framework (ADAPT) with the particularities of the context and culture under study. The refined version of the ASI reported herein offers the additional benefit of brevity and increased accuracy. Moreover, the principles and procedures outlined in the process of modifying the ASI can act as a template for revising and retesting the measure across cultures and contexts.

From a practical perspective, data obtained from the ASI may prove helpful in planning mental health and psychosocial support services in acute and protracted refugee situations (Tol et al., 2011). Finally, the ASI offers to expand the array of outcome measures that can be used for testing psychotherapeutic or psychosocial strategies aimed at promoting the adaptation of refugees in various contexts. In that respect, the ASI may assist in extending the scope of assessment and monitoring beyond the conventional indices of trauma, ongoing immediate living difficulties, and mental health outcomes such as PTSD and depression (Tol, Rees, & Silove, 2013). Specifically, as a measure, the ASI applies a general model of adaptation to identifying the psychosocial stressors that may lead to functional impairment amongst refugees, which, with modification, can apply to displaced populations from a diversity of cultural backgrounds living in a variety of resettlement environments (Silove, Ventevogel, & Rees, 2017; Tay & Silove, 2016).

DECLARATION OF INTEREST STATEMENT

None.

FUNDING SUPPORT

National Health and Medical Research Council (Grant: RM083000) and NHMCR Early Career Fellowship.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

How to cite this article: Tay AK, Rees S, Tam N, Kareth M, Silove D. Developing a measure of adaptive stress arising from the psychosocial disruptions experienced by refugees based on a sample of displaced persons from West Papua. *Int J Methods Psychiatr Res*. 2019;28:e1770. <https://doi.org/10.1002/mpr.1770>