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Complete List of Authors:	Tyler, Natasha; University of Nottingham Business School Collares, Carlos; Maastricht University , School of Health Professions Education Byrne, Ged; Health Education England Byrne-Davis, Lucie; University of Manchester, Manchester Medical School
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Measuring the Outcomes of Volunteering for Education: Development and pilot of a tool to assess health professionals' personal and professional development from international volunteering

Tyler, N, University of Nottingham, natasha.tyler@nottingham.ac.uk (Corresponding Author)

Collares, CF, Maastricht University, c.collares@maastrichtuniversity.nl

Byrne, GJ, Health Education England, ged.byrne@hee.nhs.uk

Byrne-Davis, LMT, University of Manchester, UK lucie.byrne-davis@manchester.ac.uk

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Abstract

Objective: The development and pilot of a self-report questionnaire, to assess personal and professional development gained through experiences in low and middle-income country health volunteering**.**

Design The instrument was developed from a core set of the outcomes of international placements for UK health professionals. Principle component analysis and multidimensional item response theory were conducted using results of a cross-sectional pilot study to highlight items with the best psychometric properties.

Setting: Questionnaires were completed both online and in multiple UK health professional events face-to-face.

Participants: 436 Healthcare professional participants from the UK completed a 110 item questionnaire in which they assessed their knowledge, skills and attitudes.

Measures: The 110 item questionnaire included self-report questions on a 7-point Likert scale of agreement, developed from the core outcome set, including items on satisfaction, clinical skills, communication and other important health professional knowledge, skills, attitudes and behaviours. Item reduction led to development of the 40-item Measuring the Outcomes of Volunteering for Education- Tool (MOVE-iT). Internal consistency was evaluated by the Cronbach α coefficient. Exploratory analysis investigated the structure of the data using Principal Component Analysis and Multivariate Item Response Theory.

Results: Exploratory Analysis found 10 principle components that explained 71.80% of the variance. Components were labelled 'Team Work, Adaptability, Adapting Communication, Cultural Sensitivity, Difficult Communication, Confidence, Teaching, Management, Behaviour Change and Life Satisfaction'. Internal consistency was acceptable for the identified components (α between 0.72 to 0.86).

Conclusions: A 40-item self-report questionnaire developed from a core outcome set for personal and professional development from international placements was developed, with evidence of good reliability and validity. This questionnaire will increase understanding of the impact of international placements for UK health professionals, facilitating comparisons of different types of experience. This will aid

decision making about whether and how UK health professionals should be encouraged to volunteer internationally.

Key Words

- Personal and Professional Development
- International Placements
- Volunteering
- Health Professionals
- Low and Middle Income Countries
- Principle Component Analysis
- Psychometric Tool
- Learning Assessment
- Self-Assessment

Article Summary

Strengths and Limitations of this Study

- The Measuring the Outcomes of Volunteering for Education- Tool (MOVE-iT) was developed based on evidence from peer-reviewed literature and expert opinion
- The underlying structures of the instrument were explored using a large data set of 436 multi-disciplinary health professionals
- The psychometric analyses demonstrate good internal consistency reliability

Background

Globalisation of the health workforce has inevitably led to large numbers of qualified healthcare professionals choosing to temporarily work overseas in some capacity, with many choosing low resource environments in low and middle income countries (LMICs) [1]. This is often perceived as a loss to the high income country, for example with the UK National Health Service (NHS): a loss of staff within a service that is already under pressure. Although, it has long been reported that such international placements are

thought to result in personal and professional development (PPD) and such skills can benefit both the individuals practice and subsequently patient outcomes upon return [2]. Many report learning as a result of the new experience and particularly that working in a low resource environment encourages healthcare professionals to learn new skills in an effort to adequately adapt [3–5]. It is also believed that low resource settings provide staff with an opportunity to practice skills that they would not develop in domestic work setting, as such giving them increased confidence in their work [4, 6]. This includes exposure to higher numbers of clinical cases and often clinical cases that are more challenging than those seen in high income countries (HICs) as well as opportunities to lead, make decisions and work within new cultural and social norms [5, 7]. Many staff report a change in core attitudes or beliefs: a greater appreciation of caring, an acceptance of cultural differences or a changed/new/broader perspective [4, 5, 8, 9]. As a result, in the UK, some organisations have proposed that enabling and encouraging staff to work in low resource environments may have great benefits to the NHS [2, 3, 10] and have expressed a desire to assess PPD outcomes [11, 12] to provide quantitative evidence of benefit.

Research into the benefits of international working or volunteering (from now on referred to as 'international placements' for ease), has reported similar PPD outcomes across countries, projects and professions, including communication, leadership, team work, flexibility and cultural awareness [2, 4, 5, 13]. In a recent meta-synthesis and Delphi study, we reported a list of 116 outcomes [14] from a review of literature on international placements for healthcare professionals. The list included benefits and costs that would be likely to happen to a health professional of any cadre in an international placement.

A small number of previous UK papers have used a questionnaire approach to learning [4, 15, 16] but these have not taken a psychometric approach to the measurement of underpinning domains of learning. A questionnaire developed in the USA, using latent trait analysis, found 11 'volunteer outcome' factors including open-minded and intercultural relationships [17]. The USA questionnaire is not specifically about healthcare. In summary, no questionnaire exists, to our knowledge that attempts to measure the personal and professional outcomes for health professionals in international placements. A psychometric measure of these outcomes to evidence such benefits, could be imperative in changing perceptions of the perceptions of employing organisations and reducing barriers for individual staff that would like to undertake international placements.

This study aimed to create a measure of the PPD outcomes of international placements by developing questions based on the core outcome set derived by Tyler et al., [14], piloting these questions with a large sample of healthcare workers and using item response theory to establish and test a set of latent traits and their associated questions. In Item Response Theory, 'constructs' are theoretical terms that refer to unobserved, idealised entities [18]. Latent traits are one type of construct, which are qualities possessed by individuals that can change, but only over the long term [18]. Latent traits include attitudes, preferences and dispositions, but also lots of the things that are important for professional development such as ability, expertise and aptitude [19]. No measure of a latent trait is ever considered perfectly accurate, instead different measures are used to estimate latent traits [20], with varying levels of effectiveness [18].

Methods

Participants

We aimed to recruit 400 participants across 4 different groups: 100 health professionals that had been on international placements in the past, 100 who were about to undertake an international placement or currently working overseas, 100 with an interest in international placements but no past experience and 100 with no interest in or past experience of international placements. We needed as many health professionals as possible to complete the tool and it needed to be relevant for those with and without international experience to get a full range of potential answers on the questions. We aimed for this many participants because of previous psychometric research on the sample size requirements for precise estimates of reliability coefficients [21]. Inclusion criteria were that the participant be or have been an NHS employee (current, past or future), working/worked in a patient facing role as a qualified healthcare professional (some NHS admin and support staff were excluded).

Design

We used a cross-sectional design, so participants were measured only at one time point.

Procedure

Creating the questionnaire

We developed a questionnaire based on the core outcome set reported in our previous paper [14]**.** PPD outcomes include changes in experience, confidence and attitudes, so two members of the team (LBD,NT) developed statements in these categories, to be self-reported in terms of strength of agreement using a 7-point Likert scale. Where the core outcome reported in the previous paper, could be interpreted in multiple ways, we referred back to the original papers where the outcome was originally reported from the metasynthesis [14] and used this to make decisions about how to express the statement. If a statement could indicate change in experience, confidence and / or attitude, we developed multiple questions, using more than 1 of the 3 items (confidence, experience and attitudes).

Pre-pilot

The questionnaire was pre-piloted on a small group of returned volunteers, to establish that the questionnaire was readable and understandable. We administered the tool online using Manchester eForms [22]. The authors, plus a team of researchers in international placements, met to consider all of the written comments from the pilot plus their own opinions. We conducted a cognitive interview with four participants, using both think aloud interviewing and verbal probing [23, 24]. Any comments, issues, questions or suggestions raised during the cognitive interviews were inputted into a table, one member of the team (NT) decided how best to act on each one and whether changes needed to be made. The table was then reviewed by another team member (LBD) and disagreements were discussed and resolved.

Pilot

There were two methods of recruitment: online and face-to-face. Face-to-face participants were recruited using an opportunistic sample at health professional events nationwide, many of which had an international focus (the majority of the sample gained this way were nurses and HCAs). Online participants were recruited in numerous ways, including links to the questionnaire posted on international volunteering blogs and in health professional newsletters and bulletins. The majority of the online sample was gathered using a network technique, companies, projects and hospital health links that place professionals internationally agreed to send the

link via email to health professionals, the majority of the doctors were responded online.

The tool was administered either online or face-to-face, as was convenient and appropriate for the participants. Online participants received a link in an email, blog or online community and after giving consent. Face-to-face participants completed a paper version of the questionnaire. Recruitment took place between April and July 2016.

Materials:

Measure

The tool consisted of 110 statements measured on a 7-point Likert scale ranging from strongly agree to strongly disagree. The Likert scale contained the following descriptors: 1 Strongly Agree, 2, 3, 4 Neither Agree not Disagree, 5, 6, 7 Strongly Disagree (this was reverse coded for analysis as higher intensity ordinal constructs need to be higher values, strongly agree at 7, strongly disagree at 1). No statements were reversed. The statements questionnaire fell into 3 categories: Thinking about the last month, About you and Confidence. 'Thinking about the last month', was the largest section and contained 56 questions. For example: In the last month I demonstrated a good awareness about how culture influences health. The second,' About you' contained 35 questions and includes questions regarding an individual's skills, attitudes and knowledge. For example, I have an excellent work ethic. The final entitled 'Confidence', contained questions regarding an individual's confidence/competency. For example, I am confident in my abilities to allocate tasks and co-ordinate colleagues.

An additional existing scale was used within the tool, the satisfaction with life scale (SWLS) [25]. This is a five-item scale that has been used frequently to measure satisfaction with life. This replaced a number of statements from the core outcome set about satisfaction with life, since the questions had already been refined and tested for validity and reliability[25].

In addition to the 110 statements, participants demographic and placement data was also gathered. Each participant was asked basic demographic questions: age,

gender, profession, employment status, nationality and years since registration. Past experience on international placements was also recorded.

Analysis

Principal Component Analysis

We used successive iterations of principal component analysis to reduce the pool of items, so that only the items with optimal psychometric properties would remain. Principal Component Analysis (PCA) is a dimension-reduction tool that can be used to reduce a large set of items to a small set that still contains most of the information in the large set (246). PCA is a mathematical procedure which can be used to transform a large number of (possibly) correlated items into a smaller number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible. Initially, a parallel analysis was performed to determine the number of factors. Items with low communalities (<0.500) or loadings below 0.3 were withdrawn in subsequent iterations. In the final iterations, exclusions were performed at an item-by-item basis.

Multidimensional Item Response Theory

A multidimensional item response theory (MIRT) model was created based on the results of the best iteration of the principal component analysis. This is a model that shows how the items in the self-assessment relate to the latent traits and the correlational relationships between the traits and items. The multidimensional model was used to show which items assess which latent variables. The MIRT model was used to assess the latent factor structure of the final version of the questionnaire. MIRT is analogous to confirmatory factor analysis (CFA) [26]. The most important distinctive features of MIRT is the exemption of compliance to the multivariate normality assumption needed for CFA as MIRT considers all Likert scale variables as categorical. MIRT parameters in this study were estimatated using weighted least squares means- and variance-adjusted (WLSMV), given its appropriateness for categorical variables in comparison to Bayesian estimation, which would be an operationally attractive alternative, given the high dimensionality of the data [27].

Principal component analysis was performed in IBM SPSS 23 [28]. Multidimensional item response theory analysis was performed in Mplus 8 [29].

Results

Creating the Tool

Two members of the team (LBD, NT) assessed each core outcome and generated 103 statements with Likert scales of agreement for each statement (from strongly disagree to strongly agree). We excluded 40 items from the core outcome set which would not be measurable through self-report questionnaires. These were items about organisational outcomes for the NHS (8), outcomes that were too vague to be specifically defined (8) or overlapped in meaning with another and were combined (24). For example, '*exposure to ethical dilemmas'* and '*increased awareness of/knowledge about ethics*' were combined *into 'I have frequently experienced ethical dilemmas'.* See additional files for a record of the decisions and their reasons.

We therefore included 56 statements about the frequency which which the individual experienced something or exhibited certain behaviour. For example, 'In the last month I frequently experienced ethical dilemmas'. We generated 19 confidence statements. For example, 'I am confident in my ability to teach others'. Other statements, which were more about attitudes and feelings were labelled 'about you' and included, for example, 'I have an excellent work ethic', (n=35). Supplementary material shows the matches between the outcomes and statements.

Pre-pilot

Sixteen participants completed the pilot questionnaire, including seven from the research group. Three participants completed cognitive interviews. This resulted in numerous changes being made to the statements, including using an existing life satisfaction scale (SWLS) and removing a statement that was unusual 'the UK is the best country in the world'. Reasons for any changes made are included in supplementary material. As a result of this process a 110-item tool was created for the pilot phase.

Pilot

Participants

Four hundred and thirty six participants completed the questionnaire, 42% (182/436) participants had no international experience. The remainder of participants had experience (169/436, 39%), or were overseas/due to depart at the time (79/436, 18%). Table 1 which shows the anticipated and actual participant groups, indicates that the sample included an overrepresentation of participants with past international experience and a slight underrepresentation of those currently overseas or no international experience but interested.

Table 1: Participants: Anticipated and Actual Numbers

Group	Target	N included (%)	Percentage of target
Currently Overseas/Due to Depart	100	79 (18%) (26 Currently Overseas. 53 Due to Depart)	79%
Past International Experience	100	169 (39%)	169%
No International Experience- Interested	100	78 (18%)	78%
No International Experience- Not Interested	100	104 (24%)	104%
Total	400	436 (100%)	**109%**

All participants were NHS employees (past or present). Table 2 shows that 34% (148/436) categorised themselves as medical and dental (doctors), 31% (135/436) nursing and midwifery, 15% (65/436) Allied health professionals, 7% support to clinical staff (30/436), 3% Healthcare scientists (13/436) and 3% ambulance (13/436). This is largely in line with the NHS North West employee data [30], whereby 30% of the workforce is nursing and midwifery. The other staff groups were also relatively proportionate, besides Medical and Dental which represents only 9% of the North West workforce and support to staff (28%). Also NHS infrastructure support was under-represented as we only recruited staff in patient facing roles.

Only 26% of the sample was male (113/436), 72% female (323/436). Table 3 shows that the sample was well spread across working ages, 8% of the sample were under 25 (35/436), 18% 26-30 (78/436), 29% 31-40 (126/436), 19% 41-50 (83/436), 19% 51-60 (83/436), 7% 61-70 (30/436). The majority of the sample were employed full-time (75%, 327/436), 17% part-time (74/436), 5% retired (22/436), 4% students (post registration) (17/436) and <1% Unemployed, see Table 3. The majority of the sample, that stated their nationality, considered themselves British (350/436, 83%) however when dual British nationals and British devolution nations were included this figure reached 87% (379/436). The remainder included 3% from Ireland/Northern Ireland (13/436), 3% from the EU (13/436) and 7% from outside of the EU (30/436), see Table 3. Data was missing for 14 participants. Regarding career stage, data was missing from 47 participants, of those that stated their career stage, 25% were early-career (97/386), having registered for the first time within the last 5 years, 24% had over 25 years' experience (93/386), 35% had 6-15 years (136/386), 15% had 16-25 years (58/386), see Table 3.

Table 2: Professions of participants

Staff group	n	Pilot sample	NHSNW [30]
Medical and Dental	146	34%	9%
Nursing and Midwifery	135	31%	30%
Allied Health Professionals	64	15%	6%
Healthcare Scientists	13	3%	3%
Ambulance	13	3%	2%
Support to clinical staff	30	7%	28%
NHS infrastructure support	5	1%	18%
Other scientific, therapeutic & technical	3	1%	4%
Other	25	6%	<1%

Table 3: Participant Demographic Information: age, employment status, nationality, gender and career stage (years since registration)

Age	n	Employment status	n	Nationality	n	Years since registration	n	Gender	n

Under 25	35	Full Time	325	British	350	<5 Years	98	Male	113
26-30	76	Part Time	72	English	7	6 to 15	137	Female	323
31-40	127	Retired	20	Irish	11	16 to 25	60	Total	436
41-50	84	Student	16	Scottish	4	26+	94		
51-60	81	Unemployed	3	Welsh	1	Total	389		
61-70	32	Total	436	N Irish	2	Missing Data	47		
Total	435			EU	12				
Missing Data	1			Non EU	28				
				Dual British	7				
				Total	422				
				Missing Data	14				

Principal Component Analysis

The principal component analysis used the correlation matrix obtained from the application of the questionnaire to the 436 participants. Twenty-one iterations of principal component analysis were performed. From the original set of items, only 40 items were chosen for the last iteration of the principal component analysis. The Kaiser-Meyer-Olkin measure showed the level of sampling adequacy to be acceptable (KMO = 0.896). The lowest measure of sample adequacy for an individual item was 0.810 ("*I demonstrated I'm a good teacher*"). The Bartlett's sphericity test indicated that the inter-item correlations were sufficient for proceeding with the analysis. The lowest value for the items' communalities was 0.590 ("*If I could live my life over, I would change almost nothing*"), which is above the aimed threshold of 0.500. After *varimax* rotation, 10 factors were extracted taking into account the findings of the scree plot and of a Monte Carlo parallel analysis. The 10 factors explained 71.80% of the variance. On the scree plot (see Figure 1) it is possible to observe that the first five factors had the highest eigenvalues, while the remaining five had similarly low eigenvalues.

A multidimensional item response theory model was created based on the results of the best iteration of the principal component analysis. The resulting model comprised the 40 items with the best psychometric properties and 10 latent variables based on the factors obtained in the principal component analysis. The diagram with the resulting model, containing the items selected for each one of the latent variables, the loadings for each item and the correlation coefficients between the constructs can be seen in Figure 2. This model was chosen as it was the best possible solution to reconcile the need of creating a comprehensive, content-rich questionnaire while obtaining satisfactory evidence of validity based on its internal structure. In terms of goodness-of-fit, the model had significantly better fit than a unidimensional solution in the chi-square test for difference testing ($\chi 2 = 2889.749$, df = 45, $p < 0.001$). However, the goodness-of-fit indices were not entirely perfect. While CFI, RMSEA and $\chi 2$/df are within acceptable margins, TLI and WRMR are slightly out of the optimal margins (above 0.950 for TLI and below 1,2 for WRMR) but still within the acceptable range. The comparison of goodness-of-fit indices between the unidimensional solution and the proposed model can be observed in Table 4.

Table 4 – Comparison of selected goodness-of-fit indices between the unidimensional model and the proposed model.

Models	χ^2	df	χ^2/df	RMSEA	CFI	TLI	WRMR
Unidimensional	8206.204	740	11.089	0.152	0.641	0.622	3.511
Proposed model	1736.922	695	2.499	0.059	0.950	0.944	1.271

Table 5- Cronbach's alpha co-efficient for each construct

Construct	Cronbach's alpha
Confidence	0.86
Life satisfaction	0.86
Behaviour Change	0.77
Cultural awareness	0.72
Difficult communication	0.86
Teaching skills	0.78
Team Work	0.82
Management skills	0.86

Flexibility	0.83
Adapting communication	0.88

Reliability estimates were calculated using Cronbachs's alpha coefficients but also using estimates of individual precision calculated based on the individual estimates of the standard errors of measurement. Figure 1 shows the precision curves for each latent variable. While "Confidence", "Life Satisfaction" and "Team Work" had the highest means for the individual precision estimates, "Adaptability" was the construct that achieved the highest precision estimates for most of the theta spectrum. "Team Work" had the lowest estimates for individual precision. Using the information functions as indicators of precision, "Flexibility" achieved the highest values and "Team work", the lowest ones. As expected, an inverse situation is observable on the curves for the standard errors of measurement, with "Flexibility" showing the lowest measurement errors and "Team Work" the highest ones. The precision, information and standard error curves for the retrieved constructs under the MIRT analysis can be observed in Figures 3, 4 and 5.

Table 5 shows the Cronbach's alpha coefficients for each one of the retrieved constructs. Taking the Cronbach's alpha coefficients into account, the reliability estimates are somewhat divergent from the MIRT-based precision estimates. Using Cronbach's alpha, the most reliable factor was "Adapting Communication" and the least reliable was "Cultural Awareness".

The PCA resulted in a 40 items that can be grouped into 10 constructs, the final list of constructs and the items that belong on each can be seen in Table 6. Table 6 also shows the loading estimates, the standard errors of the loading estimates, the ratios between the estimate and the standard error and the two-tailed *p*-values for the estimates. Table 6 shows the final selection of items with the dimension each one of them belongs.

<insert table 6>

<insert figures 1-5>

Discussion

The study aimed to develop a questionnaire, using a large sample of healthcare professionals with varying degrees of international experience, to establish and test a set of latent traits and associated items that would measure the PPD outcomes of international placements. We developed a 40-item questionnaire that can quantify 10 dimensions of PPD. We have named the dimensions Confidence, Life Satisfaction, Cultural Awareness, Adapting Communication, Challenging Communication, Teaching, Behaviour Change, Management, Teaching and Adaptability. Reliability evidence is favourable to the latent trait structure, both when using a single coefficient for the entire sample, and under the multidimensional item response theory approach. The validity evidence based on the internal structure of the questionnaire detailed in this study, combined with the content validity evidence based on the selection of the initial pool of items [14] helps build a strong validity argument in favour of the use of this questionnaire for the measurement of PDD-related dimensions of international placements.

Previous literature presents outcomes using broad categories such as communication, leadership or cultural skills [2, 3] and the tool will facilitate assessment of these. For example, the domain of 'communication', often mentioned in previous literature, can be assessed in two domains 'difficult communication' and 'adapting communication', each containing 3 items. The reduction of a larger pool of items which assess each domain, illustrates that not all elements which could be included in each domain either should be or need to be in order to reliably assess that domain.

The participants in this study represented a broad range of healthcare professionals. Although the professions of participants in the study were representative of the NHSNW workforce [31], 'Medical and Dental' (Doctors) were over-represented and 'Support to clinical staff' (Healthcare Assistants or similar) underrepresented. Both the sampling procedures and the fact that doctors are the group most likely to work internationally . [32]. will have been likely to lead to this overrepresentation. International experience is often imbedded into medical training courses, or is at least not far removed from it [33]. The numbers are almost reversed in this sample, doctors constitute only 9.5% of the NHS workforce and account for 34% of the sample, whilst support staff make-up 28%, only 7% completed the pilot. Further analysis shows that all of the 30 support staff had no international experience, of

these only 26% were interested in international work. The sample of doctors was polarised, only 4% had no interest in international work, but 90% had either past/current experience or were about to travel internationally. Yet, Nursing and Midwifery, Allied Health Professionals and Ambulance, mapped very closely onto the NHSNW demographics. However, despite the sample not being fully representative, it was necessary to ensure a sample that included 50% that had or were due to undertake international experience. Females were also over-represented in the sample. Nevertheless, the sample did contain a wide variety of staff and, as such, could be used to assess the learning of a wide variety of staff.

The tool only includes items which group together and are therefore theoretically assessing the same latent trait. This means that many items considered important for international volunteering in the core outcome set were not included [14]. When assessing latent traits, items which do not explain more variance in scores are redundant. This tool, therefore, compliments rather than replaces other tools which professionals to reflect on all components of their PPD [15].

Conclusion

We have created an evidence-based 40-item psychometric tool for self-assessment of learning on international placements. This tool could be used in research and practice. In terms of research, it offers the opportunity to compare different types of placement for their impact on PPD. It has been reported that certain variables may affect the likelihood of PPD. These may be moderating variables; something that influences strength of the relationship between international placements and development of a latent trait [34]. For example, some argue that 'career stage' may affect the likelihood of development of management skills internationally [7, 35]. There may also be mediating variables that explains the relationship between two other variables [34]. For example, some argue it is lack of available resources that affects an individual's development of 'adaptability' [36, 37]. This tool could be used to measure PPD so that these relationships could be explored statistically. Exploration of these relationships would provide evidence for employers, volunteer placing organisations and volunteers themselves, to select and develop international placements that are likely to lead to desired PPD outcomes. As such, the tool could have a potentially great impact on international placement policy and practice and

the support or otherwise of the increasing globalization of the health workforce. In fact, the tool will be used in all Health Education England authorised volunteer placements over a twelve month period; which will generate large-scale data to hopefully evidence the benefits and potentially strengthen the tool.

Ethics

Ethical approval was granted via the University of Salford (ref HSCR14/58) and the University of Manchester Research Ethics Committee (ref 14185).

List of Abbreviations

CFA- Confirmatory Factor Analysis

GHE- Global Health Exchange

HEE- Health Education England

HCA- Healthcare Assistant

HIC- High Income Country

LMIC- Low and Middle-income Country

MIRT- Multivariate Item Response Theory

NHS- National Health Service

NHSNW- National Health Service North West

PCA- Principle Component analysis

PPD- Personal and Professional Development

SWLS- Satisfaction with Life Scale

Declarations

Ethics approval and consent to participate

Approval for the study was obtained from the Ethical Research Committee, University of Salford, and the University of Manchester Research Ethics Committee. Participants gave informed consent.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

Professor Ged Byrne is the Director of Global Engagement for Health Education England. The other authors declare no competing interests.

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Author contributions

NT participated in the design of the study, conducted the pilot and drafted the majority of the manuscript. LBD conceived the design of the study, analysed data and contributed significantly to drafting the manuscript. CC provided oversight to the study design, conducted the PCA and statistical analysis and drafted the manuscript, GB provided oversight of study design, helped recruit participants and drafted the

manuscript. All authors participated in the coordination of the research and read and approved the final manuscript.

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Table 6: The final selection of items with the dimension each one of them belongs, the loading estimates, the standard errors of the loading estimates, the ratios between the estimate and the standard error and the two-tailed *p*-values for the estimates.

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
CONFIDENCE			
I am confident in my ability to manage myself in a clinical environment.	0.727	0.030	0.000
I am confident in my abilities to work independently when necessary.	0.719	0.032	0.000
I am confident in my ability to deal with the unexpected.	0.743	0.025	0.000
I am confident in my ability to be adaptable and innovative as a leader.	0.733	0.024	0.000

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
I am confident in my ability to adapt and be flexible clinically.	0.823	0.021	0.000
I am confident in my ability to adapt and be flexible in general.	0.798	0.021	0.000
I am confident in my ability to find solutions despite limited resources.	0.770	0.022	0.000
I am confident in my ability to apply clinical skills to another context.	0.721	0.026	0.000
I am confident in my work.	0.724	0.025	0.000
LIFE SATISFACTION			
In most ways my life is close to my ideal.	0.834	0.02	0.000
The conditions of my life are excellent.	0.783	0.02	0.000
I am satisfied with my life.	0.893	0.017	0.000
So far I have gotten the important things I want in life.	0.776	0.024	0.000
If I could live my life over. I would change almost nothing.	0.667	0.029	0.000
Taking everything into consideration. I am satisfied with my job.	0.717	0.038	0.000
CULTURAL			
I demonstrated a good awareness about how culture influences health.	0.761	0.036	0.000
I frequently demonstrated cultural sensitivity.	0.881	0.031	0.000
I was constantly conscious of culture when working with patients.	0.779	0.033	0.000
ADAPTING COMMUNICATION			

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
I changed the way I speak so that somebody can understand me (e.g. purposely spoke slower and clearer).	0.899	0.024	0.000
I changed the way I communicate to make it more contextually appropriate (e.g.. to make it more culturally appropriate).	0.916	0.025	0.000
I frequently relied on my non-verbal communication (e.g. hand gestures).	0.751	0.032	0.000
TEACHING			
I demonstrated I'm a good teacher.	0.813	0.024	0.000
I adapted the way I teach to make it better for the learner.	0.807	0.023	0.000
I am confident in my ability to teach others.	0.883	0.031	0.000
DIFFICULT COMMUNICATION			
I demonstrated that I am skilled in challenging conversations. even in high pressure situations.	0.842	0.025	0.000
I demonstrated that I am able to manage difficult people effectively.	0.862	0.021	0.000
I frequently dealt with difficult people.	0.774	0.027	0.000
BEHAVIOUR CHANGE			
I am able to empower patients to help themselves.	0.807	0.026	0.000
I am able to empower colleagues to help themselves.	0.794	0.025	0.000
In my work I have demonstrated skills in changing colleagues' behaviour.	0.761	0.027	0.000
In my work I have demonstrated skills in encouraging and supporting patients to change behaviour.	0.778	0.027	0.000

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
MANAGEMENT			
I allocated tasks.	0.848	0.021	0.000
I co-ordinated colleagues.	0.868	0.02	0.000
I demonstrated I am able to plan and organise.	0.907	0.024	0.000
TEAM WORK			
I was frequently proactive at work (e.g. used my initiative. got on with things. thought on my feet).	0.778	0.027	0.000
I demonstrated that I am able to cope in work (e.g. able to deal with stress).	0.763	0.028	0.000
I demonstrated that I am particularly good at working as part of team.	0.765	0.026	0.000
FLEXIBILITY			
I demonstrated I'm good at dealing with the unexpected.	0.857	0.037	0.000
I frequently had to find solutions despite limited resources.	0.912	0.017	0.000
I demonstrated I am able to find solutions despite limited resources.	0.937	0.017	0.000

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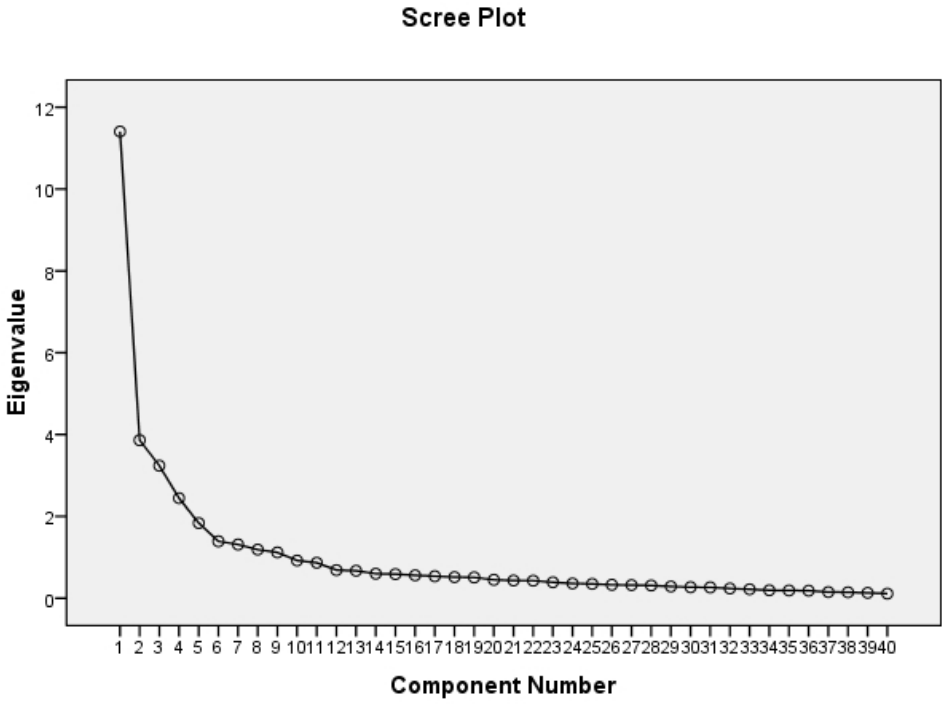
Scree Plot
Eigenvalue
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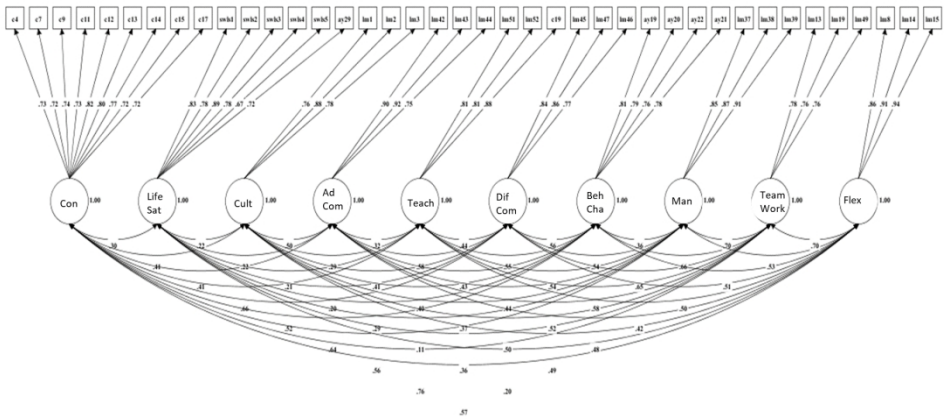
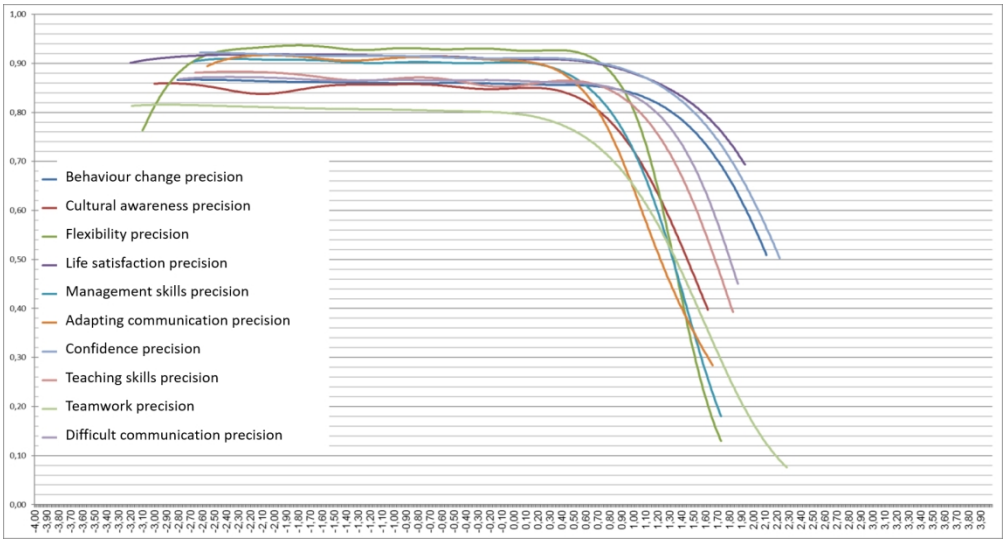
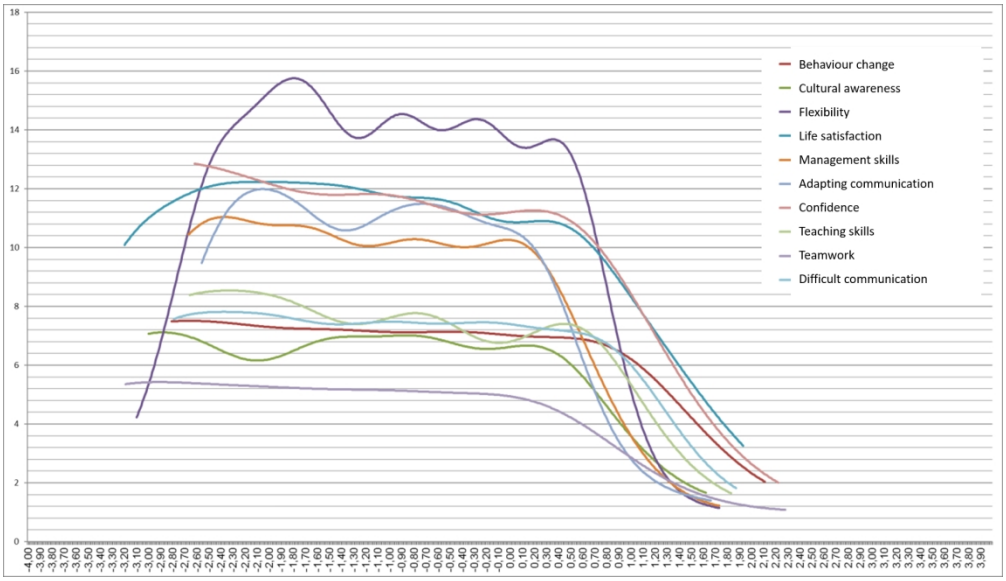
Scree Plot



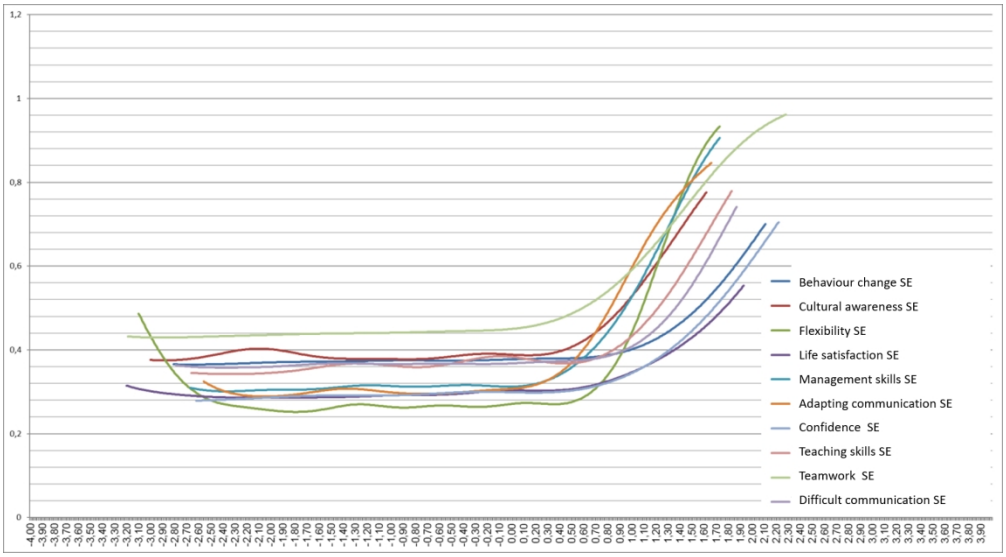
Latent variables and loadings



Estimates for mean individual precision of the latent variable scores



Information functions for the latent variables



Estimates for individual standard errors of measurement of the latent variable scores

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Measuring the Outcomes of Volunteering for Education: Development and pilot of a tool to assess health professionals' personal and professional development from international volunteering

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Measuring the Outcomes of Volunteering for Education: Development and pilot of a tool to assess health professionals' personal and professional development from international volunteering

Tyler, N, University of Nottingham, natasha.tyler@nottingham.ac.uk (Corresponding Author)

Collares, CF, Maastricht University, c.collares@maastrichtuniversity.nl

Byrne, GJ, Health Education England, ged.byrne@hee.nhs.uk

Byrne-Davis, LMT, University of Manchester, UK lucie.byrne-davis@manchester.ac.uk

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Abstract

Objective: The development and pilot of a self-report questionnaire, to assess personal and professional development of health professionals gained through experiences in low and middle-income countries**.**

Design The instrument was developed from a core set of the outcomes of international placements for UK health professionals. Principle component analysis and multidimensional item response theory were conducted using results of a cross-sectional pilot study to highlight items with the best psychometric properties.

Setting: Questionnaires were completed both online and in multiple UK health professional events face-to-face.

Participants: 436 Healthcare professional participants from the UK (with and without international experience) completed a 110-item questionnaire in which they assessed their knowledge, skills and attitudes.

Measures: The 110 item questionnaire included self-report questions on a 7-point Likert scale of agreement, developed from the core outcome set, including items on satisfaction, clinical skills, communication and other important health professional knowledge, skills, attitudes and behaviours. Item reduction led to development of the 40-item Measuring the Outcomes of Volunteering for Education- Tool (MOVE-iT). Internal consistency was evaluated by the Cronbach's α coefficient. Exploratory analysis investigated the structure of the data using Principal Component Analysis and Multivariate Item Response Theory.

Results: Exploratory Analysis found 10 principle components that explained 71.80% of the variance. Components were labelled 'Attitude to work, Adaptability, Adapting Communication, Cultural Sensitivity, Difficult Communication, Confidence, Teaching, Management, Behaviour Change and Life Satisfaction'. Internal consistency was acceptable for the identified components (α between 0.72 to 0.86).

Conclusions: A 40-item self-report questionnaire developed from a core outcome set for personal and professional development from international placements was developed, with evidence of good reliability and validity. This questionnaire will increase understanding of impact of international placements, facilitating

comparisons of different types of experience. This will aid decision making about whether UK health professionals should be encouraged to volunteer internationally and in what capacity.

Key Words

- Personal and Professional Development
- International Placements
- Volunteering
- Health Professionals
- Low and Middle Income Countries
- Principle Component Analysis
- Psychometric Tool
- Learning Assessment
- Self-Assessment

Article Summary

Strengths and Limitations of this Study

- The Measuring the Outcomes of Volunteering for Education- Tool (MOVE-iT) was developed based on evidence from peer-reviewed literature and expert opinion
- The underlying structures of the instrument were explored using a large data set of 436 multi-disciplinary health professionals
- The psychometric analyses demonstrate good internal consistency reliability
- The MOVE-iT tool can be used to assess learning of health professionals volunteering in low and middle-income countries

Background

Globalisation of the health workforce has inevitably led to large numbers of qualified healthcare professionals choosing to temporarily (ranging between 1 day to 2 years) work overseas in some capacity, with many choosing low and middle income countries (LMICs) (1). In this paper we describe international placements in any LMIC (as defined by the

OECD) in which the healthcare professional receives little or no remuneration; this is often referred to as volunteering. Such placements can take numerous forms, for example a dentist delivering a service on a hospital train in India (2), British healthcare professionals of many cadres working together in health partnerships with a hospital in Tanzania (3), or healthcare scientists working in labs in sub-Saharan Africa (4).

International health volunteering has been reported as resulting in personal and professional development (PPD), for example a change in attitudes on a personal level, or developing new/broadening existing professional skills, see our previous work for a full list of all reported PPD (5). Benefits have been reported for both the individual's practice and also patient outcomes upon return (6). Many professionals report PPD outcomes as a result of the new experience and particularly that working in an LMIC encourages healthcare professionals to learn new skills in an effort to adequately adapt, for example using new clinical techniques specific to the LMIC, or dealing with a new cultural phenomenon (7–9). Professionals report that LMICs provide staff with an opportunity to practice skills that they would not develop in a domestic work setting, as such giving them increased confidence in their work (8,10). In some academic papers professionals report perceived/expected exposure to higher numbers of clinical cases and often clinical cases that are more challenging than those seen in high income countries (HICs) as well as opportunities to lead, make decisions and work within new cultural and social norms (6,9,11,12). Many staff report a change in core attitudes or beliefs: a greater appreciation of caring, an acceptance of cultural differences or a changed/new/broader perspective (8,9,13,14). As a result, in the UK, some organisations have proposed that enabling and encouraging staff to work in LMICs may have great benefits to the NHS (6,7,15) and have expressed a desire to assess PPD outcomes (16,17) to provide quantitative evidence of benefit.

Despite these reported benefits, volunteering is sometimes perceived as a loss to the high income country, for example our research found that within the UK National Health Service (NHS), some management perceived volunteering as a loss of staff within a service that is already under pressure (15). As such, some employers are reluctant to release staff for international placements (15).

Qualitative research into the benefits of international working or volunteering (from now on

referred to as 'international placements' for ease), has reported similar PPD outcomes regardless of the host country, type of projects or individual's profession. Communication, leadership, attitude to work, flexibility and cultural awareness are frequently reported outcomes (2,6,9,12,18). However, from an educational perspective, precise information about this learning (process, outcomes, variables) is seldom reported. In a recent meta-synthesis and Delphi study, we reported a list of 116 outcomes (5) from a review of literature on international placements for healthcare professionals. The list included benefits and costs that were agreed by stakeholders to be frequently experienced by health professionals (of any cadre) in an international placement. Costs (e.g. health outcomes, financial loss, clinical de-skilling) are not reported in this paper, but can we found in the meta-synthesis (5). We also summarised the moderating (factors that affect the strength of a relationship) and mediating variables (factors that explain the relationship between two items) that were reported in the literature to potentially affect PPD outcomes (e.g. length of stay, host country, level of experience, supervision).

There have been some attempts to quantify these outcomes, for example, a small number of previous UK papers have used a questionnaire approach to understand outcomes (8,19,20), but these have not taken a psychometric approach to the measurement of underpinning domains of learning (i.e. developed and tested an evidence based questionnaire). A number of psychometric questionnaires have been developed outside of the UK, but are based on non-domain specific outcomes for any professional, hence are not specific to healthcare professionals (21–23). For example, the IVIS used latent trait analysis and found 11 'volunteer outcome' factors including open-minded and intercultural relationships (24). It is not known whether there are unique elements of learning or outcomes that are specific to healthcare professionals (from within the NHS) that differ from the non-domain specific learning measured in existing tools. Particularly as some of the qualitative research suggests unique outcomes, for example related to patient interaction (9,25).

This study aimed to create a measure of the PPD outcomes of international placements. We worked on the large set of outcomes that stakeholders agreed were core outcomes from international placements for health professionals (2). We aimed to reduce the items to a short questionnaire using item response theory to establish and test a set of latent traits and their associated questions.

Methods

Design

We followed traditional tool development methods in order to develop a measurement tool (26). In summary, we took the PPD outcomes found in the previous study (27), made them into questions and then reduced their number through a process of piloting with health professionals and using statistical methods to eliminate items which were not congruent with other items or were redundant because they were too congruent with other items. We used a cross-sectional design, so participants were measured only at one time point. The study used Item Response Theory, whereby 'constructs' are theoretical terms that refer to unobserved, idealised entities (28). Latent traits are one type of construct, which are qualities possessed by individuals that can change, but only over the long term (28). Latent traits include attitudes, preferences and dispositions, but also elements that are important for professional development such as ability, expertise and aptitude (29). No measure of a latent trait is ever considered perfectly accurate, instead different measures are used to estimate latent traits (30), with varying levels of effectiveness (28).

Participants

Previous psychometric research on the sample size requirements for precise estimates of reliability coefficients; suggested we needed 400 participants (31). We therefore aimed to recruit the 400 participants across 4 different groups: 100 health professionals that had been on international placements in the past, 100 who were about to undertake an international placement or currently working overseas, 100 with an interest in international placements but no past experience and 100 with no interest in or past experience of international placements. We included health professionals who had and who had not worked internationally. It is usual to do item reduction with a sample of the population who will be using the tool. Since the tool could be used to compare PPD in health professionals with or without international experience or before and after international experience, we decided to include, in the sample, health professionals without international experience. We further subdivided our sample into people who were interested in international experience and not to

ensure that the tool items were reduced on the basis of answers from people with all ranges of experience and perceptions of international placements. Participants were not excluded based on the years since NHS employment, provided they had this experience at some point. Inclusion criteria were that the participant be or have been an NHS employee (current or past), working/worked in a patient facing role as a qualified healthcare professional.

Procedure

Creating the pilot questionnaire

We developed a questionnaire based on the core outcome set reported in our previous paper (5). Two members of the team looked for common inductive, themes across the outcomes (LBD, NT). We found experience, confidence and attitudes, where outcomes were to do with experience, we categorised them as experience and asked about the experiences they had during a suitable time period. If statements were about how confident they felt or attitudes they held, we categorised them as such and asked questions in that way. Statements were self-reported in terms of strength of agreement using a 7-point Likert scale. Where the core outcome reported in the previous paper, could be interpreted in multiple ways, we referred back to the original papers where the outcome was originally reported from the metasynthesis (5) and used this to make decisions about how to express the statement. If a statement could indicate change in experience, confidence and / or attitude, we developed questions for each.

Two members of the team (LBD, NT) assessed each core outcome and generated 103 statements with Likert scales of agreement for each statement (from strongly disagree to strongly agree). We excluded 40 items from the core outcome set which would not be measurable through self-report questionnaires. These were items about organisational outcomes for the NHS (8), outcomes that were too vague to be specifically defined (8) or overlapped in meaning with another and were combined (24). For example, '*exposure to ethical dilemmas'* and '*increased awareness of/knowledge about ethics*' were combined *into 'I have frequently experienced ethical dilemmas'.* See supplementary material for a record of the decisions and their reasons. In addition 7 items from the Satisfaction with Life Scale were added (REF).

We included 56 statements about the frequency with which the individual had an experience or exhibited certain behaviour in the last month (regardless of where this last month's work took place). For example, 'In the last month I frequently dealt with difficult people'. We generated 19 confidence statements. For example, 'I am confident in my ability to teach others'. Other statements, which were more about attitudes and feelings were labelled included, for example, 'I have an excellent work ethic', (n=35). Supplementary material shows the matches between the outcomes and statements.

Pre-pilot

The questionnaire was pre-piloted on sixteen participants, including seven from the MOVE research group (a group of Salford/Manchester researchers involved in similar research), to establish that the questionnaire was readable and understandable. We administered the tool online using eForms (32). The authors, plus the wider institutional team of researchers in international placements, met face-to-face to consider all of the written comments from the pilot. We conducted a cognitive interview with four participants, using both think aloud interviewing and verbal probing, whereby participants were questioned/asked to think aloud as they completed the questionnaire (33,34). Any comments, issues, questions or suggestions raised during the cognitive interviews were inputted into a table, one member of the team (NT) decided how best to act on each one and whether changes needed to be made. The table was then reviewed by another team member (LBD) and disagreements were discussed and resolved. This resulted in numerous changes being made to the statements, including using an existing life satisfaction scale (SWLS), previous research suggest using an existing validated for scale if one exists and the cognitive interviews and pre-pilot process highlighted the necessity to do this (26). As a result of this process a 110-item tool was created for the pilot phase.

Pilot

There were two methods of recruitment: online and face-to-face. Face-to-face participants were recruited using an opportunistic sample at health professional

events nationwide (conferences, training events, exhibitions), many of which had an international focus (the majority of the sample gained this way were nurses and nursing assistants). Online participants were recruited in numerous ways, including links to the questionnaire posted on international volunteering blogs and in health professional newsletters and bulletins. The majority of the online sample was gathered using snowball sampling with key contacts within companies, projects and hospital health links that place professionals internationally agreed to send the link via email to health professionals, the majority of the doctors were responded online.

The tool was completed by participants either online or face-to-face, as was convenient and appropriate for the participants. Online participants received a link in an email, blog or online community and after giving consent. Face-to-face participants completed a paper version of the questionnaire. Of the 43 organisations that helped us recruit, 9 involved face-to-face recruitment (21%). Recruitment took place between April and July 2016.

Materials:

Measure

The tool consisted of 110 statements measured on a 7-point Likert scale ranging from strongly agree to strongly disagree. The Likert scale contained the following descriptors: 1 Strongly Agree, 2, 3, 4 Neither Agree not Disagree, 5, 6, 7 Strongly Disagree (this was reverse coded for analysis as higher intensity ordinal constructs need to be higher values, strongly agree at 7, strongly disagree at 1). No statements were reversed.

An additional existing scale was used within the tool, the Satisfaction with Life Scale (SWLS) (35). This is a five-item scale that has been used frequently to measure satisfaction with life. This replaced a number of statements from the core outcome set about satisfaction with life, since the questions had already been refined and tested for validity and reliability and guidelines suggest using existing scales where possible (26,35).

In addition to the 110 statements, participants demographic and placement data was also gathered. Each participant was asked basic demographic questions: age, gender, profession, employment status, nationality and years since registration.

Past experience on international placements was also recorded (country, length of stay).

Analyses

Principal Component Analysis

We used successive iterations of principal component analysis to reduce the pool of items, so that only the items with optimal psychometric properties would remain. Principal Component Analysis (PCA) is a dimension-reduction tool that can be used to reduce a large set of items to a small set that still contains most of the information in the large set (36). Initially, a parallel analysis was performed to determine the number of factors. Items with low communalities (<0.500) or loadings below 0.3 were withdrawn in subsequent iterations. In the final iterations, exclusions were performed at an item-by-item basis. We decided that even if there were more items in one domain we would retain them if they had adequate psychometric properties. PCA was performed in IBM SPSS 23 (37).

Multidimensional Item Response Theory

We created a multidimensional item response theory (MIRT) model, based on the results of the best iteration of the PCA in order to test the structure of the factors we found and remove any items which did not improve the assessment of each factor. MIRT is analogous to confirmatory factor analysis (CFA) (38) but, unlike CFA, MIRT considers all Likert scale variables as categorical, which is more appropriate for our data. MIRT parameters in this study were estimated using weighted least squares means- and variance-adjusted, given their appropriateness for categorical variables in comparison to Bayesian estimation, which would be an operationally attractive alternative, given the high dimensionality of the data (39). MIRT analysis was performed in Mplus 8 (40).

Patient and Public Involvement

No patient involved

Results

Pilot

Participants

Four hundred and thirty six participants completed the questionnaire, 42% (182/436) of participants had no international experience (Table 1).

Table 1: Participants: Anticipated and Actual Numbers

Group	Target	N included (%)	Percentage of target
Currently Overseas/Due to Depart	100	79 (18%) (26 Currently Overseas. 53 Due to Depart)	79%
Past International Experience	100	169 (39%)	169%
No International Experience- Interested	100	78 (18%)	78%
No International Experience- Not Interested	100	104 (24%)	104%
Total	400	436 (100%)	**109%**

All participants were NHS employees (past or present). Staff group representation was largely in line with the NHS North West employee data (41), whereby 30% of the workforce is nursing and midwifery (Table 2). The other staff groups were also relatively proportionate, besides Medical and Dental which represents only 9% of the North West workforce and support to staff (28%). This suggests that any item reduction based on variability in responses from the sampled group were largely representative of the NHS workforce. Table 3 shows the participant demographics.

Table 2: Professions of participants

Staff group	n	Pilot sample	NHSNW (41)
Medical and Dental	146	34%	9%
Nursing and Midwifery	135	31%	30%
Allied Health Professionals	64	15%	6%
Healthcare Scientists	13	3%	3%
Ambulance	13	3%	2%
Support to clinical staff	30	7%	28%
NHS infrastructure support	5	1%	18%

Other scientific, therapeutic & technical	3	1%	4%
Other	25	6%	<1%

Table 3: Participant Demographic Information: age, employment status, nationality, gender and career stage (years since registration was used as a proxy measure of experience)

Age	n	Employment status	n	Nationality	n	Years since registration	n	Gender	n
Under 25	35	Full Time	325	British	350	<5 Years	98	Male	113
26-30	76	Part Time	72	English	7	6 to 15	137	Female	323
31-40	127	Retired	20	Irish	11	16 to 25	60	Total	436
41-50	84	Student	16	Scottish	4	26+	94		
51-60	81	Unemployed	3	Welsh	1	Total	389		
61-70	32	Total	436	N Irish	2	Missing Data	47		
Total	435			EU	12				
Missing Data	1			Non EU	28				
				Dual British	7				
				Total	422				
				Missing Data	14				

Principal Component Analysis

The principal component analysis used the correlation matrix obtained from the application of the questionnaire to the 436 participants. The 436 responses included those with no international experience to account for the range of variability in response across the NHS workforce, regardless of experience. Twenty-one iterations of principal component analysis were performed. From the original set of

items, only 40 items were chosen for the last iteration of the principal component analysis. The Kaiser-Meyer-Olkin measure showed the level of sampling adequacy to be acceptable (KMO = 0.896). The lowest measure of sample adequacy for an individual item was 0.810 ("*I demonstrated I'm a good teacher*"). The Bartlett's sphericity test indicated that the inter-item correlations were sufficient for proceeding with the analysis. The lowest value for the items' communalities was 0.590 ("*If I could live my life over, I would change almost nothing*"), which is above the aimed threshold of 0.500. After *varimax* rotation, 10 factors were extracted taking into account the findings of the scree plot and of a Monte Carlo parallel analysis. The 10 factors explained 71.80% of the variance. On the scree plot (see Figure 1) it is possible to observe that the first five factors had the highest eigenvalues.

Multi-Dimensional Item Response Theory

The diagram with the resulting model; whichcontains the items selected for each one of the latent variables, the loadings for each item and the correlation coefficients between the constructs, can be seen in Figure 2. This model was chosen as it was the best possible solution to reconcile the need of creating a comprehensive, content-rich questionnaire while obtaining satisfactory evidence of validity based on its internal structure. In terms of goodness-of-fit, the model had significantly better fit than a unidimensional solution in the chi-square test for difference testing ($\chi 2$ = 2889.749, df = 45, $p < 0.001$). The comparison of goodness-of-fit indices between the unidimensional solution and the proposed model can be observed in Table 4. The chi-square is not the chi-square of any model but the chi-square of the difference of the chi-squares of each model separately.

Table 4 – Comparison of selected goodness-of-fit indices between the unidimensional model and the proposed model.

Models	χ^2	df	χ^2/df	RMSEA	CFI	TLI	WRMR
Unidimensional	8206.204	740	11.089	0.152	0.641	0.622	3.511
Proposed model	1736.922	695	2.499	0.059	0.950	0.944	1.271

Table 5- Cronbach's alpha co-efficient for each construct

Construct	Cronbach's alpha
Adapting Communication	0.88
Confidence	0.86
Life satisfaction	0.86
Difficult communication	0.86
Management skills	0.86
Attitude to work	0.82
Flexibility	0.83
Teaching skills	0.78
Behaviour Change	0.77
Cultural awareness	0.72

Reliability estimates were calculated using Cronbachs's alpha coefficients but also using estimates of individual precision calculated based on the individual estimates of the standard errors of measurement. Figure 1 shows the precision curves for each latent variable. While "Confidence", "Life Satisfaction" and "Attitudes to Work" had the highest means for the individual precision estimates, "Adaptability" was the construct that achieved the highest precision estimates for most of the theta spectrum. "Attitude to work" had the lowest estimates for individual precision. Using the information functions as indicators of precision, "Flexibility" achieved the highest values and "Attitude to work", the lowest ones. As expected, an inverse situation is observable on the curves for the standard errors of measurement, with "Flexibility" showing the lowest measurement errors and "Attitude to work" the highest ones. The precision, information and standard error curves for the retrieved constructs under the MIRT analysis can be observed in Figures 3, 4 and 5. The precision, information and SE curves demonstrate that the quality of the measures for each one of the proposed constructs varies across the latent spectrum, with lower levels of reliability and information and higher levels of standard error of measurement in the extremes of the latent spectrum. The extreme right side of the spectrum has the worst reliability and highest error. The information curve, therefore, is indirect evidence of reliability with the advantage of being sample-independent.

Table 5 shows the Cronbach's alpha coefficients for each one of the retrieved constructs. Taking the Cronbach's alpha coefficients into account, the reliability estimates are somewhat divergent from the MIRT-based precision estimates. Using Cronbach's alpha, the most reliable factor was "Adapting Communication" and the least reliable was "Cultural Awareness".

The analysis resulted in 40 items grouped into 10 constructs, the final list of constructs and the items that belong on each can be seen in Table 6. Table 6 also shows the loading estimates, the standard errors of the loading estimates, the ratios between the estimate and the standard error and the two-tailed *p*-values for the estimates. Table 6 shows the final selection of items with the dimension each one of them belongs.

<insert table 6>

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Discussion

In this study we converted stakeholder agreed PPD outcomes of health professional international placements (27) into outcome statements, to assess which have the best psychometric properties for self-assessment. By piloting these statements with a large set of healthcare professionals and using item response theory to establish and test a set of latent traits and their associated questions, we were able to determine the 40 items with the best psychometric properties to create the MOVEiT tool. Reliability evidence is favourable to the latent trait structure, both when using a single coefficient for the entire sample, and under the multidimensional item response theory approach. The validity evidence based on the internal structure of the questionnaire detailed in this study, combined with the content validity evidence based on the selection of the initial pool of items (5) helps build a strong validity argument in favour of the use of this questionnaire for the measurement of PDD-related dimensions of international placements. There were many more outcomes retained within the confidence domain as there were more items in the original data that we about confidence, and these items demonstrated more variability in responses regarding what people were confident about. We kept this as a large domain as we didn't want to lose the richness of that data.

This paper aimed to consider whether a unique tool is needed to assess outcomes of UK healthcare professionals as a unique professional group, due to the qualitative reports of healthcare specific (i.e. patient interaction outcomes) in the literature (9,25). We found that six of the outcome statements included in the MOVEiT tool were specific to healthcare professionals (i.e. I am confident in my ability to manage myself in a clinical environment). However, if one were to reduce the health specifity of the wording (for example, change the word clinical to work, or patient to customer) the tool has similarities to other psychometric measures introduced earlier in this paper (21,22). These similarities provide support for the application of all measures and suggest that MOVEiT could be applicable outside of healthcare.

The 40 outcome statements that we found to have the best psychometric properties fell within the main outcome categories reported in past literature. For example, communication, leadership, attitude to work, cultural awareness are frequently reported outcomes in the literature and domains within this tool (2,6,9,12,18). In our previous work we criticise the current evidence base for being too vague in outcome reporting, as many papers report communication, leadership and cultural awareness as broad outcomes, rather than specify the relevant components within each that develop (specific skills, knowledge or attitudes) (2,5,12). By using psychometric tests to assess latent traits, we further highlight the necessity for specific outcome reporting, as we found outcome statements associated with adapting communication and difficult communication to be two unique latent traits, rather than a single entity.

We hope that any healthcare professionals as individuals, project managers, or NHS trusts may choose to use the tool in both a within or between participant manner (comparing outcomes pre and post international placements and comparing staff with and without international experience). By collecting data using the MOVEiT tool and the variable statements developed in our previous work (to assess moderating or mediating variables that may affect outcomes), future researchers could begin to gather precise information about this learning (process, outcomes, variables) (5). This should also be considered against measures of the list of costs reported in our previous work (5), as there is considerable literature regarding the ethical concerns of medical practice in LMICs, particularly when staff practice skills that they could not in a high income country (42,43). If mutual benefits could be evidenced using metrics, and costs minimised/mitigated by assessing the elements that increase

mutual benefits, employers may be less reluctant to release staff to undertake such work (1,6). Particularly is evidence suggests that such work, may be beneficial for the LMIC, the NHS and the individual professional.

Going forward we hope to develop a larger set of data; which will a) help us understand in more detail the processes associated with the outcomes and b) assess more thoroughly the reliability and validity of the tool c)adapt or reduce the tool further based on future data and d) assess sensitivity of the tool to change.

Limitations

The tool only includes items which are either psychometrically related, or show variability of response. This means that many items that stakeholders considered important for inclusion in the core outcome set were not represented within the tool (5). This tool, therefore, compliments rather than replaces other tools which professionals to reflect on all components of their PPD (19). This tool provides a way of evidencing benefits, however there is a body of critical evidence outlining the ethical concerns of medical practice abroad, particularly when individuals practice in ways that they might not in a high-income country (43,44). A full cost-benefit analysis of this phenomena can be found in the authors other work (15), the authors only advocate benefits in mutually-beneficial, sustainable, ethical placements.

Conclusion

This evidence-based 40-item psychometric tool for self-assessment of outcomes from international placements (MOVEit) could be used in research and practice. Future work will reveal if the tool has the sensitivity to detect change in the domains.

Ethics

Ethical approval was granted via the University of Salford (ref HSCR14/58) and the University of Manchester Research Ethics Committee (ref 14185).

List of Abbreviations

CFA- Confirmatory Factor Analysis

GHE- Global Health Exchange

HEE- Health Education England

HCA- Healthcare Assistant

HIC- High Income Country

LMIC- Low and Middle-income Country

MIRT- Multivariate Item Response Theory

NHS- National Health Service

NHSNW- National Health Service North West

PCA- Principle Component analysis

PPD- Personal and Professional Development

SWLS- Satisfaction with Life Scale

Declarations

Ethics approval and consent to participate

Approval for the study was obtained from the Ethical Research Committee, University of Salford, and the University of Manchester Research Ethics Committee. Participants gave informed consent.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

Professor Ged Byrne is the Director of Global Engagement for Health Education England. The other authors declare no competing interests.

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Author contributions

NT participated in the design of the study, conducted the pilot and drafted the majority of the manuscript. LBD conceived the design of the study, analysed data and contributed significantly to drafting the manuscript. CC provided oversight to the study design, conducted the PCA and statistical analysis and drafted the manuscript, GB provided oversight of study design, helped recruit participants and drafted the manuscript. All authors participated in the coordination of the research and read and approved the final manuscript.

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Table 6: Estimated discrimination parameters from the proposed MIRT model

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
CONFIDENCE			

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
I am confident in my ability to manage myself in a clinical environment.	0.727	0.030	0.000
I am confident in my abilities to work independently when necessary.	0.719	0.032	0.000
I am confident in my ability to deal with the unexpected.	0.743	0.025	0.000
I am confident in my ability to be adaptable and innovative as a leader.	0.733	0.024	0.000
I am confident in my ability to adapt and be flexible clinically.	0.823	0.021	0.000
I am confident in my ability to adapt and be flexible in general.	0.798	0.021	0.000
I am confident in my ability to find solutions despite limited resources.	0.770	0.022	0.000
I am confident in my ability to apply clinical skills to another context.	0.721	0.026	0.000
I am confident in my work.	0.724	0.025	0.000
LIFE SATISFACTION			
In most ways my life is close to my ideal.	0.834	0.02	0.000
The conditions of my life are excellent.	0.783	0.02	0.000
I am satisfied with my life.	0.893	0.017	0.000
So far I have gotten the important things I want in life.	0.776	0.024	0.000
If I could live my life over. I would change almost nothing.	0.667	0.029	0.000
Taking everything into consideration. I am satisfied with my job.	0.717	0.038	0.000
CULTURAL			

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
*I demonstrated a good awareness about how culture influences health.	0.761	0.036	0.000
*I frequently demonstrated cultural sensitivity.	0.881	0.031	0.000
*I was constantly conscious of culture when working with patients.	0.779	0.033	0.000
ADAPTING COMMUNICATION			
*I changed the way I speak so that somebody can understand me (e.g. purposely spoke slower and clearer).	0.899	0.024	0.000
*I changed the way I communicate to make it more contextually appropriate (e.g.. to make it more culturally appropriate).	0.916	0.025	0.000
*I frequently relied on my non-verbal communication (e.g. hand gestures).	0.751	0.032	0.000
TEACHING			
*I demonstrated I'm a good teacher.	0.813	0.024	0.000
*I adapted the way I teach to make it better for the learner.	0.807	0.023	0.000
I am confident in my ability to teach others.	0.883	0.031	0.000
DIFFICULT COMMUNICATION			
*I demonstrated that I am skilled in challenging conversations. even in high pressure situations.	0.842	0.025	0.000
*I demonstrated that I am able to manage difficult people effectively.	0.862	0.021	0.000
*I frequently dealt with difficult people.	0.774	0.027	0.000
BEHAVIOUR CHANGE			

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
I am able to empower patients to help themselves.	0.807	0.026	0.000
I am able to empower colleagues to help themselves.	0.794	0.025	0.000
In my work I have demonstrated skills in changing colleagues' behaviour.	0.761	0.027	0.000
In my work I have demonstrated skills in encouraging and supporting patients to change behaviour.	0.778	0.027	0.000
MANAGEMENT			
*I allocated tasks.	0.848	0.021	0.000
*I co-ordinated colleagues.	0.868	0.02	0.000
*I demonstrated I am able to plan and organise.	0.907	0.024	0.000
ATTITUDE TO WORK			
*I was frequently proactive at work (e.g. used my initiative. got on with things. thought on my feet).	0.778	0.027	0.000
*I demonstrated that I am able to cope in work (e.g. able to deal with stress).	0.763	0.028	0.000
*I demonstrated that I am particularly good at working as part of team.	0.765	0.026	0.000
FLEXIBILITY			
*I demonstrated I'm good at dealing with the unexpected.	0.857	0.037	0.000
*I frequently had to find solutions despite limited resources.	0.912	0.017	0.000
*I demonstrated I am able to find solutions despite limited resources.	0.937	0.017	0.000

*items preceded by * indicate that 'In the last month' is presented ahead of that statement, providing a time reference to consider the experience.

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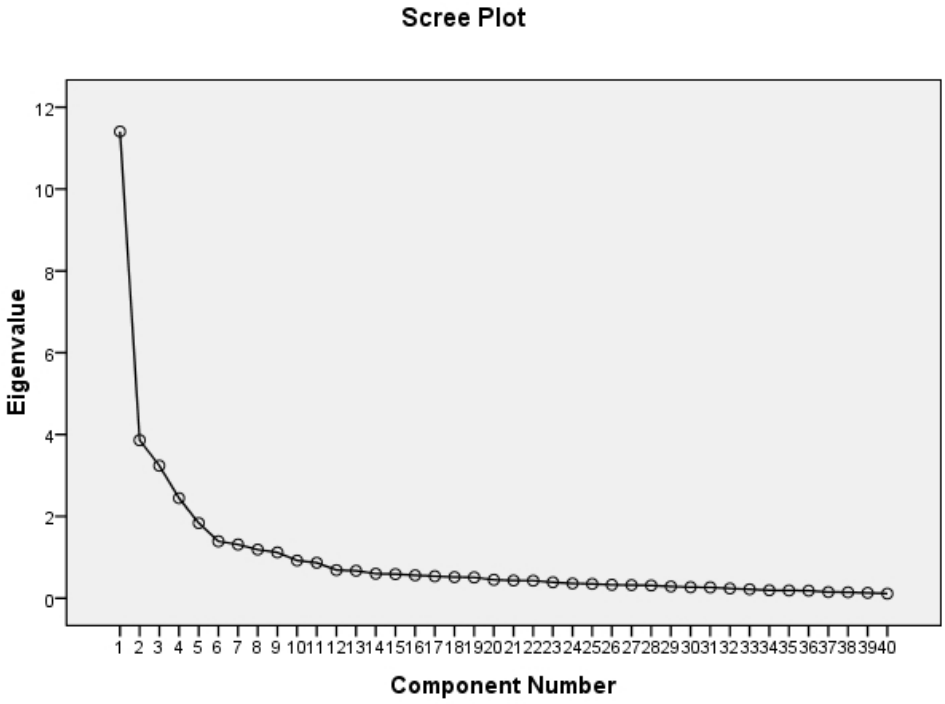
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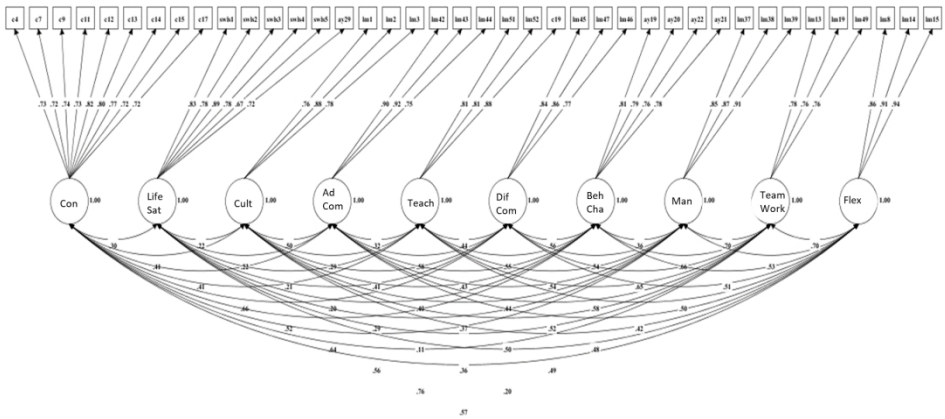
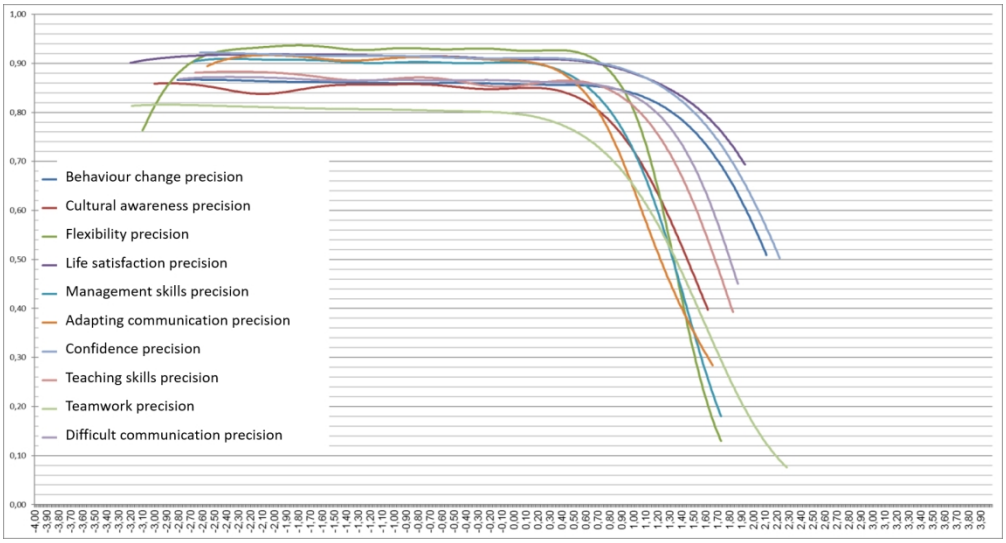
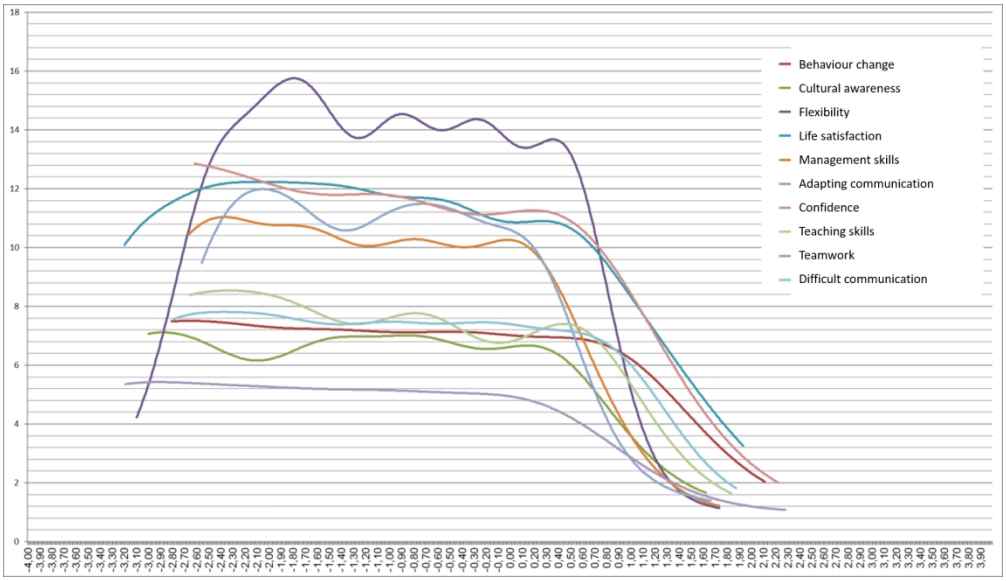
Scree Plot



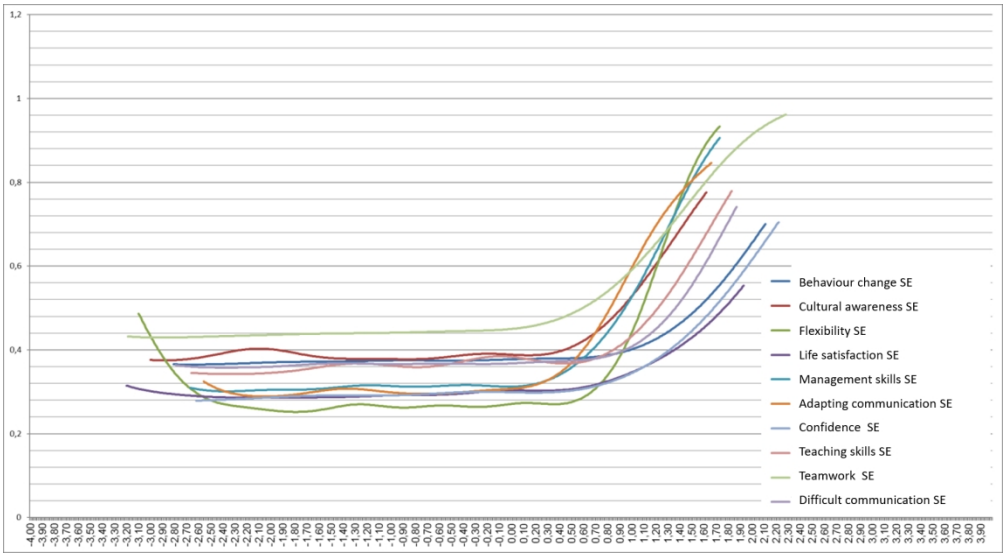
Latent variables and loadings



Estimates for mean individual precision of the latent variable scores



Information functions for the latent variables



Estimates for individual standard errors of measurement of the latent variable scores

Additional Files: Tables

Table 1: Each core outcome and how it was used in the tool

CORE OUTCOME	INCLUDE/REMOVED/COMBINE	Reason/changed to/combined into
INCREASED AWARENESS OF/KNOWLEDGE ABOUT CULTURAL DIFFERENCES AND SIMILARITIES (e.g., understanding key issues within a culture, culturally acceptable behaviour and cultures of UK immigrants, learning about, accepting and changing assumptions about other cultures)	COMB	I have demonstrated a good awareness about how cultural differences influence health
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE CULTURAL ASPECTS OF HEALTH (e.g., greater understanding of health promotion, how culture affects daily life and professional work, cultural differences in health, the effects of politics on health, sustainable healthcare)	COMB	I have demonstrated a good awareness about how cultural differences influence health
ABILITY TO WORK WITH LIMITED RESOURCES (e.g., being more resourceful, ability to target resources, ability to find solutions despite limited resources, making use of everything available, ability to work without reliance on technology, manage in a low resource setting)	COMB	I have frequently had to find solutions despite limited resources
INCREASED AWARENESS OF/KNOWLEDGE ABOUT CULTURE IN PRACTICAL ASSESSMENTS (e.g., the importance of collecting relevant cultural information about peopleâ€™s presenting health problems and learning how to conduct cultural assessments and culturally based physical assessments)	INC	
ABILITY TO APPLY CLINICAL SKILLS TO ANOTHER CONTEXT (e.g., a more challenging environment or a low resource setting)	INC	
ABILITY TO BE ADAPTABLE AND INNOVATIVE IN TEACHING (e.g., ability to transfer skills and knowledge to the most influential people or to another context, recognising different learning styles, being adaptable in assessment)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT HOW OTHER HEALTHCARE SYSTEMS FUNCTION (e.g., developed insight into disparities within healthcare systems, understanding of other systems)	INC	
ABILITY TO COPE (e.g., improved coping strategies, ability to deal with lack of structure, knock backs and stress, being unfazed by things and taking things in stride, new approach to guilt for patients problems)	INC	
INCREASED CULTURAL SENSITIVITY (e.g., sensitivity to reasoning behind cultural differences, feelings of minority and language barriers)	COMB	I have frequently demonstrated cultural sensitivity (e.g. understanding that words and behaviours can have different meanings)
UNDERSTANDING THAT WORDS AND BEHAVIOURS CAN HAVE DIFFERENT MEANINGS (e.g., understanding how words are perceived by others, understanding how to speak and behave so as not offend people)	COMB	I have frequently demonstrated cultural sensitivity (e.g. understanding that words and behaviours can have different meanings)

ABILITY TO APPLY KNOWLEDGE ACROSS SYSTEMS (e.g., ability to apply knowledge from host system to UK and vice versa, using knowledge gained in system to improve/change another)	INC	
DEVELOPMENT OF A NEW PERSPECTIVE (e.g., revising assumptions, seeing things differently, changed world views and outlook, look at everything in a new light, openness to new experiences, put things into perspective)	INC	
IMPROVED FLEXIBILITY AND ADAPTABILITY (e.g., acceptance of other ways of working, adaptation to responsibility, being able to adapt more easily to unfamiliar situations, able to cope more easily with change, gaining a wider perspective, understanding the flexibility of roles)	INC	
ABILITY TO BE INNOVATE WHEN OVERCOMING CHALLENGES (i.e., finding unique ways of overcoming cultural and language challenges)	COMB	I have frequently had to find solutions despite limited resources
INCREASED RESPECT FOR OTHER CULTURES	COMB	I have demonstrated a good awareness about how cultural differences influence health
INCREASED UNDERSTANDING OF BASIC SKILLS AND IDEAS (i.e., back to basics, e.g., basic observations using eyes, less reliance on lab tests and technology, basic clinical skills and science)	COMB	I have relied heavily on the basic skills of my profession (e.g. physical examination)
CONFIDENCE IN TEACHING ABILITY (e.g., being more comfortable around others, confidence public speaking, confidence in transferring knowledge)	COMB	In the last month I have demonstrated that I'm a good teacher I am confident in my ability to teach others
IMPROVED CONFIDENCE (e.g., in caring for clients from another culture, in quality improvement methods, to take bolder steps, to address challenging situations, self-confidence, confidence in professional ability,)	INC	
CONFIDENCE TO WORK IN OTHER LOCATIONS (e.g., confidence to move to another city/country, working with UK multicultural/ underserved populations)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT GLOBAL ISSUES (e.g., re-evaluating world issues, shared purpose)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT CONDITIONS AND PROCEDURES RARELY ENCOUNTERED IN THE UK (e.g., greater understanding of procedures not used in the UK, unfamiliar equipment and delayed presentations, better management of conditions that are not common in the UK)	COMB	I have a good knowledge of conditions and procedures rarely encountered in the UK (e.g. tropical diseases, delayed presentations, old equipment)
INCREASED AWARENESS OF/KNOWLEDGE ABOUT TROPICAL DISEASES	COMB	I have a good knowledge of conditions and procedures rarely encountered in the UK (e.g. tropical diseases, delayed presentations, old equipment)
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF MUTUAL LEARNING AND RESPECT (i.e., greater understanding of reciprocal learning)	INC	
ABILITY TO BE ADAPTABLE IN LEADING (e.g., able to lead in complex novel situations, ability to compromise not dictate)	INC	
ABILITY TO WORK WITHIN A SYSTEM WITH UNFAMILIAR POWER DYNAMICS	INC	
ABILITY TO ADAPT SOCIAL NORMS TO MEET NEEDS OF ANOTHER CULTURE (e.g., change behaviours to fit into another culture, being aware of own social norms and adapting them)	INC	
ABILITY TO EXCHANGE IDEAS WITH THOSE FROM ANOTHER CULTURE	INC	

INCREASED SELF-AWARENESS (e.g., understanding own skills and limitations, how to challenge own beliefs and importance of reflecting on own situation)	INC	
PATIENCE AND TOLERANCE (e.g., accepting and working at other peoples pace, more tolerant)	INC	
PROACTIVITY (e.g., thinking on feet, using initiative, efficiency, get on with things rather than look for someone to blame)	INC	
ABILITY TO WORK WITH RESOURCES AVAILABLE IN SPECIFIC CONTEXTS (i.e., understanding the reasons behind lack of resources)	COMB	I have frequently had to find solutions despite limited resources
ABILITY TO WORK TOWARDS SOLUTIONS (e.g., solution focused approach)	INC	
UNDERSTANDING THAT SPEED AND LANGUAGE COMPETENCY AFFECT COMMUNICATION (e.g., awareness of how speed affects comprehension, understanding language differences and checking recipient comprehension, ability to use an interpreter)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF COMMUNITY PARTICIPATION IN HEALTH (e.g., understanding the community and social influences on health, the role of the community in health, public health and the importance of community work)	INC	
ABILITY TO USE A BROADER RANGE OF CLINICAL SKILLS (e.g., enhancing existing skills and acquiring new clinical skills, greater all round competence)	INC	
UNDERSTANDING THAT CHANGING BEHAVIOUR IS COMPLEX (e.g., understanding how to make small changes and not to force your perspective onto others,)	COMB	In my work I have demonstrated skills in changing patients' or colleagues' behaviours
ABILITY TO IMPROVE SERVICE (e.g., renewed enthusiasm for service improvement)	INC	
INCREASED STAFF KNOWLEDGE AND SKILLS (e.g., increased staff knowledge of low cost healthcare, more knowledgeable staff able to cover more areas, to discover better ways of doing things and more aware of waste reduction)	REM	too vague and not based on individual
INCREASED AWARENESS OF/KNOWLEDGE ABOUT HOW CONTEXT AFFECTS COMMUNICATION (e.g., effectively conveying ideas in a contextually appropriate way)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE NEED FOR AND IMPORTANCE OF TRAINING (i.e., understanding how important effective training is in)	INC	
IMPROVEMENT IN TEACHING SKILLS (e.g., learning new techniques, greater training delivery skills, lecturing skills and small group teaching skills)	COMB	In the last month I have demonstrated that I'm a good teacher I am confident in my ability to teach others
ABILITY TO DEAL WITH THE UNEXPECTED	INC	
ABILITY TO MANAGE PROJECTS	INC	
DEEPER ENGAGEMENT WITH ISSUES OF EQUALITY AND DIVERSITY	INC	
ABILITY TO OVERCOME COMMUNICATION CHALLENGES (e.g., ability to communicate effectively in high pressure situations, engage in challenging conversations and liaise between groups)	INC	
ABILITY TO BE INNOVATIVE WITH CLINICAL SKILLS (e.g., use of innovative techniques, finding new ways to approach a condition, new ways of working)	INC	

APPRECIATION OF HAVING THE RIGHT TOOLS AND EQUIPMENT TO BE ABLE TO DO THE JOB (i.e., resources: technical equipment, disposal equipment, cleaning products and protective equipment)	COMB	I have frequently had to find solutions despite limited resources
APPRECIATION OF EXCELLENT HUMAN RESOURCE IN THE NHS (e.g., multidisciplinary TEAM WORKs, HR structures, appreciation of own profession, understanding hierarchy and the importance of each person within it)	INC	
IMPROVED EMOTIONAL INTELLIGENCE (e.g., changed engagement with self, knowledge and world)	INC	
ABILITY TO IDENTIFY AND ANTICIPATE POTENTIAL PROBLEMS (e.g., identify problems when setting up a new project)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT APPROPRIATE CLINICAL BEHAVIOUR (e.g., knowing when to stop and when to move forward, when to ask for help and different populations needs)	INC	
ABILITY TO MAKE INDEPENDENT CLINICAL DECISIONS (e.g., ability to make an urgent decision in an emergency, dealing with uncertain outcomes, evaluating risks to patients and self)	COMB	I am confident in my ability to make appropriate independent clinical decisions
UNDERSTANDING OWN POTENTIAL TO EMPOWER PEOPLE	INC	
ABILITY TO WORK AS PART OF A TEAM WORK (e.g., understanding TEAM WORK group norms, perception of roles within the group, managing personal objectives within a group)	INC	
ABILITY TO BUILD A GLOBAL NETWORK	INC	
ABILITY TO DISSEMINATION BEST PRACTICE GLOBALLY	INC	
APPRECIATION OF FREE UNIVERSAL HEALTH (e.g., the NHS system of free healthcare for all, privilege and opportunity, the expectations that are placed on NHS by service users)	INC	
IMPROVED SITUATIONAL AWARENESS (i.e., understanding your environment so you can understand what to do)	REM	Research suggests self-report does not measure this effectively
INCREASED JOB SATISFACTION (e.g., increased motivation and morale within profession, renewed passion for work, sense of reward)	INC	
PERSONAL SATISFACTION (e.g., personal achievements and challenges, new experiences, experiencing a different lifestyle, a holiday, appreciation of own life, personal fulfilment)	INC	
CAN-DO ATTITUDE	INC	
ABILITY TO PROVIDE BETTER CARE (e.g., ability to integrate primary and secondary care, to provide multicultural care, to develop most effective approaches to care and taking responsibility for providing quality of care)	INC	
ABILITY TO CO-OPERATE (e.g., willingness to see another point of view)	INC	
APPRECIATION OF CLINICAL GOVERNANCE PROCEDURES WITHIN NHS (e.g., waste disposal, audit, TEAM WORKwork, education system, tests and investigations)	COMB	I have thought about and appreciated clinical governance
APPRECIATION OF THE IMPORTANCE OF CARE AND COMPASSION (e.g., ability to compare compassion in both systems, empathy and fairness)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE POSITIVE IMPACT OF CLINICAL POLICIES AND GOVERNANCE (e.g., understanding the benefits of a comprehensive checklist)	COMB	I have thought about and appreciated clinical governance
INCREASED AWARENESS OF/KNOWLEDGE ABOUT ETHICS (i.e., experiencing ethical dilemmas, understanding the importance of ethics)	COMB	I have frequently experienced ethical dilemmas

CHANGED PERCEPTION OF OTHERNESS (e.g., understanding importance of being a friendly stranger in UK, feeling like a foreigner)	INC	
INTEGRITY	REM	Too vague
INDEPENDENCE (e.g., lone working)	INC	
ABILITY TO PLAN AND ORGANISE (e.g., ability to set direction, improved audit skills)	INC	
ABILITY TO MAKE DECISIONS (e.g., understanding who the decision is for, taking action on decision, making judgements	COMB	I am confident in my ability to make appropriate independent clinical decisions
ABILITY TO MANAGE RISK (e.g., manage risk in advance, evaluation of environment, understanding the clinical importance of risk management and the wider implication of poorly managed risk)	INC	
INCREASED PATIENT SATISFACTION (e.g., staff better able to respond to UK multicultural populations, staff able to compare how systems affect patient satisfaction, have greater relationships with multicultural population, more in tune with patients and more aware of individual needs of patients).	REM	Cannot be measured in professional self-reports alone
ABILITY TO COMMUNICATE NON-VERBALLY	INC	
ABILITY TO ESTABLISH COMMUNICATION SYSTEMS (e.g., formal and informal)	INC	
INCREASED CLINICAL KNOWLEDGE IN RELATION TO OTHER PROFESSIONS (e.g., doctors understanding nurses and vice versa, multi-disciplinary awareness)	INC	
ABILITY TO GET THE MOST OUT OF PEOPLE (e.g., encouraging people to work together, recognise their own strengths and to take possession of their own work/projects, ability to assess the capability of others)	INC	
ABILITY TO MANAGE PEOPLE (e.g., able to allocate tasks and co-ordinate people, to deal with people with differing objectives, to negotiate with multiple stakeholders, to manage difficult people)	COMB	Colleagues have noticed my abilities to manage difficult people
ABILITY TO DEVELOP FRIENDSHIPS (e.g., relationship formation skills, developing new friendships)	INC	
ABILITY TO MANAGE SELF (e.g., own expectations, self-reliance, self-management, self-assurance, reflexivity)	INC	
CHANGED JUDGEMENT (e.g., non-judgemental attitude, changed self-judgement)	INC	
DIPLOMACY	REM	Too vague
ABILITY TO FIND FACTS TO SOLVE PROBLEMS	INC	
DEVELOPING REDUNDANT OR BAD SKILLS/ATTITUDES (e.g., developing non-transferable skills, bad habits, deskilling, returning with overconfidence in own ability, poorer communication skills, loss of confidence)	INC	
FINANCIAL LOSS (e.g., costs of getting involved, loss of earnings, pension or employment entitlement)	REM	Too contextual- add to variables
REDUCTION IN NHS DROP OUTS (e.g., increased staff retention, when they volunteer and come back to NHS)	REM	Cannot be measured in professional self-reports alone
ABILITY TO OBSERVE AND EXAMINE PATIENTS (e.g., increased intuitive knowledge of clinical signs and clinical judgement ability to make diagnosis without investigations)	COMB	I have relied heavily on the basic skills of my profession (e.g. physical examination)
ABILITY TO WORK IN A PROFESSIONALLY COMPETENT WAY (e.g., having wider view of profession, intellectual development, reminder of professional responsibilities, stronger work ethic)	REM	Too vague
INCREASED UNDERSTANDING OF HOW TO BE A GOOD TEACHER (e.g., allowing students to learn from mistakes, ability to suggest and acknowledge improvements in teaching,	COMB	In the last month I have demonstrated that I'm a good teacher

understanding how communication affects learning, how to target training most effectively and the importance of experiential learning)		I am confident in my ability to teach others
ACT AS A ROLE MODEL (e.g., lead by example)	INC	
INFLUENCES CAREER PATHWAY (i.e., affects specialism choice, exploration of potential career pathways, pursuing careers in primary care, family practice, public service, sub-specialism in global health, teaching)	REM	Went into variables
ABILITY TO MANAGE TIME AND PRIORITISE (e.g., ability to respond quickly in an emergency, managing immediate need vs long term need, prioritisation of limited resources)	CHANG	In my ability to manage myself and prioritise (e.g. time management, managing emotions, responding an emergency, prioritising workload)
INCREASED ABILITY TO CHANGE BEHAVIOUR IN COLLEAGUES OR PATIENTS (e.g., ability to implement behaviour change and to assess the impact of healthcare systems)	COMB	In my work I have demonstrated skills in changing patients' or colleagues' behaviours
ABILITY TO MANAGE TRAGEDIES	INC	
EXPOSURE TO ETHICAL DILEMMAS (e.g., expected to work outside of competency, to do clinical work, little regulation, little supervision, too much responsibility)	COMB	I have frequently experienced ethical dilemmas
REDUCTION IN STAFF COMPETENCE (e.g., brain drain reversal: NHS loss of competent staff to overseas placements, staff unable to cope with paperwork on return)	REM	Cannot be measured in professional self-reports alone
NO RECOGNITION OR ACCREDITATION UPON RETURN	REM	Put into variables
INCREASED INTERNATIONAL REPUTATION OF NHS (e.g., greater fulfilment of social responsibility)	REM	Cannot be measured in professional self-reports alone
INCREASED INTERNATIONAL REPUTATION (of UK)	REM	Cannot be measured in professional self-reports alone
ABILITY TO VERBALISE KNOWLEDGE (e.g., ability to verbalise core concepts and deep knowledge, ability to explain complex ideas to others)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF TRUST BETWEEN COLLEAGUES WITHIN HEALTHCARE SYSTEMS	INC	
INCREASED AWARENESS OF AND KNOWLEDGE THE FUNCTIONING OF SYSTEMS (e.g., able to identify stakeholders and change agents, understanding influencing patterns of those in power, value systems and the difficulty of questioning organisations)	INC	
REFRESHMENT AND REINVIGORATION (e.g., chance to take time away to become refreshed and feel reinvigorated to work upon return)	INC	
ABILITY TO MANAGE HEALTHCARE ENVIRONMENTS (e.g., ability to manage wards and staff)	COMB	Colleagues have noticed my abilities to manage difficult people
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF CONSCIOUSLY MAKING AN EFFORT TO GET ON WITH COLLEAGUES (e.g., learning colleagueâ€™s names)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE COSTS OF HEALTHCARE	INC	
ABILITY TO ACCEPT AND UNDERSTAND FAILURE (e.g., to continue with something that did not have desired outcome at first, learning to accept failure, thinking differently about failure, persistence)	INC	
HUMILITY (including professional humility)	INC	
ABILITY TO THINK THROUGH PROBLEMS IN A LOGICAL WAY (e.g., analytical/lateral thinking)	INC	

ABILITY TO ENGAGE SENIOR PEOPLE	INC	
HEALTH CONSEQUENCES (e.g., animal bites, tropical diseases, STDâ€™s, injuries and transport accidents, infection, jet lag, skin disease)	REM	Went into variables
EXTREME NATIONALISM TOWARDS UK	INC	
LOSS OF INTEREST IN PROFESSION (e.g., not wanting to work in your profession when home)	INC	
NHS BECOMES A MORE ATTRACTIVE EMPLOYER (e.g., an employer that offers staff the opportunity to volunteer)	REM	Cannot be measured in professional self-reports alone
INCREASED WORKFORCE PRODUCTIVITY	REM	Cannot be measured in professional self-reports alone

Table 2: Construct used to frame statement

Statement	Area of Interest
awareness about how cultural differences influence health	Experience
ability to find solutions despite limited resources	Confidence
find solutions despite limited resources	Experience Confidence
conscious of culture when working with patients (e.g. the importance of collecting cultural information)	Attitudes
ability to apply clinical skills to another context	Confidence
teach clinical colleagues	Experience
adapt the way I teach to make it more valuable	Experience
knowledge about how healthcare systems outside of the UK function	Attitudes
ablity to cope in work (e.g. ability to deal with stress)	Experience
cultural sensitivity (e.g. understanding that words and behaviours can have different meanings)	Experience
apply my clinical knowledge in any health system	Confidence
developed a new perspective (e.g. changed my outlook)	Experience
ability to adapt and be flexible in work	Confidence Experience
thinking about basic sciences (e.g. physiology, cell biological, biochemistry)	Experience
relied basic skills profession (e.g. physical examination)	Experience
rely more on laboratory tests than physical examination	Attitudes
confident in workplace	Confidence
confident to work in another country	Confidence
knowledge about global issues	Attitudes

knowledge of conditions and procedures rarely encountered in the UK (e.g. tropical diseases, delayed presentations, old equipment)	Attitudes
ability to work within an unfamiliar power dynamic	Confidence
adapting my social norms to meet the needs of another culture	Experience
leader in work	Experience
my abilities to be adaptable and innovative as a leader	Confidence
thought about my own skills, limitations and beliefs	Experience
patient and tolerant	Experience
proactive at work (e.g. used my initiative, got on with things, thought on feet)	Experience
someone who focuses on solutions not problems	Attitudes
changed the way I speak so that somebody can understand me	Experience
community participation is crucial for the health of the individual	Attitudes
clinical skills that I have hardly ever used before	Experience
difficult to change someone else's behaviour	Attitudes
skills in changing patients' or colleagues' behaviours	Experience
improved the healthcare service I work in	Experience
changed the way I communicate to make it more contextually appropriate	Experience
good teacher	Experience
ability to deal with the unexpected	ConfidenceExperience
ability to manage projects	Confidence Experience
deeply engaged with issues and equality and diversity	Attitudes
highly skilled in challenging conversations and effective communication, even in high pressure situations	Experience
glad that I have access to the right tools and equipment to do my job	Experience
thought about and appreciated the excellent TEAM WORKs, structures and individuals I work with in the NHS	Experience
good understanding of my own thoughts, feelings and behaviours	Attitudes
I am good at anticipating future problems	Experience
ability to make appropriate independent clinical decisions	Confidence
ability to empower others to help themselves	Attitudes
good at working as part of TEAM WORK	Experience

professional network that includes people from all over the world	Attitudes
confident in my ability to disseminate UK best clinical practice globally	Confidence
thought about and appreciated free universal health	Experience
gone about my daily work in a fairly automatic way	Experience
satisfied in job	Attitudes
satisfied in personal life	Attitudes
'can-do' attitude	Experience
provide excellent, high quality care	Experience
willingness to see someone else's point of view	Experience
thought about and appreciated clinical governance	Experience
thought about and appreciated the importance of care and compassion	Experience
experienced ethical dilemmas	Experience
appropriately manage ethical dilemmas	Confidence
experiences of feeling like an outsider	Attitudes
abilities to work independently when necessary	Confident
abilities in planning and organisation	Experience
actively manage risk, including anticipating risk and evaluating my environment	Experience
to rely on my non-verbal communication	Experience
establish communication systems (formal or informal)	Experience
understanding of the roles and responsibilities of all the professional staff I work with	Attitudes
capable of 'getting the most out of people' e.g., encouraging them and empowering them	Attitudes
managed difficult people	Experience Confidence
allocated tasks and co-ordinated colleagues	Experience Confidence
developing friendships and social relationships	Attitudes
ability to manage myself, including self-reliance and reflexivity	Confidence
quick to judge other people	Attitudes
developed bad habits in work	Experience
lost some confidence in my clinical practice	Experience
work ethic	Attitudes
act as a good role model at work	Attitudes

manage situations that I consider to be a tragedy	Experience Confidence
ability to explain complex ideas to others	Experience
trust between colleagues is crucial in healthcare systems	Attitudes
good understanding of organisations e.g., identifying change agents and understanding who has power	Attitudes
work has made me feel refreshed and reinvigorated	Experience
consciously make an effort to get on with colleagues e.g. learning everybody's name	Attitudes
aware of the financial costs of healthcare	Experience
persistent in the face of failure	Attitudes
accept failure as a part of learning	Attitudes
direct and positive communication with senior people in the organisation I have been working in	Experience
the UK is the best country in the world	Attitudes

Table 3: Variables from systematic review and when they were presented t

Variable	Presented
Type of project (Charity, profit making, non-for-profit	To project manager
Professionals involved in project	To project manager
Volunteer recruitment	To project manager
Continuity of visits	To project manager
Number of British professionals in country at each time	To project manager
Logistical organisation	To project manager
Project funding	To project manager
Volunteer/British Professional funding	To project manager
Local funding	To project manager
Volunteer activities	To project manager
Organisational support	To project manager
Preparation	To project manager
Learning objectives	To project manager
Evaluation and reflection	To project manager
Risk Assessments	To project manager

Local needs assessment	To project manager
Who is involved in development of aims, focus, structure of project	To project manager
Relationships with receiving organisation	To project manager
Importance of sustainability, capacity building and service delivery	To project manager
Project name, company and location	Pre-placement questionnaire
Employment immediately before trip	Pre-placement questionnaire
Use of annual leave	Pre-placement questionnaire
Motivation	Pre-placement questionnaire
Support	Pre-placement questionnaire
Comfort working outside of competence or in a high situation	Pre-placement questionnaire
Expectations of impact	Pre-placement questionnaire
Professional knowledge	Pre-placement questionnaire
Length of stay	Post-placement questionnaire
Project engagement	Post-placement questionnaire
Learning host language	Post-placement questionnaire
Utilisation of skills	Post-placement questionnaire
Number of Interactions with patients	Post-placement questionnaire
Conditions experienced	Post-placement questionnaire
Understanding of local context	Post-placement questionnaire
Similarities to UK	Post-placement questionnaire
Transferability of skills to UK	Post-placement questionnaire
Opportunities	Post-placement questionnaire
Local staff	Post-placement questionnaire

Negative consequences	Post-placement questionnaire
Cost of placement	Post-placement questionnaire
Reflection	Post-placement questionnaire
Contact with loved ones	Post-placement questionnaire
Support	Post-placement questionnaire
Number of projects in facility	Post-placement questionnaire
General experience	Post-placement questionnaire
Ability to cope with NHS paperwork upon return	Post-placement questionnaire
Less interest in profession upon return	Post-placement questionnaire
Desire to leave NHS/UK upon return	Post-placement questionnaire
Recognition/Accreditation upon return	Post-placement questionnaire
Employment status upon return	Post-placement questionnaire
Returner schemes upon return	Post-placement questionnaire
Influence on career path upon return	Post-placement questionnaire

Table 4 : results of cognitive interviews

Statement	Comment	Action taken (or reason not)
Frequently/constantly	interchangable	Decision was made on purpose
I exchanged ideas with colleagues from a different culture	Red herring- exchanged	Choose Exchanged, as communicated could mean asking what time the bus arrives, want this to represent meaningful conversation
I feel I've developed a new perspective	Doesn't really make sense pre-placement, need to use more examples to contextualise	Participant used, having some kind of revelation, include this as an example
I anticipated future problems	… and took necessary action	Decided to take participants advice here, and add took necessary action as anticipating them alone is not enough
Skills, limitations and beliefs	too much for one sentence	remove beliefs
I provided excellent high quality care	Excellent and high quality are the same remove excellent	Remove excellent

I am able to find solutions despite limited resources	What if don't have limited resources i.e. in UK	Leave as is, participants won't agree if have adequate resources
I have tried to understand somebody elese POV	I have understood somebody elses POV	Remove tried
I have demonstrated patience and tolerance	Need time marker	Change to -I have frequently demonstrated patience and tolerance
I relied heavily on the basic skills of my profession	Need more examples	Include low tech and inutative
I lost some confidence in my clinical practice	Change to: Sometimes I feel I have forgotten the things I have learnt	Leave as is, participants will know what clinical practice is
I thought about and appreciated	Maybe use just appreciated	change
I think I have developed bad work habits	Remove 'I think' and include some	I have developed some bad work habits
I actively managed risk, including anticipating risk and evaluating environment	Too much- change to I anticipated risk and actively managed it	I anticipated risk and actively managed it (e.g. evaluating environment)
I frequently managed projects		Include e.g. (including one continuous project, or components of a project)
I managed one or more situations that I consider to be a tragedy	Chance to tragic situations	Leave as is
I established communication systems (formal and informal)	What about if they are already established	Changed to established/used
I changed the way I speak so that somebody can understand me	Change to I have adapted my communication to suit to context	Leave as is, too much jargon in suggestion
I frequently had to rely on my non-verbal communication	I frequently relied on my non-verbal communication	Change
I demonstrated that I am highly skilled in challenging conversations and effective communication, even in high pressure situations	I demonstrated that I am skilled in challenging conversations, even in high pressure situations	Removed some to make it more understandable
I dealt with difficult people	Include frequently	I frequently dealt with difficult people
I demonstrated that I am able to manage difficult people	I demonstrated that I am able to manage difficult people effectively	Add in effectively
I taught clinical colleagues	(of any profession at any career stage)	Add in brackets
Perceptions of yourself	Change to About you – and change the other to demographics	Change
When I work clinically I am frequently thinking about basic scientific principles (e.g. physiology, cell biology, biochemistry)	Change e.g's	Physiology, chemistry
I have a good knowledge of how healthcare systems outside of the UK function	I have an awareness of how other healthcare systems (outside of the UK) function	Change- as most people will only know 1 or 2 countries not all

I have a professional network that includes people from around the world	Change to other countries	May not be around the world, just in 1 or 2 countries
I tend to develop a good understanding of how understanding of how organisations can work	Change to I have	Tend to confuses things
I am someone who focuses on solutions not problems	Comments that no-one would answer no to this	Then it would disappear in the psychometrics and statistics so leave
I have an excellent work ethic	Comments to change to conscientious	Will not change means something different
I keep trying when things are difficult	Comments to change to persevere	Yes keep simple
I have an excellent understanding of the roles and responsibilities of all the professional staff I work with	Change to clear	I have a clear understanding of the roles and responsibilities of all the professional staff I work with
I am quick to judge other people	Add admit and sometimes	I admit I am sometimes quick to judge other people
I believe I have the ability to empower patients to help themselves	I am able to empower patients to help themselves, also patients isn't the word midwives use	Remove believe as adds another dimension, keep patients as it is obvious who we mean to that 1 group
I believe I have the ability to empower colleagues to help themselves	I am able empower colleagues to help themselves	Remove believe as adds another dimension
In my work I have demonstrated skills in changing patients behaviour	In encouraging and supporting patients to change behaviour	Change to -In my work I have demonstrated skills in encouraging and supporting patients to change behaviour
Its crucial to consciously make an effort to get on with colleagues	Add' I feel'	No need to add 'I feel' adds another dimension
I demonstrated that I am capable of getting the most out of people	Change to 'best' move to 'in the last month'	Change to - I demonstrated that I am capable of getting the best out of people- move to last month, add enabling into e.g's
Community participation is crucial…	Add I feel	No need to add 'I feel' adds another dimension
Job satisfaction	Use validated single item- Taking everything into consideration, I am satisfied with my job	Reliability and Validity of a Single-Item Measure of Job Satisfaction Christyn L. Dolbier, PhD; Judith A. Webster, MSN; Katherine T. McCalister, EdD; Mark W. Mallon, MS; Mary A. Steinhardt, EdD, LPC an adaptation of the one in the literature that correlates with other larger measures, to suit the current format of an agreement likert scale?
Life satisfaction	Instead use 5 item validated SWLS scale	Ed Diener, Robert A. Emmons, Randy J. Larsen and Sharon Griffin as noted in the 1985 article in the *Journal of Personality Assessment*

I sometimes I felt like an outsider	I sometimes felt like an outsider in my environment	Add in my environment to make it more contextualised, move to culture area rather than life satisfaction as it seems less intrusive
In my ability to manage situations that I consider to be awful, tragic or difficult	Remove awful, too many words	In my ability to manage situations that I consider to be tragic or difficult
In my ability to manage myself	Expand into 2: In my ability to manage myself in a clinical environment In my ability to manage myself in life generally (e.g. time management, managing emotions)	Split into 2
In my ability to adapt and be flexible in work	Would be different for clinical and everything else – pp more confident In ability to be flexible clinically	Separated
In my ability to find solutions despite limited resources	See above comment about 'despite'	Maybe as this is confidence have, ability to find solutions in an environment with limited resources, the above one could literally say, in the last month I have had to find solutions in an environment with limited resources, then we expect low scores pre, and high during and possibly post.
That I can apply my clinical knowledge in any health systems	Change any to another	That I can apply my clinical knowledge in another health system
In my ability to work within an unfamiliar power dynamic	Don't quite understand the question, suggested are you affected by power dynamics	Are you affected would change the question. move to in the last month, have been affected by power dynamics and one about dealing with it appropriately
In my workplace	Remove place	Change to in my work
In my ability to disseminate best practice globally	Globally too big, maybe across a wider context (e.g. to other countries)	Change to disseminate UK best practice to other countries
Career Stage	Louise and John had- experienced, mid etc.	Change to year of registration free text
Nationality	British, European, non-eu (LMIC) non-EU (high income)	Change to free text
Project Name	Make non-madatory and ask to describe in one sentence project- e.g. RCM project in Uganda based in Mulago Hospital	in a sentence describe the title of your project and where it takes place e.g., RCM mentoring project in Mulago Hospital, Uganda. Or Milton Keynes Hospital Trust training project in University of City, Country
I would feel comfortable working in a high risk situations	Comment- Is the risk to the patient or the volunteer	High risk situation is well defined
I agreed with and internationalised lots of the knowledge, skills, behaviours and attitudes of the other staff in the host facility	Too confusing	Simplify sentence

Atleast once I questioned by view of reality	Confusing- changed answer after I explained	Change to at least once I have been aware of my opinions or perspectives changing in a profound way'
Which of the following were correct about local staff: I engaged with them frequently There was frequently a more knowledgeable person than me around We had many share values	Reword- seems like everyone would agree Too Context Specific Said they did but didn't act on it	This is about Vygotskys MKO, could we separate into 2- more clinically knowledgeable, more culturally knowledgeable change to, it was obvious we had many shared values?
Health consequences (animal bites, injuries, illness)	Remove animal bites, gets confused with mosquito bites which most people would get	Remove animal bites
I feel unable to cope with NHS paperwork	Not to do with placement	Doesn't matter? If its not to do with placement, then we will see that it is the same before and after?
I would like to leave the NHS to work overseas	Not all employed by NHS	Change to NHS/UK
Project Managers:		
Which of the following describe the relationship between your organisation and the receiving organisation: We depend on eachother	Weird statement Add in well maintained relationships with local staff and leadership Links with local experts	Remove
Does your project have links with local experts and well maintained relationships with local staff and leadership	Move to earlier Q	Move to earlier Q
What type of preparation do volunteers receive?	Add all Change options to: Contact with previous volunteers Formal training and preparation events in the UK Informal training and preparation events in the UK Formal training and preparation events in host country Informal training and preparation events in country Handbook or written preparation Other	What type of preparation do all volunteers receive? – otherwise one or two might get it Change options

What is the main focus of your project: Service delivery Capacity Building Development Sustainability Training Other	Most would tick all	Change to separate question: How important is sustainability/service delivery/cacapcity building to your project – Very Important • Important • Moderately Important • Slightly Important • Not Important Remove training development and other
Who was involved/consulting during development of aims, focus, structure, project tasks within your project	Remove 'within your project' In example grey area (at some stage) Change health policy makers and management in LMIC to Management in LMIC Local government and policy makers	Change
Do you volunteers take recurring trips?	Change options	Always Very Often Sometimes Rarely Never
In the last year have any volunteers dropped out of your project?	Remove as too context specific could be illness etc	Remove question
Is volunteer learning incorporated into project or assessed?	Comment- Add informal reporting and learning	Do you formally assess volunteer learning or professional or personal development? And then time points
How many volunteers are placed at one time within this project	Add on average	Add on average
How would you describe your organisation?	Change list- does not encompass all, make tick box: • New organisation • Established organisation • Hospital or university link (health partnership) • Commercial/profit making • Not for profit/charity	
Which of the following describe the relationship between your organisation and the receiving organisation? We depend on one another We are especially good at collaboration	Remove depend statement, weird and out of context Change collaboration one to we work well in collaboration	Change

To the best of your knowledge, what income level is the host country?		Remove now as we will code countries
Do restructure of questions so similar are together		Do restructure
Add to post-placement		
Which country was your placement in- free text		Add
What support do your volunteers receive? A local or western expert to provide feedback	Change to Have access to – move to volunteer post Change to: an opportunity to get frequent feedback from a local or western senior colleague	Change to have access to and move to post placement- what support did you have access to? Change
Are you the only project working in the healthcare facility	Was yours the only project working in the healthcare facility	Change and more to post placement
Length of stay		Move length of stay to Post placement
Recurring visits		Move to post placement

Table 5: How participants were recruited through collaborative organisations

Organisation	Method of distribution of questionnaire	Target Group	Number of people that had opportunity to engage
Ambulance Station 1	Attended with paper versions	All groups	15
Conference 1	Handed out paper versions at conference, presented online link at conference, online link sent by contact within organisation	All groups	Up to 400 on mailing list (who may have also attended conference)
Field Hospital 1	Online link sent by contact within organisation	Returned Volunteers	180
Field Hospital 2	Online Link sent by contact within organisation	Returned Volunteers	50
Field Hospital 3	Attended event with paper version	All groups	6

Field Hospitals 4	Online Link sent by contact within organisation	All groupos	80
General Practice 1	Attended with paper versions	All groups	4
Health Partnership 1	Online Link sent by contact within organisation	Current Volunteers	2
Health Partnership 2	Online Link sent by contact within organisation	All groups	6
Health Partnership 3	Online Link sent by contact within organisation, also asked to send to one colleague with no international experience	Returned and no international experience	50
Health Partnership 4	Online Link sent by contact within organisation	Pre Placement	Awaiting Response
Health Partnership 5	Online Link sent by contact within organisation	All groups	6
Health Partnership 6	Online Link sent by contact within organisation	All groups	15
Hospital 1	Online Link sent by contact within organisation	All groups	30
Hospital 2	Attended induction events with paper versions	All groups	85
Individual Influencer 1	Posted link to personal twitter and emailed 7 colleagues	All groups	182 twitter followers 7 colleagues
Online Community of Practice 1	Posted link to Community of Practice Online group	All groups	297 members
Previous Research Participants 1	Link sent by researcher directly to participants	All groups	290
Previous Research Participants 2	Link sent directly to email addresses	All groups	59
Professional Network 1	Link distributed in E bulletin	All groups	374 opened link (sent to 1800)

Professional Network 2	Online Link sent by contact within organisation	All groups	Awaiting response
Recruitment Event 1	Attended event with paper versions	All groups	15
Recruitment Event 2	Attended event with paper versions	All groups	18
Royal College 1	Online Link sent by contact within organisation	Returned Volunteers	70
Royal College 2	Online link sent by one member to a select few relevant individuals Conference attended with paper versions	Returned Volunteers	11
Royal College 3	Online Link sent by contact within organisation	Returned Volunteers	19
Royal College 4	Link sent directly to group members email addresses	All groups	45
Royal College 5	Online Link sent by contact within organisation	All groups	437
Royal College 6	Link posted on global health facebook group	All groups	79 in group
The Royal College 7	Link posted on blog and to twitter	All groups	1000 blog followers, 400 twitter followers
Trust 1	Online Link sent by contact within organisation	Returned Volunteers	43
University Alumni 1	Link posted to Facebook, Twitter and LinkedIn groups	All groups	1000+
University Department 1	Online Link sent by contact within organisation (stated was only for qualified health professionals)	All groups	270

University Department 2	Online Link sent by contact within organisation	No international experience	21
University Department 3	Online Link sent by contact within organisation	No international experience	37
University Department 4	Paper versions handed out at end of lecture	All groups	17
University Department 5	Online Link sent by contact within organisation	All groups	55
University Department 6	Online Link posted on students forum	All groups	500
Volunteer Project 1	Online Link sent by contact within organisation	Current Volunteers	9
Volunteer Project 2	Online Link sent by contact within organisation	All groups	116
Volunteer Project 3	Online Link sent by contact within organisation	Pre placement	5
Volunteer Project 4	Online Link sent by contact within organisation	All groups	4
Volunteer Project 5	Online Link sent by contact within organisation	Returned Volunteers	35

Table 6: Staff Group x International Experience

Staff group	Past international experience	Currently internationally working	No experience - interested	No experience- not interested	Planned future international experience	
Medical and Dental	77	20	10	7	32	146
Nursing and Midwifery	51	2	39	31	13	136
Allied Health Professionals	23	4	12	17	9	65
Healthcare Scientists	6	0	1	5	1	13
Ambulance	2	0	1	10	1	14

Support to clinical staff (HCAs)	0	0	8	22	0	30
NHS infrastructure support	1	0	3	1	0	5
Other scientific, therapeutic & technical	8	0	4	9	5	26
Other	1	0	0	2	0	3

Table 7 – Correlation coefficients between the latent variables. their standard errors and *p*-values. according to the proposed multidimensional item response theory model.

	Estimate	S.E.	*p*-value (two tailed)
LIFE SATISFACTION	WITH		
CONFIDENCE	0.295	0.045	0.000
CULTURAL	WITH		
CONFIDENCE	0.41	0.044	0.000
LIFE SATISFACTION	0.223	0.051	0.000
ADAPTING COMMUNICATION	WITH		
CONFIDENCE	0.12	0.044	0.000
LIFE SATISFACTION	0.223	0.049	0.000
CULTURAL	0.497	0.043	0.000
TEACHING	WITH		
CONFIDENCE	0.662	0.031	0.000
LIFE SATISFACTION	0.208	0.049	0.000
CULTURAL	0.29	0.051	0.000
ADAPTING COMMUNICATION	0.319	0.048	0.000
DIFFICULT COMMUNICATION	WITH		
CONFIDENCE	0.518	0.035	0.000
LIFE SATISFACTION	0.196	0.046	0.000
CULTURAL	0.412	0.045	0.000

	Estimate	S.E.	*p*-value (two tailed)
ADAPTING COMMUNICATION	0.58	0.037	0.000
TEACHING	0.44	0.04	0.000
BEHAVIOUR CHANGE	WITH		
CONFIDENCE	0.638	0.027	0.000
LIFE SATISFACTION	0.289	0.045	0.000
CULTURAL	0.397	0.051	0.000
ADAPTING COMMUNICATION	0.427	0.041	0.000
TEACHING	0.554	0.035	0.000
DIFFICULT COMMUNICATION	0.558	0.035	0.000
MANAGAMENT	WITH		
CONFIDENCE	0.563	0.035	0.000
LIFE SATISFACTION	0.113	0.051	0.025
CULTURAL	0.367	0.051	0.000
ADAPTING COMMUNICATION	0.436	0.043	0.000
TEACHING	0.545	0.036	0.000
DIFFICULT COMMUNICATION	0.54	0.038	0.000
BEHAVIOUR CHANGE	0.364	0.044	0.000
TEAM WORK	WITH		
CONFIDENCE	0.757	0.028	0.000
LIFE SATISFACTION	0.362	0.049	0.000
CULTURAL	0.497	0.047	0.000
ADAPTING COMMUNICATION	0.522	0.043	0.000
TEACHING	0.577	0.037	0.000
DIFFICULT COMMUNICATION	0.653	0.036	0.000
BEHAVIOUR CHANGE	0.658	0.034	0.000
MANAGAMENT	0.696	0.032	0.000
FLEXIBILITY	WITH		
CONFIDENCE	0.571	0.033	0.000
LIFE SATISFACTION	0.198	0.044	0.000

	Estimate	S.E.	*p*-value (two tailed)
CULTURAL	0.492	0.039	0.000
ADAPTING COMMUNICATION	0.475	0.04	0.000
TEACHING	0.423	0.041	0.000
DIFFICULT COMMUNICATION	0.497	0.038	0.000
BEHAVIOUR CHANGE	0.514	0.034	0.000
MANAGAMENT	0.527	0.036	0.000
TEAM WORK	0.705	0.03	0.000

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Measuring the Outcomes of Volunteering for Education: Development and pilot of a tool to assess health professionals' personal and professional development from international volunteering

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Measuring the Outcomes of Volunteering for Education: Development and pilot of a tool to assess health professionals' personal and professional development from international volunteering

Tyler, N, University of Nottingham, natasha.tyler@nottingham.ac.uk (Corresponding Author)

Collares, CF, Maastricht University, c.collares@maastrichtuniversity.nl

Byrne, GJ, Health Education England, ged.byrne@hee.nhs.uk

Byrne-Davis, LMT, University of Manchester, UK lucie.byrne-davis@manchester.ac.uk

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Abstract

Objective: The development and pilot of a self-report questionnaire, to assess personal and professional development of health professionals gained through experiences in low and middle-income countries**.**

Design The instrument was developed from a core set of the outcomes of international placements for UK health professionals. Principle component analysis and multidimensional item response theory were conducted using results of a cross-sectional pilot study to highlight items with the best psychometric properties.

Setting: Questionnaires were completed both online and in multiple UK health professional events face-to-face.

Participants: 436 Healthcare professional participants from the UK (with and without international experience) completed a 110-item questionnaire in which they assessed their knowledge, skills and attitudes.

Measures: The 110 item questionnaire included self-report questions on a 7-point Likert scale of agreement, developed from the core outcome set, including items on satisfaction, clinical skills, communication and other important health professional knowledge, skills, attitudes and behaviours. Item reduction led to development of the 40-item Measuring the Outcomes of Volunteering for Education- Tool (MOVE-iT). Internal consistency was evaluated by the Cronbach's α coefficient. Exploratory analysis investigated the structure of the data using Principal Component Analysis and Multivariate Item Response Theory.

Results: Exploratory Analysis found 10 principle components that explained 71.80% of the variance. Components were labelled 'Attitude to work, Adaptability, Adapting Communication, Cultural Sensitivity, Difficult Communication, Confidence, Teaching, Management, Behaviour Change and Life Satisfaction'. Internal consistency was acceptable for the identified components (α between 0.72 to 0.86).

Conclusions: A 40-item self-report questionnaire developed from a core outcome set for personal and professional development from international placements was developed, with evidence of good reliability and validity. This questionnaire will increase understanding of impact of international placements, facilitating

comparisons of different types of experience. This will aid decision making about whether UK health professionals should be encouraged to volunteer internationally and in what capacity.

Key Words

- Personal and Professional Development
- International Placements
- Volunteering
- Health Professionals
- Low and Middle Income Countries
- Principle Component Analysis
- Psychometric Tool
- Learning Assessment
- Self-Assessment

Article Summary

Strengths and Limitations of this Study

- The Measuring the Outcomes of Volunteering for Education- Tool (MOVE-iT) was developed based on evidence from peer-reviewed literature and expert opinion
- The underlying structures of the instrument were explored using a large data set of 436 multi-disciplinary health professionals
- The psychometric analyses demonstrate good internal consistency reliability
- The MOVE-iT tool can be used to assess learning of health professionals volunteering in low and middle-income countries
- This tool provides a way of evidencing benefits, however there is a body of critical evidence outlining the ethical concerns of medical practice abroad, particularly when individuals practice in ways that they might not in a high-income country

Background

Globalisation of the health workforce has inevitably led to large numbers of qualified healthcare professionals choosing to temporarily (ranging between 1 day to 2 years) work overseas in some capacity, with many choosing low and middle income countries (LMICs) (1). In this paper we describe international placements in any LMIC (as defined by the OECD) in which the healthcare professional receives little or no remuneration; this is often referred to as volunteering. Such placements can take numerous forms, for example a dentist delivering a service on a hospital train in India (2), British healthcare professionals of many cadres working together in health partnerships with a hospital in Tanzania (3), or healthcare scientists working in labs in sub-Saharan Africa (4).

International health volunteering has been reported as resulting in personal and professional development (PPD), for example a change in attitudes on a personal level, or developing new/broadening existing professional skills, see our previous work for a full list of all reported PPD (5). Benefits have been reported for both the individual's practice and also patient outcomes upon return (6). Many professionals report PPD outcomes as a result of the new experience and particularly that working in an LMIC encourages healthcare professionals to learn new skills in an effort to adequately adapt, for example using new clinical techniques specific to the LMIC, or dealing with a new cultural phenomenon (7–9). Professionals report that LMICs provide staff with an opportunity to practice skills that they would not develop in a domestic work setting, as such giving them increased confidence in their work (8,10). In some academic papers professionals report perceived/expected exposure to higher numbers of clinical cases and often clinical cases that are more challenging than those seen in high income countries (HICs) as well as opportunities to lead, make decisions and work within new cultural and social norms (6,9,11,12). Many staff report a change in core attitudes or beliefs: a greater appreciation of caring, an acceptance of cultural differences or a changed/new/broader perspective (8,9,13,14). As a result, in the UK, some organisations have proposed that enabling and encouraging staff to work in LMICs may have great benefits to the NHS (6,7,15) and have expressed a desire to assess PPD outcomes (16,17) to provide quantitative evidence of benefit.

Despite these reported benefits, volunteering is sometimes perceived as a loss to the high income country, for example our research found that within the UK National Health Service (NHS), some management perceived volunteering as a loss of staff within a

service that is already under pressure (15). As such, some employers are reluctant to release staff for international placements (15).

Qualitative research into the benefits of international working or volunteering (from now on referred to as 'international placements' for ease), has reported similar PPD outcomes regardless of the host country, type of projects or individual's profession. Communication, leadership, attitude to work, flexibility and cultural awareness are frequently reported outcomes (2,6,9,12,18). However, from an educational perspective, precise information about this learning (process, outcomes, variables) is seldom reported. In a recent meta-synthesis and Delphi study, we reported a list of 116 outcomes (5) from a review of literature on international placements for healthcare professionals. The list included benefits and costs that were agreed by stakeholders to be frequently experienced by health professionals (of any cadre) in an international placement. Costs (e.g. health outcomes, financial loss, clinical de-skilling) are not reported in this paper, but can we found in the meta-synthesis (5). We also summarised the moderating (factors that affect the strength of a relationship) and mediating variables (factors that explain the relationship between two items) that were reported in the literature to potentially affect PPD outcomes (e.g. length of stay, host country, level of experience, supervision).

There have been some attempts to quantify these outcomes, for example, a small number of previous UK papers have used a questionnaire approach to understand outcomes (8,19,20), but these have not taken a psychometric approach to the measurement of underpinning domains of learning (i.e. developed and tested an evidence based questionnaire). A number of psychometric questionnaires have been developed outside of the UK, but are based on non-domain specific outcomes for any professional, hence are not specific to healthcare professionals (21–23). For example, the IVIS used latent trait analysis and found 11 'volunteer outcome' factors including open-minded and intercultural relationships (24). It is not known whether there are unique elements of learning or outcomes that are specific to healthcare professionals (from within the NHS) that differ from the non-domain specific learning measured in existing tools. Particularly as some of the qualitative research suggests unique outcomes, for example related to patient interaction (9,25).

This study aimed to create a measure of the PPD outcomes of international placements.

We worked on the large set of outcomes that stakeholders agreed were core outcomes from international placements for health professionals (2). We aimed to reduce the items to a short questionnaire using item response theory to establish and test a set of latent traits and their associated questions.

Methods

Design

We followed traditional tool development methods in order to develop a measurement tool (26). In summary, we took the PPD outcomes found in the previous study (27), made them into questions and then reduced their number through a process of piloting with health professionals and using statistical methods to eliminate items which were not congruent with other items or were redundant because they were too congruent with other items. We used a cross-sectional design, so participants were measured only at one time point. The study used Item Response Theory, whereby 'constructs' are theoretical terms that refer to unobserved, idealised entities (28). Latent traits are one type of construct, which are qualities possessed by individuals that can change, but only over the long term (28). Latent traits include attitudes, preferences and dispositions, but also elements that are important for professional development such as ability, expertise and aptitude (29). No measure of a latent trait is ever considered perfectly accurate, instead different measures are used to estimate latent traits (30), with varying levels of effectiveness (28).

Participants

Previous psychometric research on the sample size requirements for precise estimates of reliability coefficients; suggested we needed 400 participants (31). We therefore aimed to recruit the 400 participants across 4 different groups: 100 health professionals that had been on international placements in the past, 100 who were about to undertake an international placement or currently working overseas, 100 with an interest in international placements but no past experience and 100 with no interest in or past experience of international placements. We included health professionals who had and who had not worked internationally. It is usual to do item reduction with a sample of the population who will be using the tool. Since the tool

could be used to compare PPD in health professionals with or without international experience or before and after international experience, we decided to include, in the sample, health professionals without international experience. We further subdivided our sample into people who were interested in international experience and not to ensure that the tool items were reduced on the basis of answers from people with all ranges of experience and perceptions of international placements. Participants were not excluded based on the years since NHS employment, provided they had this experience at some point. Inclusion criteria were that the participant be or have been an NHS employee (current or past), working/worked in a patient facing role as a qualified healthcare professional.

Procedure

Creating the pilot questionnaire

We developed a questionnaire based on the core outcome set reported in our previous paper (5). Two members of the team looked for common inductive, themes across the outcomes (LBD, NT). We found experience, confidence and attitudes, where outcomes were to do with experience, we categorised them as experience and asked about the experiences they had during a suitable time period. If statements were about how confident they felt or attitudes they held, we categorised them as such and asked questions in that way. Statements were self-reported in terms of strength of agreement using a 7-point Likert scale. Where the core outcome reported in the previous paper, could be interpreted in multiple ways, we referred back to the original papers where the outcome was originally reported from the metasynthesis (5) and used this to make decisions about how to express the statement. If a statement could indicate change in experience, confidence and / or attitude, we developed questions for each.

Two members of the team (LBD, NT) assessed each core outcome and generated 103 statements with Likert scales of agreement for each statement (from strongly disagree to strongly agree). We excluded 40 items from the core outcome set which would not be measurable through self-report questionnaires. These were items about organisational outcomes for the NHS (8), outcomes that were too vague to be specifically defined (8) or overlapped in meaning with another and were combined

(24). For example, '*exposure to ethical dilemmas'* and '*increased awareness of/knowledge about ethics*' were combined *into 'I have frequently experienced ethical dilemmas'.* See supplementary material for a record of the decisions and their reasons. In addition 7 items from the Satisfaction with Life Scale were added (REF).

We included 56 statements about the frequency with which the individual had an experience or exhibited certain behaviour in the last month (regardless of where this last month's work took place). For example, 'In the last month I frequently dealt with difficult people'. We generated 19 confidence statements. For example, 'I am confident in my ability to teach others'. Other statements, which were more about attitudes and feelings were labelled included, for example, 'I have an excellent work ethic', (n=35). Supplementary material shows the matches between the outcomes and statements.

Pre-pilot

The questionnaire was pre-piloted on 16 participants, including seven from the MOVE research group (a group of Salford/Manchester researchers involved in similar research), to establish that the questionnaire was readable and understandable. We administered the tool online using eForms (32). The authors, plus the wider institutional team of researchers in international placements, met face-to-face to consider all of the written comments from the pilot. We conducted a cognitive interview with four participants, using both think aloud interviewing and verbal probing, whereby participants were questioned/asked to think aloud as they completed the questionnaire (33,34). Any comments, issues, questions or suggestions raised during the cognitive interviews were inputted into a table, one member of the team (NT) decided how best to act on each one and whether changes needed to be made. The table was then reviewed by another team member (LBD) and disagreements were discussed and resolved. This resulted in numerous changes being made to the statements, including using an existing life satisfaction scale (SWLS), previous research suggest using an existing validated for scale if one exists and the cognitive interviews and pre-pilot process highlighted the necessity to do this (26). As a result of this process a 110-item tool was created for the pilot phase.

Pilot

There were two methods of recruitment: online and face-to-face. Face-to-face participants were recruited using an opportunistic sample at health professional events nationwide (conferences, training events, exhibitions), many of which had an international focus (the majority of the sample gained this way were nurses and nursing assistants). Online participants were recruited in numerous ways, including links to the questionnaire posted on international volunteering blogs and in health professional newsletters and bulletins. The majority of the online sample was gathered using snowball sampling with key contacts within companies, projects and hospital health links that place professionals internationally agreed to send the link via email to health professionals, the majority of the doctors were responded online.

The tool was completed by participants either online or face-to-face, as was convenient and appropriate for the participants. Online participants received a link in an email, blog or online community and after giving consent. Face-to-face participants completed a paper version of the questionnaire. Of the 43 organisations that helped us recruit, nine involved face-to-face recruitment (21%). Recruitment took place between April and July 2016.

Materials:

Measure

The tool consisted of 110 statements measured on a 7-point Likert scale ranging from strongly agree to strongly disagree. The Likert scale contained the following descriptors: 1 Strongly Agree, 2, 3, 4 Neither Agree not Disagree, 5, 6, 7 Strongly Disagree (this was reverse coded for analysis as higher intensity ordinal constructs need to be higher values, strongly agree at 7, strongly disagree at 1). No statements were reversed.

An additional existing scale was used within the tool, the Satisfaction with Life Scale (SWLS) (35). This is a five-item scale that has been used frequently to measure satisfaction with life. This replaced a number of statements from the core outcome set about satisfaction with life, since the questions had already been refined and tested for validity and reliability and guidelines suggest using existing scales where possible (26,35).

In addition to the 110 statements, participants demographic and placement data was also gathered. Each participant was asked basic demographic questions: age, gender, profession, employment status, nationality and years since registration. Past experience on international placements was also recorded (country, length of stay).

Analyses

Principal Component Analysis

We used successive iterations of principal component analysis to reduce the pool of items, so that only the items with optimal psychometric properties would remain. Principal Component Analysis (PCA) is a dimension-reduction tool that can be used to reduce a large set of items to a small set that still contains most of the information in the large set (36). Initially, a parallel analysis was performed to determine the number of factors. Items with low communalities (<0.500) or loadings below 0.3 were withdrawn in subsequent iterations. In the final iterations, exclusions were performed at an item-by-item basis. We decided that even if there were more items in one domain we would retain them if they had adequate psychometric properties. PCA was performed in IBM SPSS 23 (37).

Multidimensional Item Response Theory

We created a multidimensional item response theory (MIRT) model, based on the results of the best iteration of the PCA in order to test the structure of the factors we found and remove any items which did not improve the assessment of each factor. MIRT is analogous to confirmatory factor analysis (CFA) (38) but, unlike CFA, MIRT considers all Likert scale variables as categorical, which is more appropriate for our data. MIRT parameters in this study were estimated using weighted least squares means- and variance-adjusted, given their appropriateness for categorical variables in comparison to Bayesian estimation, which would be an operationally attractive alternative, given the high dimensionality of the data (39). MIRT analysis was performed in Mplus 8 (40).

Patient and Public Involvement

No patient involved

Results

Pilot

Participants

Four hundred and thirty six participants completed the questionnaire, 42% (182/436) of participants had no international experience (Table 1).

Table 1: Participants: Anticipated and Actual Numbers

Group	Target	N included (%)	Percentage of target
Currently Overseas/Due to Depart	100	79 (18%) (26 Currently Overseas. 53 Due to Depart)	79%
Past International Experience	100	169 (39%)	169%
No International Experience- Interested	100	78 (18%)	78%
No International Experience- Not Interested	100	104 (24%)	104%
Total	400	436 (100%)	**109%**

All participants were NHS employees (past or present). Staff group representation was largely in line with the NHS North West employee data (41), whereby 30% of the workforce is nursing and midwifery (Table 2). The other staff groups were also relatively proportionate, besides Medical and Dental which represents only 9% of the North West workforce and support to staff (28%). This suggests that any item reduction based on variability in responses from the sampled group were largely representative of the NHS workforce. Table 3 shows the participant demographics.

Table 2: Professions of participants

Staff group	n	Pilot sample	NHSNW (41)
Medical and Dental	146	34%	9%
Nursing and Midwifery	135	31%	30%

Allied Health Professionals	64	15%	6%
Healthcare Scientists	13	3%	3%
Ambulance	13	3%	2%
Support to clinical staff	30	7%	28%
NHS infrastructure support	5	1%	18%
Other scientific, therapeutic & technical	3	1%	4%
Other	25	6%	<1%

Table 3: Participant Demographic Information: age, employment status, nationality, gender and career stage (years since registration was used as a proxy measure of experience)

Age	n	Employment status	n	Nationality	n	Years since registration	n	Gender	n
Under 25	35	Full Time	325	British	350	<5 Years	98	Male	113
26-30	76	Part Time	72	English	7	6 to 15	137	Female	323
31-40	127	Retired	20	Irish	11	16 to 25	60	Total	436
41-50	84	Student	16	Scottish	4	26+	94		
51-60	81	Unemployed	3	Welsh	1	Total	389		
61-70	32	Total	436	N Irish	2	Missing Data	47		
Total	435			EU	12				
Missing Data	1			Non EU	28				
				Dual British	7				
				Total	422				
				Missing Data	14				

Principal Component Analysis

The principal component analysis used the correlation matrix obtained from the application of the questionnaire to the 436 participants. The 436 responses included those with no international experience to account for the range of variability in response across the NHS workforce, regardless of experience. Twenty-one iterations of principal component analysis were performed. From the original set of items, only 40 items were chosen for the last iteration of the principal component analysis. The Kaiser-Meyer-Olkin measure showed the level of sampling adequacy to be acceptable (KMO = 0.896). The lowest measure of sample adequacy for an individual item was 0.810 ("*I demonstrated I'm a good teacher*"). The Bartlett's sphericity test indicated that the inter-item correlations were sufficient for proceeding with the analysis. The lowest value for the items' communalities was 0.590 ("*If I could live my life over, I would change almost nothing*"), which is above the aimed threshold of 0.500. After *varimax* rotation, 10 factors were extracted taking into account the findings of the scree plot and of a Monte Carlo parallel analysis. The 10 factors explained 71.80% of the variance. On the scree plot (see Figure 1) it is possible to observe that the first five factors had the highest eigenvalues.

Multi-Dimensional Item Response Theory

The diagram with the resulting model; whichcontains the items selected for each one of the latent variables, the loadings for each item and the correlation coefficients between the constructs, can be seen in Figure 2. This model was chosen as it was the best possible solution to reconcile the need of creating a comprehensive, content-rich questionnaire while obtaining satisfactory evidence of validity based on its internal structure. In terms of goodness-of-fit, the model had significantly better fit than a unidimensional solution in the chi-square test for difference testing ($\chi 2$ = 2889.749, df = 45, $p < 0.001$). The comparison of goodness-of-fit indices between the unidimensional solution and the proposed model can be observed in Table 4. The chi-square is not the chi-square of any model but the chi-square of the difference of the chi-squares of each model separately.

Table 4 – Comparison of selected goodness-of-fit indices between the unidimensional model and the proposed model.

Models	χ^2	df	χ^2/df	RMSEA	CFI	TLI	WRMR
Unidimensional	8206.204	740	11.089	0.152	0.641	0.622	3.511
Proposed model	1736.922	695	2.499	0.059	0.950	0.944	1.271

Table 5- Cronbach's alpha co-efficient for each construct

Construct	Cronbach's alpha
Adapting Communication	0.88
Confidence	0.86
Life satisfaction	0.86
Difficult communication	0.86
Management skills	0.86
Attitude to work	0.82
Flexibility	0.83
Teaching skills	0.78
Behaviour Change	0.77
Cultural awareness	0.72

Reliability estimates were calculated using Cronbachs's alpha coefficients but also using estimates of individual precision calculated based on the individual estimates of the standard errors of measurement. Figure 1 shows the precision curves for each latent variable. While "Confidence", "Life Satisfaction" and "Attitudes to Work" had the highest means for the individual precision estimates, "Adaptability" was the construct that achieved the highest precision estimates for most of the theta spectrum. "Attitude to work" had the lowest estimates for individual precision. Using the information functions as indicators of precision, "Flexibility" achieved the highest values and "Attitude to work", the lowest ones. As expected, an inverse situation is observable on the curves for the standard errors of measurement, with "Flexibility" showing the lowest measurement errors and "Attitude to work" the highest ones. The precision, information and standard error curves for the retrieved constructs under the MIRT analysis can be observed in Figures 3, 4 and 5. The precision, information and SE curves demonstrate that the quality of the measures for each one of the proposed constructs varies across the latent spectrum, with lower levels of reliability

and information and higher levels of standard error of measurement in the extremes of the latent spectrum. The extreme right side of the spectrum has the worst reliability and highest error. The information curve, therefore, is indirect evidence of reliability with the advantage of being sample-independent.

Table 5 shows the Cronbach's alpha coefficients for each one of the retrieved constructs. Taking the Cronbach's alpha coefficients into account, the reliability estimates are somewhat divergent from the MIRT-based precision estimates. Using Cronbach's alpha, the most reliable factor was "Adapting Communication" and the least reliable was "Cultural Awareness".

The analysis resulted in 40 items grouped into 10 constructs, the final list of constructs and the items that belong on each can be seen in Table 6. Table 6 also shows the loading estimates, the standard errors of the loading estimates, the ratios between the estimate and the standard error and the two-tailed *p*-values for the estimates. Table 6 shows the final selection of items with the dimension each one of them belongs.

<insert table 6>

<insert figures 1-5>

Discussion

In this study we converted stakeholder agreed PPD outcomes of health professional international placements (27) into outcome statements, to assess which have the best psychometric properties for self-assessment. By piloting these statements with a large set of healthcare professionals and using item response theory to establish and test a set of latent traits and their associated questions, we were able to determine the 40 items with the best psychometric properties to create the MOVEiT tool. Reliability evidence is favourable to the latent trait structure, both when using a single coefficient for the entire sample, and under the multidimensional item response theory approach. The validity evidence based on the internal structure of the questionnaire detailed in this study, combined with the content validity evidence based on the selection of the initial pool of items (5) helps build a strong validity argument in favour of the use of this questionnaire for the measurement of PDD-related dimensions of international placements. There were many more outcomes retained within the confidence domain as there were more items in the original data

that we about confidence, and these items demonstrated more variability in responses regarding what people were confident about. We kept this as a large domain as we did not want to lose the richness of that data.

This paper aimed to consider whether a unique tool is needed to assess outcomes of UK healthcare professionals as a unique professional group, due to the qualitative reports of healthcare specific (i.e. patient interaction outcomes) in the literature (9,25). We found that six of the outcome statements included in the MOVEiT tool were specific to healthcare professionals (i.e. I am confident in my ability to manage myself in a clinical environment). However, if one were to reduce the health specifity of the wording (for example, change the word clinical to work, or patient to customer) the tool has similarities to other psychometric measures introduced earlier in this paper (21,22). These similarities provide support for the application of all measures and suggest that MOVEiT could be applicable outside of healthcare.

The 40 outcome statements that we found to have the best psychometric properties fell within the main outcome categories reported in past literature. For example, communication, leadership, attitude to work, cultural awareness are frequently reported outcomes in the literature and domains within this tool (2,6,9,12,18). In our previous work we criticise the current evidence base for being too vague in outcome reporting, as many papers report communication, leadership and cultural awareness as broad outcomes, rather than specify the relevant components within each that develop (specific skills, knowledge or attitudes) (2,5,12). By using psychometric tests to assess latent traits, we further highlight the necessity for specific outcome reporting, as we found outcome statements associated with adapting communication and difficult communication to be two unique latent traits, rather than a single entity.

We hope that any healthcare professionals as individuals, project managers, or NHS trusts may choose to use the tool in both a within or between participant manner (comparing outcomes pre and post international placements and comparing staff with and without international experience). By collecting data using the MOVEiT tool and the variable statements developed in our previous work (to assess moderating or mediating variables that may affect outcomes), future researchers could begin to gather precise information about this learning (process, outcomes, variables) (5).

This should also be considered against measures of the list of costs reported in our previous work (5), as there is considerable literature regarding the ethical concerns of medical practice in LMICs, particularly when staff practice skills that they could not in a high income country (42,43). If mutual benefits could be evidenced using metrics, and costs minimised/mitigated by assessing the elements that increase mutual benefits, employers may be less reluctant to release staff to undertake such work (1,6). Particularly is evidence suggests that such work, may be beneficial for the LMIC, the NHS and the individual professional.

Going forward we hope to develop a larger set of data; which will a) help us understand in more detail the processes associated with the outcomes and b) assess more thoroughly the reliability and validity of the tool c)adapt or reduce the tool further based on future data and d) assess sensitivity of the tool to change.

Limitations

The tool only includes items which are either psychometrically related, or show variability of response. This means that many items that stakeholders considered important for inclusion in the core outcome set were not represented within the tool (5). This tool, therefore, compliments rather than replaces other tools which professionals to reflect on all components of their PPD (19). This tool provides a way of evidencing benefits, however there is a body of critical evidence outlining the ethical concerns of medical practice abroad, particularly when individuals practice in ways that they might not in a high-income country (43,44). A full cost-benefit analysis of this phenomena can be found in the authors other work (15), the authors only advocate benefits in mutually-beneficial, sustainable, ethical placements.

Conclusion

This evidence-based 40-item psychometric tool for self-assessment of outcomes from international placements (MOVEit) could be used in research and practice. Future work will reveal if the tool has the sensitivity to detect change in the domains.

Ethics

Ethical approval was granted via the University of Salford (ref HSCR14/58) and the University of Manchester Research Ethics Committee (ref 14185).

List of Abbreviations

CFA- Confirmatory Factor Analysis

GHE- Global Health Exchange

HEE- Health Education England

HCA- Healthcare Assistant

HIC- High Income Country

LMIC- Low and Middle-income Country

MIRT- Multivariate Item Response Theory

NHS- National Health Service

NHSNW- National Health Service North West

PCA- Principle Component analysis

PPD- Personal and Professional Development

SWLS- Satisfaction with Life Scale

Declarations

Ethics approval and consent to participate

Approval for the study was obtained from the Ethical Research Committee, University of Salford, and the University of Manchester Research Ethics Committee. Participants gave informed consent.

Consent for publication

Not applicable

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

Professor Ged Byrne is the Director of Global Engagement for Health Education England. The other authors declare no competing interests.

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Author contributions

NT participated in the design of the study, conducted the pilot and drafted the majority of the manuscript. LBD conceived the design of the study, analysed data and contributed significantly to drafting the manuscript. CC provided oversight to the study design, conducted the PCA and statistical analysis and drafted the manuscript, GB provided oversight of study design, helped recruit participants and drafted the manuscript. All authors participated in the coordination of the research and read and approved the final manuscript.

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Table 6: Estimated discrimination parameters from the proposed MIRT model

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
CONFIDENCE			
I am confident in my ability to manage myself in a clinical environment.	0.727	0.030	0.000
I am confident in my abilities to work independently when necessary.	0.719	0.032	0.000
I am confident in my ability to deal with the unexpected.	0.743	0.025	0.000
I am confident in my ability to be adaptable and innovative as a leader.	0.733	0.024	0.000
I am confident in my ability to adapt and be flexible clinically.	0.823	0.021	0.000
I am confident in my ability to adapt and be flexible in general.	0.798	0.021	0.000
I am confident in my ability to find solutions despite limited resources.	0.770	0.022	0.000
I am confident in my ability to apply clinical skills to another context.	0.721	0.026	0.000
I am confident in my work.	0.724	0.025	0.000
LIFE SATISFACTION			
In most ways my life is close to my ideal.	0.834	0.02	0.000
The conditions of my life are excellent.	0.783	0.02	0.000
I am satisfied with my life.	0.893	0.017	0.000
So far I have gotten the important things I want in life.	0.776	0.024	0.000
If I could live my life over. I would change almost nothing.	0.667	0.029	0.000
Taking everything into consideration. I am satisfied with my job.	0.717	0.038	0.000

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
CULTURAL			
*I demonstrated a good awareness about how culture influences health.	0.761	0.036	0.000
*I frequently demonstrated cultural sensitivity.	0.881	0.031	0.000
*I was constantly conscious of culture when working with patients.	0.779	0.033	0.000
ADAPTING COMMUNICATION			
*I changed the way I speak so that somebody can understand me (e.g. purposely spoke slower and clearer).	0.899	0.024	0.000
*I changed the way I communicate to make it more contextually appropriate (e.g.. to make it more culturally appropriate).	0.916	0.025	0.000
*I frequently relied on my non-verbal communication (e.g. hand gestures).	0.751	0.032	0.000
TEACHING			
*I demonstrated I'm a good teacher.	0.813	0.024	0.000
*I adapted the way I teach to make it better for the learner.	0.807	0.023	0.000
I am confident in my ability to teach others.	0.883	0.031	0.000
DIFFICULT COMMUNICATION			
*I demonstrated that I am skilled in challenging conversations. even in high pressure situations.	0.842	0.025	0.000
*I demonstrated that I am able to manage difficult people effectively.	0.862	0.021	0.000
*I frequently dealt with difficult people.	0.774	0.027	0.000

Constructs / Items	Estimate	S.E.	P-Value (two-tailed)
BEHAVIOUR CHANGE			
I am able to empower patients to help themselves.	0.807	0.026	0.000
I am able to empower colleagues to help themselves.	0.794	0.025	0.000
In my work I have demonstrated skills in changing colleagues' behaviour.	0.761	0.027	0.000
In my work I have demonstrated skills in encouraging and supporting patients to change behaviour.	0.778	0.027	0.000
MANAGEMENT			
*I allocated tasks.	0.848	0.021	0.000
*I co-ordinated colleagues.	0.868	0.02	0.000
*I demonstrated I am able to plan and organise.	0.907	0.024	0.000
ATTITUDE TO WORK			
*I was frequently proactive at work (e.g. used my initiative. got on with things. thought on my feet).	0.778	0.027	0.000
*I demonstrated that I am able to cope in work (e.g. able to deal with stress).	0.763	0.028	0.000
*I demonstrated that I am particularly good at working as part of team.	0.765	0.026	0.000
FLEXIBILITY			
*I demonstrated I'm good at dealing with the unexpected.	0.857	0.037	0.000
*I frequently had to find solutions despite limited resources.	0.912	0.017	0.000
*I demonstrated I am able to find solutions despite limited resources.	0.937	0.017	0.000

*items preceded by * indicate that 'In the last month' is presented ahead of that statement, providing a time reference to consider the experience.

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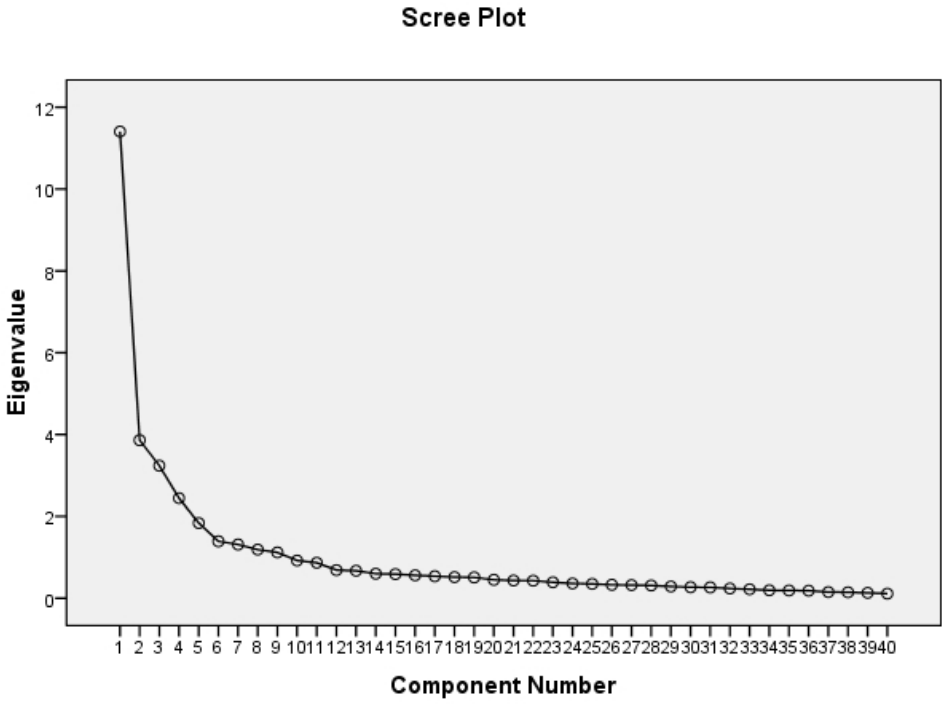
Scree Plot
Eigenvalue
12
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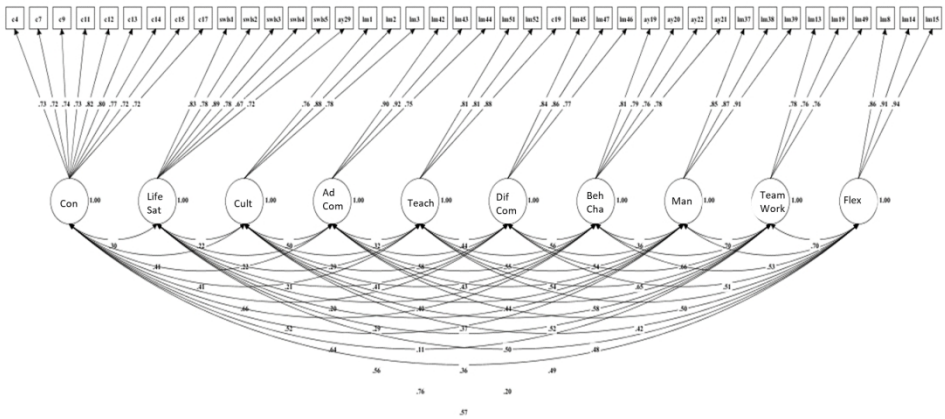
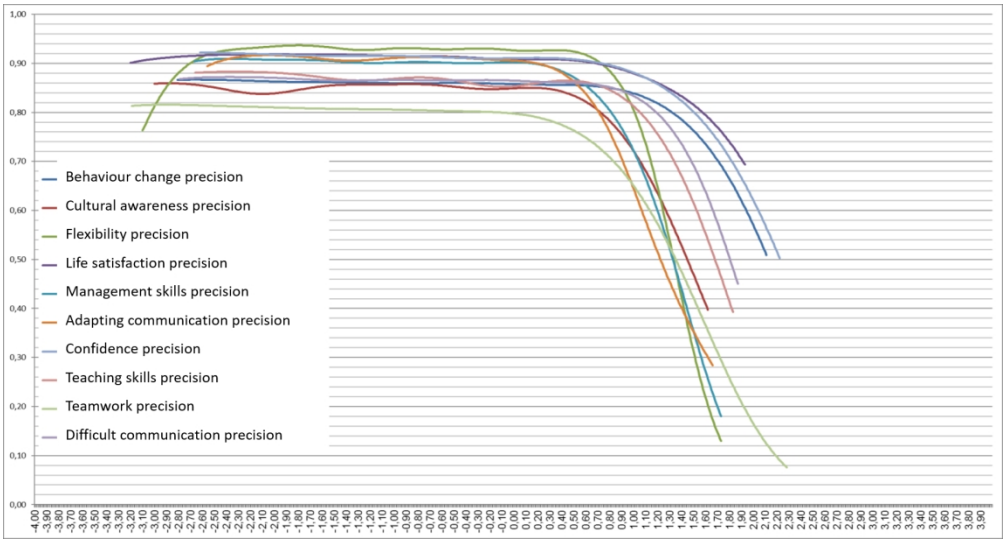
Component Number

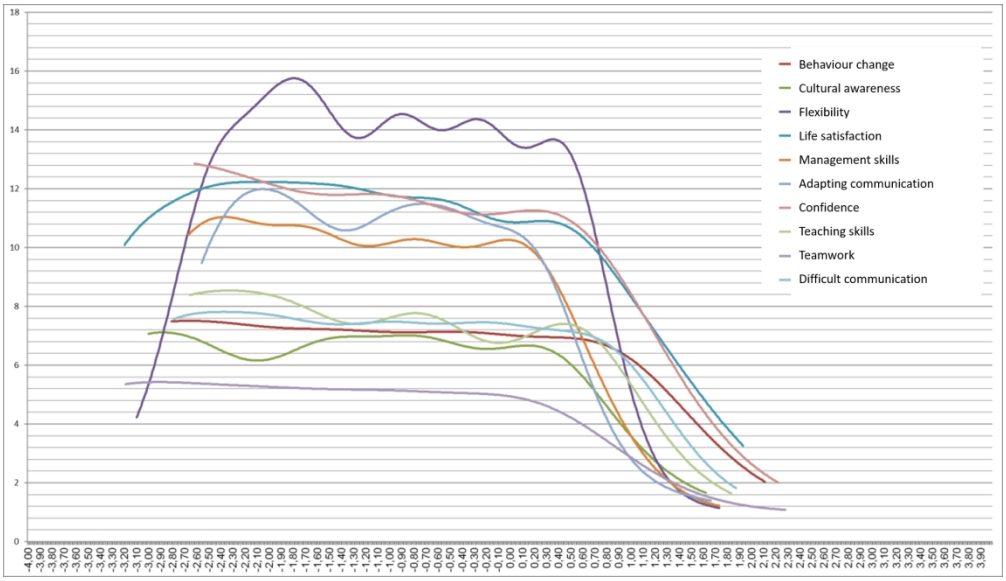
Scree Plot



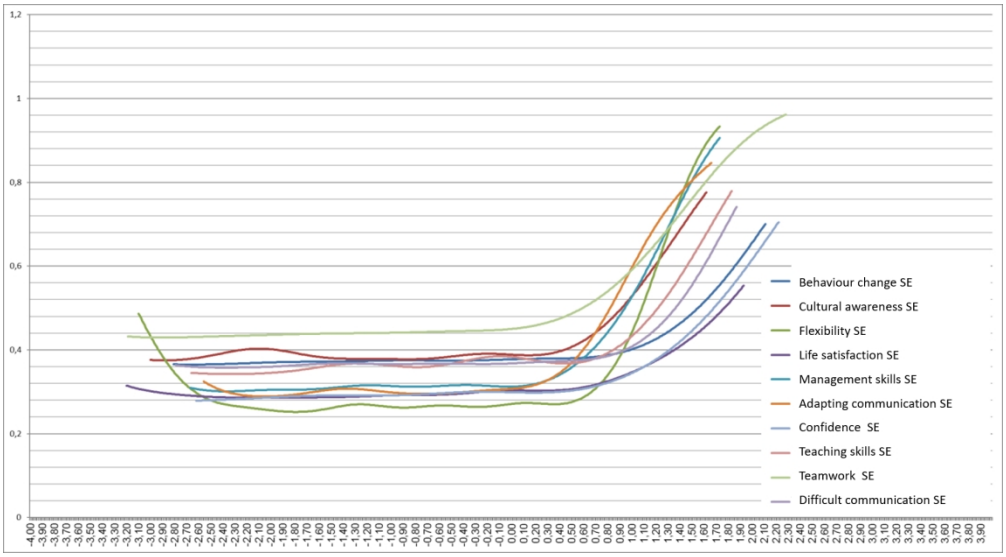
Latent variables and loadings



Estimates for mean individual precision of the latent variable scores



Information functions for the latent variables



Estimates for individual standard errors of measurement of the latent variable scores

Additional Files: Tables

Table 1: Each core outcome and how it was used in the tool

CORE OUTCOME	INCLUDE/REMOVED/COMBINE	Reason/changed to/combined into
INCREASED AWARENESS OF/KNOWLEDGE ABOUT CULTURAL DIFFERENCES AND SIMILARITIES (e.g., understanding key issues within a culture, culturally acceptable behaviour and cultures of UK immigrants, learning about, accepting and changing assumptions about other cultures)	COMB	I have demonstrated a good awareness about how cultural differences influence health
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE CULTURAL ASPECTS OF HEALTH (e.g., greater understanding of health promotion, how culture affects daily life and professional work, cultural differences in health, the effects of politics on health, sustainable healthcare)	COMB	I have demonstrated a good awareness about how cultural differences influence health
ABILITY TO WORK WITH LIMITED RESOURCES (e.g., being more resourceful, ability to target resources, ability to find solutions despite limited resources, making use of everything available, ability to work without reliance on technology, manage in a low resource setting)	COMB	I have frequently had to find solutions despite limited resources
INCREASED AWARENESS OF/KNOWLEDGE ABOUT CULTURE IN PRACTICAL ASSESSMENTS (e.g., the importance of collecting relevant cultural information about peopleâ€™s presenting health problems and learning how to conduct cultural assessments and culturally based physical assessments)	INC	
ABILITY TO APPLY CLINICAL SKILLS TO ANOTHER CONTEXT (e.g., a more challenging environment or a low resource setting)	INC	
ABILITY TO BE ADAPTABLE AND INNOVATIVE IN TEACHING (e.g., ability to transfer skills and knowledge to the most influential people or to another context, recognising different learning styles, being adaptable in assessment)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT HOW OTHER HEALTHCARE SYSTEMS FUNCTION (e.g., developed insight into disparities within healthcare systems, understanding of other systems)	INC	
ABILITY TO COPE (e.g., improved coping strategies, ability to deal with lack of structure, knock backs and stress, being unfazed by things and taking things in stride, new approach to guilt for patients problems)	INC	
INCREASED CULTURAL SENSITIVITY (e.g., sensitivity to reasoning behind cultural differences, feelings of minority and language barriers)	COMB	I have frequently demonstrated cultural sensitivity (e.g. understanding that words and behaviours can have different meanings)
UNDERSTANDING THAT WORDS AND BEHAVIOURS CAN HAVE DIFFERENT MEANINGS (e.g., understanding how words are perceived by others, understanding how to speak and behave so as not offend people)	COMB	I have frequently demonstrated cultural sensitivity (e.g. understanding that words and behaviours can have different meanings)

ABILITY TO APPLY KNOWLEDGE ACROSS SYSTEMS (e.g., ability to apply knowledge from host system to UK and vice versa, using knowledge gained in system to improve/change another)	INC	
DEVELOPMENT OF A NEW PERSPECTIVE (e.g., revising assumptions, seeing things differently, changed world views and outlook, look at everything in a new light, openness to new experiences, put things into perspective)	INC	
IMPROVED FLEXIBILITY AND ADAPTABILITY (e.g., acceptance of other ways of working, adaptation to responsibility, being able to adapt more easily to unfamiliar situations, able to cope more easily with change, gaining a wider perspective, understanding the flexibility of roles)	INC	
ABILITY TO BE INNOVATE WHEN OVERCOMING CHALLENGES (i.e., finding unique ways of overcoming cultural and language challenges)	COMB	I have frequently had to find solutions despite limited resources
INCREASED RESPECT FOR OTHER CULTURES	COMB	I have demonstrated a good awareness about how cultural differences influence health
INCREASED UNDERSTANDING OF BASIC SKILLS AND IDEAS (i.e., back to basics, e.g., basic observations using eyes, less reliance on lab tests and technology, basic clinical skills and science)	COMB	I have relied heavily on the basic skills of my profession (e.g. physical examination)
CONFIDENCE IN TEACHING ABILITY (e.g., being more comfortable around others, confidence public speaking, confidence in transferring knowledge)	COMB	In the last month I have demonstrated that I'm a good teacher I am confident in my ability to teach others
IMPROVED CONFIDENCE (e.g., in caring for clients from another culture, in quality improvement methods, to take bolder steps, to address challenging situations, self-confidence, confidence in professional ability,)	INC	
CONFIDENCE TO WORK IN OTHER LOCATIONS (e.g., confidence to move to another city/country, working with UK multicultural/ underserved populations)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT GLOBAL ISSUES (e.g., re-evaluating world issues, shared purpose)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT CONDITIONS AND PROCEDURES RARELY ENCOUNTERED IN THE UK (e.g., greater understanding of procedures not used in the UK, unfamiliar equipment and delayed presentations, better management of conditions that are not common in the UK)	COMB	I have a good knowledge of conditions and procedures rarely encountered in the UK (e.g. tropical diseases, delayed presentations, old equipment)
INCREASED AWARENESS OF/KNOWLEDGE ABOUT TROPICAL DISEASES	COMB	I have a good knowledge of conditions and procedures rarely encountered in the UK (e.g. tropical diseases, delayed presentations, old equipment)
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF MUTUAL LEARNING AND RESPECT (i.e., greater understanding of reciprocal learning)	INC	
ABILITY TO BE ADAPTABLE IN LEADING (e.g., able to lead in complex novel situations, ability to compromise not dictate)	INC	
ABILITY TO WORK WITHIN A SYSTEM WITH UNFAMILIAR POWER DYNAMICS	INC	
ABILITY TO ADAPT SOCIAL NORMS TO MEET NEEDS OF ANOTHER CULTURE (e.g., change behaviours to fit into another culture, being aware of own social norms and adapting them)	INC	
ABILITY TO EXCHANGE IDEAS WITH THOSE FROM ANOTHER CULTURE	INC	

INCREASED SELF-AWARENESS (e.g., understanding own skills and limitations, how to challenge own beliefs and importance of reflecting on own situation)	INC	
PATIENCE AND TOLERANCE (e.g., accepting and working at other peoples pace, more tolerant)	INC	
PROACTIVITY (e.g., thinking on feet, using initiative, efficiency, get on with things rather than look for someone to blame)	INC	
ABILITY TO WORK WITH RESOURCES AVAILABLE IN SPECIFIC CONTEXTS (i.e., understanding the reasons behind lack of resources)	COMB	I have frequently had to find solutions despite limited resources
ABILITY TO WORK TOWARDS SOLUTIONS (e.g., solution focused approach)	INC	
UNDERSTANDING THAT SPEED AND LANGUAGE COMPETENCY AFFECT COMMUNICATION (e.g., awareness of how speed affects comprehension, understanding language differences and checking recipient comprehension, ability to use an interpreter)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF COMMUNITY PARTICIPATION IN HEALTH (e.g., understanding the community and social influences on health, the role of the community in health, public health and the importance of community work)	INC	
ABILITY TO USE A BROADER RANGE OF CLINICAL SKILLS (e.g., enhancing existing skills and acquiring new clinical skills, greater all round competence)	INC	
UNDERSTANDING THAT CHANGING BEHAVIOUR IS COMPLEX (e.g., understanding how to make small changes and not to force your perspective onto others,)	COMB	In my work I have demonstrated skills in changing patients' or colleagues' behaviours
ABILITY TO IMPROVE SERVICE (e.g., renewed enthusiasm for service improvement)	INC	
INCREASED STAFF KNOWLEDGE AND SKILLS (e.g., increased staff knowledge of low cost healthcare, more knowledgeable staff able to cover more areas, to discover better ways of doing things and more aware of waste reduction)	REM	too vague and not based on individual
INCREASED AWARENESS OF/KNOWLEDGE ABOUT HOW CONTEXT AFFECTS COMMUNICATION (e.g., effectively conveying ideas in a contextually appropriate way)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE NEED FOR AND IMPORTANCE OF TRAINING (i.e., understanding how important effective training is in)	INC	
IMPROVEMENT IN TEACHING SKILLS (e.g., learning new techniques, greater training delivery skills, lecturing skills and small group teaching skills)	COMB	In the last month I have demonstrated that I'm a good teacher I am confident in my ability to teach others
ABILITY TO DEAL WITH THE UNEXPECTED	INC	
ABILITY TO MANAGE PROJECTS	INC	
DEEPER ENGAGEMENT WITH ISSUES OF EQUALITY AND DIVERSITY	INC	
ABILITY TO OVERCOME COMMUNICATION CHALLENGES (e.g., ability to communicate effectively in high pressure situations, engage in challenging conversations and liaise between groups)	INC	
ABILITY TO BE INNOVATIVE WITH CLINICAL SKILLS (e.g., use of innovative techniques, finding new ways to approach a condition, new ways of working)	INC	

APPRECIATION OF HAVING THE RIGHT TOOLS AND EQUIPMENT TO BE ABLE TO DO THE JOB (i.e., resources: technical equipment, disposal equipment, cleaning products and protective equipment)	COMB	I have frequently had to find solutions despite limited resources
APPRECIATION OF EXCELLENT HUMAN RESOURCE IN THE NHS (e.g., multidisciplinary TEAM WORKs, HR structures, appreciation of own profession, understanding hierarchy and the importance of each person within it)	INC	
IMPROVED EMOTIONAL INTELLIGENCE (e.g., changed engagement with self, knowledge and world)	INC	
ABILITY TO IDENTIFY AND ANTICIPATE POTENTIAL PROBLEMS (e.g., identify problems when setting up a new project)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT APPROPRIATE CLINICAL BEHAVIOUR (e.g., knowing when to stop and when to move forward, when to ask for help and different populations needs)	INC	
ABILITY TO MAKE INDEPENDENT CLINICAL DECISIONS (e.g., ability to make an urgent decision in an emergency, dealing with uncertain outcomes, evaluating risks to patients and self)	COMB	I am confident in my ability to make appropriate independent clinical decisions
UNDERSTANDING OWN POTENTIAL TO EMPOWER PEOPLE	INC	
ABILITY TO WORK AS PART OF A TEAM WORK (e.g., understanding TEAM WORK group norms, perception of roles within the group, managing personal objectives within a group)	INC	
ABILITY TO BUILD A GLOBAL NETWORK	INC	
ABILITY TO DISSEMINATION BEST PRACTICE GLOBALLY	INC	
APPRECIATION OF FREE UNIVERSAL HEALTH (e.g., the NHS system of free healthcare for all, privilege and opportunity, the expectations that are placed on NHS by service users)	INC	
IMPROVED SITUATIONAL AWARENESS (i.e., understanding your environment so you can understand what to do)	REM	Research suggests self-report does not measure this effectively
INCREASED JOB SATISFACTION (e.g., increased motivation and morale within profession, renewed passion for work, sense of reward)	INC	
PERSONAL SATISFACTION (e.g., personal achievements and challenges, new experiences, experiencing a different lifestyle, a holiday, appreciation of own life, personal fulfilment)	INC	
CAN-DO ATTITUDE	INC	
ABILITY TO PROVIDE BETTER CARE (e.g., ability to integrate primary and secondary care, to provide multicultural care, to develop most effective approaches to care and taking responsibility for providing quality of care)	INC	
ABILITY TO CO-OPERATE (e.g., willingness to see another point of view)	INC	
APPRECIATION OF CLINICAL GOVERNANCE PROCEDURES WITHIN NHS (e.g., waste disposal, audit, TEAM WORKwork, education system, tests and investigations)	COMB	I have thought about and appreciated clinical governance
APPRECIATION OF THE IMPORTANCE OF CARE AND COMPASSION (e.g., ability to compare compassion in both systems, empathy and fairness)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE POSITIVE IMPACT OF CLINICAL POLICIES AND GOVERNANCE (e.g., understanding the benefits of a comprehensive checklist)	COMB	I have thought about and appreciated clinical governance
INCREASED AWARENESS OF/KNOWLEDGE ABOUT ETHICS (i.e., experiencing ethical dilemmas, understanding the importance of ethics)	COMB	I have frequently experienced ethical dilemmas

CHANGED PERCEPTION OF OTHERNESS (e.g., understanding importance of being a friendly stranger in UK, feeling like a foreigner)	INC	
INTEGRITY	REM	Too vague
INDEPENDENCE (e.g., lone working)	INC	
ABILITY TO PLAN AND ORGANISE (e.g., ability to set direction, improved audit skills)	INC	
ABILITY TO MAKE DECISIONS (e.g., understanding who the decision is for, taking action on decision, making judgements	COMB	I am confident in my ability to make appropriate independent clinical decisions
ABILITY TO MANAGE RISK (e.g., manage risk in advance, evaluation of environment, understanding the clinical importance of risk management and the wider implication of poorly managed risk)	INC	
INCREASED PATIENT SATISFACTION (e.g., staff better able to respond to UK multicultural populations, staff able to compare how systems affect patient satisfaction, have greater relationships with multicultural population, more in tune with patients and more aware of individual needs of patients).	REM	Cannot be measured in professional self-reports alone
ABILITY TO COMMUNICATE NON-VERBALLY	INC	
ABILITY TO ESTABLISH COMMUNICATION SYSTEMS (e.g., formal and informal)	INC	
INCREASED CLINICAL KNOWLEDGE IN RELATION TO OTHER PROFESSIONS (e.g., doctors understanding nurses and vice versa, multi-disciplinary awareness)	INC	
ABILITY TO GET THE MOST OUT OF PEOPLE (e.g., encouraging people to work together, recognise their own strengths and to take possession of their own work/projects, ability to assess the capability of others)	INC	
ABILITY TO MANAGE PEOPLE (e.g., able to allocate tasks and co-ordinate people, to deal with people with differing objectives, to negotiate with multiple stakeholders, to manage difficult people)	COMB	Colleagues have noticed my abilities to manage difficult people
ABILITY TO DEVELOP FRIENDSHIPS (e.g., relationship formation skills, developing new friendships)	INC	
ABILITY TO MANAGE SELF (e.g., own expectations, self-reliance, self-management, self-assurance, reflexivity)	INC	
CHANGED JUDGEMENT (e.g., non-judgemental attitude, changed self-judgement)	INC	
DIPLOMACY	REM	Too vague
ABILITY TO FIND FACTS TO SOLVE PROBLEMS	INC	
DEVELOPING REDUNDANT OR BAD SKILLS/ATTITUDES (e.g., developing non-transferable skills, bad habits, deskilling, returning with overconfidence in own ability, poorer communication skills, loss of confidence)	INC	
FINANCIAL LOSS (e.g., costs of getting involved, loss of earnings, pension or employment entitlement)	REM	Too contextual- add to variables
REDUCTION IN NHS DROP OUTS (e.g., increased staff retention, when they volunteer and come back to NHS)	REM	Cannot be measured in professional self-reports alone
ABILITY TO OBSERVE AND EXAMINE PATIENTS (e.g., increased intuitive knowledge of clinical signs and clinical judgement ability to make diagnosis without investigations)	COMB	I have relied heavily on the basic skills of my profession (e.g. physical examination)
ABILITY TO WORK IN A PROFESSIONALLY COMPETENT WAY (e.g., having wider view of profession, intellectual development, reminder of professional responsibilities, stronger work ethic)	REM	Too vague
INCREASED UNDERSTANDING OF HOW TO BE A GOOD TEACHER (e.g., allowing students to learn from mistakes, ability to suggest and acknowledge improvements in teaching,	COMB	In the last month I have demonstrated that I'm a good teacher

understanding how communication affects learning, how to target training most effectively and the importance of experiential learning)		I am confident in my ability to teach others
ACT AS A ROLE MODEL (e.g., lead by example)	INC	
INFLUENCES CAREER PATHWAY (i.e., affects specialism choice, exploration of potential career pathways, pursuing careers in primary care, family practice, public service, sub-specialism in global health, teaching)	REM	Went into variables
ABILITY TO MANAGE TIME AND PRIORITISE (e.g., ability to respond quickly in an emergency, managing immediate need vs long term need, prioritisation of limited resources)	CHANG	In my ability to manage myself and prioritise (e.g. time management, managing emotions, responding an emergency, prioritising workload)
INCREASED ABILITY TO CHANGE BEHAVIOUR IN COLLEAGUES OR PATIENTS (e.g., ability to implement behaviour change and to assess the impact of healthcare systems)	COMB	In my work I have demonstrated skills in changing patients' or colleagues' behaviours
ABILITY TO MANAGE TRAGEDIES	INC	
EXPOSURE TO ETHICAL DILEMMAS (e.g., expected to work outside of competency, to do clinical work, little regulation, little supervision, too much responsibility)	COMB	I have frequently experienced ethical dilemmas
REDUCTION IN STAFF COMPETENCE (e.g., brain drain reversal: NHS loss of competent staff to overseas placements, staff unable to cope with paperwork on return)	REM	Cannot be measured in professional self-reports alone
NO RECOGNITION OR ACCREDITATION UPON RETURN	REM	Put into variables
INCREASED INTERNATIONAL REPUTATION OF NHS (e.g., greater fulfilment of social responsibility)	REM	Cannot be measured in professional self-reports alone
INCREASED INTERNATIONAL REPUTATION (of UK)	REM	Cannot be measured in professional self-reports alone
ABILITY TO VERBALISE KNOWLEDGE (e.g., ability to verbalise core concepts and deep knowledge, ability to explain complex ideas to others)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF TRUST BETWEEN COLLEAGUES WITHIN HEALTHCARE SYSTEMS	INC	
INCREASED AWARENESS OF AND KNOWLEDGE THE FUNCTIONING OF SYSTEMS (e.g., able to identify stakeholders and change agents, understanding influencing patterns of those in power, value systems and the difficulty of questioning organisations)	INC	
REFRESHMENT AND REINVIGORATION (e.g., chance to take time away to become refreshed and feel reinvigorated to work upon return)	INC	
ABILITY TO MANAGE HEALTHCARE ENVIRONMENTS (e.g., ability to manage wards and staff)	COMB	Colleagues have noticed my abilities to manage difficult people
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE IMPORTANCE OF CONSCIOUSLY MAKING AN EFFORT TO GET ON WITH COLLEAGUES (e.g., learning colleagueâ€™s names)	INC	
INCREASED AWARENESS OF/KNOWLEDGE ABOUT THE COSTS OF HEALTHCARE	INC	
ABILITY TO ACCEPT AND UNDERSTAND FAILURE (e.g., to continue with something that did not have desired outcome at first, learning to accept failure, thinking differently about failure, persistence)	INC	
HUMILITY (including professional humility)	INC	
ABILITY TO THINK THROUGH PROBLEMS IN A LOGICAL WAY (e.g., analytical/lateral thinking)	INC	

ABILITY TO ENGAGE SENIOR PEOPLE	INC	
HEALTH CONSEQUENCES (e.g., animal bites, tropical diseases, STDâ€™s, injuries and transport accidents, infection, jet lag, skin disease)	REM	Went into variables
EXTREME NATIONALISM TOWARDS UK	INC	
LOSS OF INTEREST IN PROFESSION (e.g., not wanting to work in your profession when home)	INC	
NHS BECOMES A MORE ATTRACTIVE EMPLOYER (e.g., an employer that offers staff the opportunity to volunteer)	REM	Cannot be measured in professional self-reports alone
INCREASED WORKFORCE PRODUCTIVITY	REM	Cannot be measured in professional self-reports alone

Table 2: Construct used to frame statement

Statement	Area of Interest
awareness about how cultural differences influence health	Experience
ability to find solutions despite limited resources	Confidence
find solutions despite limited resources	Experience Confidence
conscious of culture when working with patients (e.g. the importance of collecting cultural information)	Attitudes
ability to apply clinical skills to another context	Confidence
teach clinical colleagues	Experience
adapt the way I teach to make it more valuable	Experience
knowledge about how healthcare systems outside of the UK function	Attitudes
ablity to cope in work (e.g. ability to deal with stress)	Experience
cultural sensitivity (e.g. understanding that words and behaviours can have different meanings)	Experience
apply my clinical knowledge in any health system	Confidence
developed a new perspective (e.g. changed my outlook)	Experience
ability to adapt and be flexible in work	Confidence Experience
thinking about basic sciences (e.g. physiology, cell biological, biochemistry)	Experience
relied basic skills profession (e.g. physical examination)	Experience
rely more on laboratory tests than physical examination	Attitudes
confident in workplace	Confidence
confident to work in another country	Confidence
knowledge about global issues	Attitudes

knowledge of conditions and procedures rarely encountered in the UK (e.g. tropical diseases, delayed presentations, old equipment)	Attitudes
ability to work within an unfamiliar power dynamic	Confidence
adapting my social norms to meet the needs of another culture	Experience
leader in work	Experience
my abilities to be adaptable and innovative as a leader	Confidence
thought about my own skills, limitations and beliefs	Experience
patient and tolerant	Experience
proactive at work (e.g. used my initiative, got on with things, thought on feet)	Experience
someone who focuses on solutions not problems	Attitudes
changed the way I speak so that somebody can understand me	Experience
community participation is crucial for the health of the individual	Attitudes
clinical skills that I have hardly ever used before	Experience
difficult to change someone else's behaviour	Attitudes
skills in changing patients' or colleagues' behaviours	Experience
improved the healthcare service I work in	Experience
changed the way I communicate to make it more contextually appropriate	Experience
good teacher	Experience
ability to deal with the unexpected	ConfidenceExperience
ability to manage projects	Confidence Experience
deeply engaged with issues and equality and diversity	Attitudes
highly skilled in challenging conversations and effective communication, even in high pressure situations	Experience
glad that I have access to the right tools and equipment to do my job	Experience
thought about and appreciated the excellent TEAM WORKs, structures and individuals I work with in the NHS	Experience
good understanding of my own thoughts, feelings and behaviours	Attitudes
I am good at anticipating future problems	Experience
ability to make appropriate independent clinical decisions	Confidence
ability to empower others to help themselves	Attitudes
good at working as part of TEAM WORK	Experience

professional network that includes people from all over the world	Attitudes
confident in my ability to disseminate UK best clinical practice globally	Confidence
thought about and appreciated free universal health	Experience
gone about my daily work in a fairly automatic way	Experience
satisfied in job	Attitudes
satisfied in personal life	Attitudes
'can-do' attitude	Experience
provide excellent, high quality care	Experience
willingness to see someone else's point of view	Experience
thought about and appreciated clinical governance	Experience
thought about and appreciated the importance of care and compassion	Experience
experienced ethical dilemmas	Experience
appropriately manage ethical dilemmas	Confidence
experiences of feeling like an outsider	Attitudes
abilities to work independently when necessary	Confident
abilities in planning and organisation	Experience
actively manage risk, including anticipating risk and evaluating my environment	Experience
to rely on my non-verbal communication	Experience
establish communication systems (formal or informal)	Experience
understanding of the roles and responsibilities of all the professional staff I work with	Attitudes
capable of 'getting the most out of people' e.g., encouraging them and empowering them	Attitudes
managed difficult people	Experience Confidence
allocated tasks and co-ordinated colleagues	Experience Confidence
developing friendships and social relationships	Attitudes
ability to manage myself, including self-reliance and reflexivity	Confidence
quick to judge other people	Attitudes
developed bad habits in work	Experience
lost some confidence in my clinical practice	Experience
work ethic	Attitudes
act as a good role model at work	Attitudes

manage situations that I consider to be a tragedy	Experience Confidence
ability to explain complex ideas to others	Experience
trust between colleagues is crucial in healthcare systems	Attitudes
good understanding of organisations e.g., identifying change agents and understanding who has power	Attitudes
work has made me feel refreshed and reinvigorated	Experience
consciously make an effort to get on with colleagues e.g. learning everybody's name	Attitudes
aware of the financial costs of healthcare	Experience
persistent in the face of failure	Attitudes
accept failure as a part of learning	Attitudes
direct and positive communication with senior people in the organisation I have been working in	Experience
the UK is the best country in the world	Attitudes

Table 3: Variables from systematic review and when they were presented t

Variable	Presented
Type of project (Charity, profit making, non-for-profit	To project manager
Professionals involved in project	To project manager
Volunteer recruitment	To project manager
Continuity of visits	To project manager
Number of British professionals in country at each time	To project manager
Logistical organisation	To project manager
Project funding	To project manager
Volunteer/British Professional funding	To project manager
Local funding	To project manager
Volunteer activities	To project manager
Organisational support	To project manager
Preparation	To project manager
Learning objectives	To project manager
Evaluation and reflection	To project manager
Risk Assessments	To project manager

Local needs assessment	To project manager
Who is involved in development of aims, focus, structure of project	To project manager
Relationships with receiving organisation	To project manager
Importance of sustainability, capacity building and service delivery	To project manager
Project name, company and location	Pre-placement questionnaire
Employment immediately before trip	Pre-placement questionnaire
Use of annual leave	Pre-placement questionnaire
Motivation	Pre-placement questionnaire
Support	Pre-placement questionnaire
Comfort working outside of competence or in a high situation	Pre-placement questionnaire
Expectations of impact	Pre-placement questionnaire
Professional knowledge	Pre-placement questionnaire
Length of stay	Post-placement questionnaire
Project engagement	Post-placement questionnaire
Learning host language	Post-placement questionnaire
Utilisation of skills	Post-placement questionnaire
Number of Interactions with patients	Post-placement questionnaire
Conditions experienced	Post-placement questionnaire
Understanding of local context	Post-placement questionnaire
Similarities to UK	Post-placement questionnaire
Transferability of skills to UK	Post-placement questionnaire
Opportunities	Post-placement questionnaire
Local staff	Post-placement questionnaire

Negative consequences	Post-placement questionnaire
Cost of placement	Post-placement questionnaire
Reflection	Post-placement questionnaire
Contact with loved ones	Post-placement questionnaire
Support	Post-placement questionnaire
Number of projects in facility	Post-placement questionnaire
General experience	Post-placement questionnaire
Ability to cope with NHS paperwork upon return	Post-placement questionnaire
Less interest in profession upon return	Post-placement questionnaire
Desire to leave NHS/UK upon return	Post-placement questionnaire
Recognition/Accreditation upon return	Post-placement questionnaire
Employment status upon return	Post-placement questionnaire
Returner schemes upon return	Post-placement questionnaire
Influence on career path upon return	Post-placement questionnaire

Table 4 : results of cognitive interviews

Statement	Comment	Action taken (or reason not)
Frequently/constantly	interchangable	Decision was made on purpose
I exchanged ideas with colleagues from a different culture	Red herring- exchanged	Choose Exchanged, as communicated could mean asking what time the bus arrives, want this to represent meaningful conversation
I feel I've developed a new perspective	Doesn't really make sense pre-placement, need to use more examples to contextualise	Participant used, having some kind of revelation, include this as an example
I anticipated future problems	… and took necessary action	Decided to take participants advice here, and add took necessary action as anticipating them alone is not enough
Skills, limitations and beliefs	too much for one sentence	remove beliefs
I provided excellent high quality care	Excellent and high quality are the same remove excellent	Remove excellent

I am able to find solutions despite limited resources	What if don't have limited resources i.e. in UK	Leave as is, participants won't agree if have adequate resources
I have tried to understand somebody elese POV	I have understood somebody elses POV	Remove tried
I have demonstrated patience and tolerance	Need time marker	Change to -I have frequently demonstrated patience and tolerance
I relied heavily on the basic skills of my profession	Need more examples	Include low tech and inutative
I lost some confidence in my clinical practice	Change to: Sometimes I feel I have forgotten the things I have learnt	Leave as is, participants will know what clinical practice is
I thought about and appreciated	Maybe use just appreciated	change
I think I have developed bad work habits	Remove 'I think' and include some	I have developed some bad work habits
I actively managed risk, including anticipating risk and evaluating environment	Too much- change to I anticipated risk and actively managed it	I anticipated risk and actively managed it (e.g. evaluating environment)
I frequently managed projects		Include e.g. (including one continuous project, or components of a project)
I managed one or more situations that I consider to be a tragedy	Chance to tragic situations	Leave as is
I established communication systems (formal and informal)	What about if they are already established	Changed to established/used
I changed the way I speak so that somebody can understand me	Change to I have adapted my communication to suit to context	Leave as is, too much jargon in suggestion
I frequently had to rely on my non-verbal communication	I frequently relied on my non-verbal communication	Change
I demonstrated that I am highly skilled in challenging conversations and effective communication, even in high pressure situations	I demonstrated that I am skilled in challenging conversations, even in high pressure situations	Removed some to make it more understandable
I dealt with difficult people	Include frequently	I frequently dealt with difficult people
I demonstrated that I am able to manage difficult people	I demonstrated that I am able to manage difficult people effectively	Add in effectively
I taught clinical colleagues	(of any profession at any career stage)	Add in brackets
Perceptions of yourself	Change to About you – and change the other to demographics	Change
When I work clinically I am frequently thinking about basic scientific principles (e.g. physiology, cell biology, biochemistry)	Change e.g's	Physiology, chemistry
I have a good knowledge of how healthcare systems outside of the UK function	I have an awareness of how other healthcare systems (outside of the UK) function	Change- as most people will only know 1 or 2 countries not all

I have a professional network that includes people from around the world	Change to other countries	May not be around the world, just in 1 or 2 countries
I tend to develop a good understanding of how understanding of how organisations can work	Change to I have	Tend to confuses things
I am someone who focuses on solutions not problems	Comments that no-one would answer no to this	Then it would disappear in the psychometrics and statistics so leave
I have an excellent work ethic	Comments to change to conscientious	Will not change means something different
I keep trying when things are difficult	Comments to change to persevere	Yes keep simple
I have an excellent understanding of the roles and responsibilities of all the professional staff I work with	Change to clear	I have a clear understanding of the roles and responsibilities of all the professional staff I work with
I am quick to judge other people	Add admit and sometimes	I admit I am sometimes quick to judge other people
I believe I have the ability to empower patients to help themselves	I am able to empower patients to help themselves, also patients isn't the word midwives use	Remove believe as adds another dimension, keep patients as it is obvious who we mean to that 1 group
I believe I have the ability to empower colleagues to help themselves	I am able empower colleagues to help themselves	Remove believe as adds another dimension
In my work I have demonstrated skills in changing patients behaviour	In encouraging and supporting patients to change behaviour	Change to -In my work I have demonstrated skills in encouraging and supporting patients to change behaviour
Its crucial to consciously make an effort to get on with colleagues	Add' I feel'	No need to add 'I feel' adds another dimension
I demonstrated that I am capable of getting the most out of people	Change to 'best' move to 'in the last month'	Change to - I demonstrated that I am capable of getting the best out of people- move to last month, add enabling into e.g's
Community participation is crucial…	Add I feel	No need to add 'I feel' adds another dimension
Job satisfaction	Use validated single item- Taking everything into consideration, I am satisfied with my job	Reliability and Validity of a Single-Item Measure of Job Satisfaction Christyn L. Dolbier, PhD; Judith A. Webster, MSN; Katherine T. McCalister, EdD; Mark W. Mallon, MS; Mary A. Steinhardt, EdD, LPC an adaptation of the one in the literature that correlates with other larger measures, to suit the current format of an agreement likert scale?
Life satisfaction	Instead use 5 item validated SWLS scale	Ed Diener, Robert A. Emmons, Randy J. Larsen and Sharon Griffin as noted in the 1985 article in the *Journal of Personality Assessment*

I sometimes I felt like an outsider	I sometimes felt like an outsider in my environment	Add in my environment to make it more contextualised, move to culture area rather than life satisfaction as it seems less intrusive
In my ability to manage situations that I consider to be awful, tragic or difficult	Remove awful, too many words	In my ability to manage situations that I consider to be tragic or difficult
In my ability to manage myself	Expand into 2: In my ability to manage myself in a clinical environment In my ability to manage myself in life generally (e.g. time management, managing emotions)	Split into 2
In my ability to adapt and be flexible in work	Would be different for clinical and everything else – pp more confident In ability to be flexible clinically	Separated
In my ability to find solutions despite limited resources	See above comment about 'despite'	Maybe as this is confidence have, ability to find solutions in an environment with limited resources, the above one could literally say, in the last month I have had to find solutions in an environment with limited resources, then we expect low scores pre, and high during and possibly post.
That I can apply my clinical knowledge in any health systems	Change any to another	That I can apply my clinical knowledge in another health system
In my ability to work within an unfamiliar power dynamic	Don't quite understand the question, suggested are you affected by power dynamics	Are you affected would change the question. move to in the last month, have been affected by power dynamics and one about dealing with it appropriately
In my workplace	Remove place	Change to in my work
In my ability to disseminate best practice globally	Globally too big, maybe across a wider context (e.g. to other countries)	Change to disseminate UK best practice to other countries
Career Stage	Louise and John had- experienced, mid etc.	Change to year of registration free text
Nationality	British, European, non-eu (LMIC) non-EU (high income)	Change to free text
Project Name	Make non-madatory and ask to describe in one sentence project- e.g. RCM project in Uganda based in Mulago Hospital	in a sentence describe the title of your project and where it takes place e.g., RCM mentoring project in Mulago Hospital, Uganda. Or Milton Keynes Hospital Trust training project in University of City, Country
I would feel comfortable working in a high risk situations	Comment- Is the risk to the patient or the volunteer	High risk situation is well defined
I agreed with and internationalised lots of the knowledge, skills, behaviours and attitudes of the other staff in the host facility	Too confusing	Simplify sentence

Atleast once I questioned by view of reality	Confusing- changed answer after I explained	Change to at least once I have been aware of my opinions or perspectives changing in a profound way'
Which of the following were correct about local staff: I engaged with them frequently There was frequently a more knowledgeable person than me around We had many share values	Reword- seems like everyone would agree Too Context Specific Said they did but didn't act on it	This is about Vygotskys MKO, could we separate into 2- more clinically knowledgeable, more culturally knowledgeable change to, it was obvious we had many shared values?
Health consequences (animal bites, injuries, illness)	Remove animal bites, gets confused with mosquito bites which most people would get	Remove animal bites
I feel unable to cope with NHS paperwork	Not to do with placement	Doesn't matter? If its not to do with placement, then we will see that it is the same before and after?
I would like to leave the NHS to work overseas	Not all employed by NHS	Change to NHS/UK
Project Managers:		
Which of the following describe the relationship between your organisation and the receiving organisation: We depend on eachother	Weird statement Add in well maintained relationships with local staff and leadership Links with local experts	Remove
Does your project have links with local experts and well maintained relationships with local staff and leadership	Move to earlier Q	Move to earlier Q
What type of preparation do volunteers receive?	Add all Change options to: Contact with previous volunteers Formal training and preparation events in the UK Informal training and preparation events in the UK Formal training and preparation events in host country Informal training and preparation events in country Handbook or written preparation Other	What type of preparation do all volunteers receive? – otherwise one or two might get it Change options

What is the main focus of your project: Service delivery Capacity Building Development Sustainability Training Other	Most would tick all	Change to separate question: How important is sustainability/service delivery/cacapcity building to your project – Very Important • Important • Moderately Important • Slightly Important • Not Important Remove training development and other
Who was involved/consulting during development of aims, focus, structure, project tasks within your project	Remove 'within your project' In example grey area (at some stage) Change health policy makers and management in LMIC to Management in LMIC Local government and policy makers	Change
Do you volunteers take recurring trips?	Change options	Always Very Often Sometimes Rarely Never
In the last year have any volunteers dropped out of your project?	Remove as too context specific could be illness etc	Remove question
Is volunteer learning incorporated into project or assessed?	Comment- Add informal reporting and learning	Do you formally assess volunteer learning or professional or personal development? And then time points
How many volunteers are placed at one time within this project	Add on average	Add on average
How would you describe your organisation?	Change list- does not encompass all, make tick box: • New organisation • Established organisation • Hospital or university link (health partnership) • Commercial/profit making • Not for profit/charity	
Which of the following describe the relationship between your organisation and the receiving organisation? We depend on one another We are especially good at collaboration	Remove depend statement, weird and out of context Change collaboration one to we work well in collaboration	Change

To the best of your knowledge, what income level is the host country?		Remove now as we will code countries
Do restructure of questions so similar are together		Do restructure
Add to post-placement		
Which country was your placement in- free text		Add
What support do your volunteers receive? A local or western expert to provide feedback	Change to Have access to – move to volunteer post Change to: an opportunity to get frequent feedback from a local or western senior colleague	Change to have access to and move to post placement- what support did you have access to? Change
Are you the only project working in the healthcare facility	Was yours the only project working in the healthcare facility	Change and more to post placement
Length of stay		Move length of stay to Post placement
Recurring visits		Move to post placement

Table 5: How participants were recruited through collaborative organisations

Organisation	Method of distribution of questionnaire	Target Group	Number of people that had opportunity to engage
Ambulance Station 1	Attended with paper versions	All groups	15
Conference 1	Handed out paper versions at conference, presented online link at conference, online link sent by contact within organisation	All groups	Up to 400 on mailing list (who may have also attended conference)
Field Hospital 1	Online link sent by contact within organisation	Returned Volunteers	180
Field Hospital 2	Online Link sent by contact within organisation	Returned Volunteers	50
Field Hospital 3	Attended event with paper version	All groups	6

Field Hospitals 4	Online Link sent by contact within organisation	All groupos	80
General Practice 1	Attended with paper versions	All groups	4
Health Partnership 1	Online Link sent by contact within organisation	Current Volunteers	2
Health Partnership 2	Online Link sent by contact within organisation	All groups	6
Health Partnership 3	Online Link sent by contact within organisation, also asked to send to one colleague with no international experience	Returned and no international experience	50
Health Partnership 4	Online Link sent by contact within organisation	Pre Placement	Awaiting Response
Health Partnership 5	Online Link sent by contact within organisation	All groups	6
Health Partnership 6	Online Link sent by contact within organisation	All groups	15
Hospital 1	Online Link sent by contact within organisation	All groups	30
Hospital 2	Attended induction events with paper versions	All groups	85
Individual Influencer 1	Posted link to personal twitter and emailed 7 colleagues	All groups	182 twitter followers 7 colleagues
Online Community of Practice 1	Posted link to Community of Practice Online group	All groups	297 members
Previous Research Participants 1	Link sent by researcher directly to participants	All groups	290
Previous Research Participants 2	Link sent directly to email addresses	All groups	59
Professional Network 1	Link distributed in E bulletin	All groups	374 opened link (sent to 1800)

Professional Network 2	Online Link sent by contact within organisation	All groups	Awaiting response
Recruitment Event 1	Attended event with paper versions	All groups	15
Recruitment Event 2	Attended event with paper versions	All groups	18
Royal College 1	Online Link sent by contact within organisation	Returned Volunteers	70
Royal College 2	Online link sent by one member to a select few relevant individuals Conference attended with paper versions	Returned Volunteers	11
Royal College 3	Online Link sent by contact within organisation	Returned Volunteers	19
Royal College 4	Link sent directly to group members email addresses	All groups	45
Royal College 5	Online Link sent by contact within organisation	All groups	437
Royal College 6	Link posted on global health facebook group	All groups	79 in group
The Royal College 7	Link posted on blog and to twitter	All groups	1000 blog followers, 400 twitter followers
Trust 1	Online Link sent by contact within organisation	Returned Volunteers	43
University Alumni 1	Link posted to Facebook, Twitter and LinkedIn groups	All groups	1000+
University Department 1	Online Link sent by contact within organisation (stated was only for qualified health professionals)	All groups	270

University Department 2	Online Link sent by contact within organisation	No international experience	21
University Department 3	Online Link sent by contact within organisation	No international experience	37
University Department 4	Paper versions handed out at end of lecture	All groups	17
University Department 5	Online Link sent by contact within organisation	All groups	55
University Department 6	Online Link posted on students forum	All groups	500
Volunteer Project 1	Online Link sent by contact within organisation	Current Volunteers	9
Volunteer Project 2	Online Link sent by contact within organisation	All groups	116
Volunteer Project 3	Online Link sent by contact within organisation	Pre placement	5
Volunteer Project 4	Online Link sent by contact within organisation	All groups	4
Volunteer Project 5	Online Link sent by contact within organisation	Returned Volunteers	35

Table 6: Staff Group x International Experience

Staff group	Past international experience	Currently internationally working	No experience - interested	No experience- not interested	Planned future international experience	
Medical and Dental	77	20	10	7	32	146
Nursing and Midwifery	51	2	39	31	13	136
Allied Health Professionals	23	4	12	17	9	65
Healthcare Scientists	6	0	1	5	1	13
Ambulance	2	0	1	10	1	14

Support to clinical staff (HCAs)	0	0	8	22	0	30
NHS infrastructure support	1	0	3	1	0	5
Other scientific, therapeutic & technical	8	0	4	9	5	26
Other	1	0	0	2	0	3

Table 7 – Correlation coefficients between the latent variables. their standard errors and *p*-values. according to the proposed multidimensional item response theory model.

	Estimate	S.E.	*p*-value (two tailed)
LIFE SATISFACTION	WITH		
CONFIDENCE	0.295	0.045	0.000
CULTURAL	WITH		
CONFIDENCE	0.41	0.044	0.000
LIFE SATISFACTION	0.223	0.051	0.000
ADAPTING COMMUNICATION	WITH		
CONFIDENCE	0.12	0.044	0.000
LIFE SATISFACTION	0.223	0.049	0.000
CULTURAL	0.497	0.043	0.000
TEACHING	WITH		
CONFIDENCE	0.662	0.031	0.000
LIFE SATISFACTION	0.208	0.049	0.000
CULTURAL	0.29	0.051	0.000
ADAPTING COMMUNICATION	0.319	0.048	0.000
DIFFICULT COMMUNICATION	WITH		
CONFIDENCE	0.518	0.035	0.000
LIFE SATISFACTION	0.196	0.046	0.000
CULTURAL	0.412	0.045	0.000

	Estimate	S.E.	*p*-value (two tailed)
ADAPTING COMMUNICATION	0.58	0.037	0.000
TEACHING	0.44	0.04	0.000
BEHAVIOUR CHANGE	WITH		
CONFIDENCE	0.638	0.027	0.000
LIFE SATISFACTION	0.289	0.045	0.000
CULTURAL	0.397	0.051	0.000
ADAPTING COMMUNICATION	0.427	0.041	0.000
TEACHING	0.554	0.035	0.000
DIFFICULT COMMUNICATION	0.558	0.035	0.000
MANAGAMENT	WITH		
CONFIDENCE	0.563	0.035	0.000
LIFE SATISFACTION	0.113	0.051	0.025
CULTURAL	0.367	0.051	0.000
ADAPTING COMMUNICATION	0.436	0.043	0.000
TEACHING	0.545	0.036	0.000
DIFFICULT COMMUNICATION	0.54	0.038	0.000
BEHAVIOUR CHANGE	0.364	0.044	0.000
TEAM WORK	WITH		
CONFIDENCE	0.757	0.028	0.000
LIFE SATISFACTION	0.362	0.049	0.000
CULTURAL	0.497	0.047	0.000
ADAPTING COMMUNICATION	0.522	0.043	0.000
TEACHING	0.577	0.037	0.000
DIFFICULT COMMUNICATION	0.653	0.036	0.000
BEHAVIOUR CHANGE	0.658	0.034	0.000
MANAGAMENT	0.696	0.032	0.000
FLEXIBILITY	WITH		
CONFIDENCE	0.571	0.033	0.000
LIFE SATISFACTION	0.198	0.044	0.000

	Estimate	S.E.	*p*-value (two tailed)
CULTURAL	0.492	0.039	0.000
ADAPTING COMMUNICATION	0.475	0.04	0.000
TEACHING	0.423	0.041	0.000
DIFFICULT COMMUNICATION	0.497	0.038	0.000
BEHAVIOUR CHANGE	0.514	0.034	0.000
MANAGAMENT	0.527	0.036	0.000
TEAM WORK	0.705	0.03	0.000