Assessment of the Opening Minds Scale for use with Nursing Students

Abstract

Purpose:

Evaluate validity of the Opening Minds Scale (OMS) for nursing students via Rasch models and confirmatory factor analysis (CFA).

Design and Methods:

Undergraduate nursing student responses to OMS (n=423). Validity was evaluated via CFA and Rasch analysis.

Findings:

CFA results were strongest for a three-factor 13-item version of OMS. Rasch modelling supported sound properties for two of three scales. Internal reliabilities ranged between .6 and .7.

Practice Implications

OMS has potential as a valid measure for stigma research and anti-stigma program evaluation. Rasch analysis suggest it is inappropriate to use a total OMS score for nursing student populations.

Keywords:

Opening Minds Scale,

mental health,

mental health nursing,

stigma,

nursing students

Introduction

The stigma attached to being labelled with mental illness remains a pervasive social problem (Elraz, 2018; Michaels, Lopez, Rusch, & Corrigan, 2012). As illustrated in a review by Henderson and Gronholm (2018), mental health related stigma has far-reaching debilitating effects on: help seeking, education, employment, housing stability and safety, social care, health care access and quality of service.

Valid and reliable measures of stigma are essential to advance research and inform responses to mitigate the impact of this widespread problem. . Such measures enable researchers to estimate the degree of stigma and magnitude of negative beliefs and attitudes; at both local or population level (Angermeyer & Dietrich, 2006; Roskar et al., 2017). Furthermore, measures make it possible to evaluate effectiveness of stigma reduction interventions (Bingham & O'Brien, 2018; Simmons, Jones, & Bradley, 2017). There are diverse initiatives around the world for establishing measures of stigma attached to mental illness and related support programs. These are variously described under different banners such as 'mental health literacy', 'anti-discrimination' (Wei, McGrath, Hayden, & Kutcher, 2015) and 'community education campaigns'. However, development of valid and reliable self-report stigma measures has been variable and lacking proper psychometric evaluation, signalling a great need for quality instruments (Wei et al., 2015).

Opening Minds Scale

The Opening Minds Scale is a promising instrument for measuring stigma towards mental illness stigma and therefore a valuable research tool (Modgill, Patten, Knaak, Kassam, & Szeto, 2014). The OMS was developed in conjunction with a multi-sector Canadian program to challenge mental health stigma (Stuart et al., 2014a, 2014b). A multi-disciplinary group developed items for the OMS and sought input from focus groups with health care providers and people who had been diagnosed with mental illness (Kassam, Papish, Modgill, & Patten, 2012).

The OMS appears to accurately address three facets of mental illness stigma in health care provider settings. The first facet is attitudes of health care providers. The OMS measures whether one's reactions toward people with labelled with mental illness are negative, their experience of compassion in health care delivery; and belief in own capacity as a provider to help. The second facet asks the respondent if they would disclose if they experienced 'a mental illness', and their readiness to attain help. At the early stages of developing the OMS there was concern that it would not capture the critical construct of Social Distancing if too many items were removed (Modgill et al., 2014). This research reverted to the longer 15-item version and found Social Distancing as a separable third factor (Modgill et al., 2014).

The OMS has been evaluated using methods underpinned by Classical Test Theory, most notably, factor analysis (e.g. Chang et al., 2017). The evaluation process was similar to processes for establishing psychometric measures in other domains of healthcare. The broader psychometric field is increasingly including a supplementary yet different approach – called Rasch Analysis (Rasch, 1980). Rasch models are a prominent member of Item Response Theory. In Rasch analysis, response data are evaluated against a formal mathematic model dictating expectations on response behaviour, assuming an underlying unidimensional trait. To our knowledge, Rasch analysis, despite emerging as a critical assessment method in health research (Hagquist, Bruce, & Gustavsson, 2009; Lamoureux, Pallant, Pesudovs, Hassell, & Keeffe, 2006; Medvedev, Turner-Stokes, Ashford, & Siegert, 2018; Prieto, Alonso, & Lamarca, 2003), has not been applied to OMS data. One of the requirements for a Rasch analysis is to confirm the validity of deriving a total OMS score.

The Commune Project

The Co-produced Mental Health Nursing Education (Commune) project represents an international collaboration (Australia, Finland, the Netherlands, Iceland, Norway and Ireland – 2 sites) in the development of nursing curricula that is co-led by Experts by Experience (EbyE) and conventional nursing scholars (Horgan et al., 2018). The purpose of Commune is to enhance and deepen nursing student understanding of the perspective of those labelled

with mental illness and the concept of recovery. Personal contact is a strategy to challenge the stigma attached to mental illness (Corrigan, multiple years; Horgan et al, 2018). A culturally appropriate mental health nursing module was co-produced by nurse academics and EbyEs at each of the participating universities. As part of the evaluation of this initiative, the OMS was administered to students in the first teaching session and at the end of the module. Combining factor analysis and Rasch modelling is emerging as a rigorous approach to measure assessment in the health fields (Lamoureux et al., 2007). Accordingly, both approaches were used to evaluate the OMS.

Aim

The purpose of the current analyses is to utilise the Commune Project integrated database to comprehensively assess validity and reliability of the OMS for the nursing student population.

Method

This analysis is drawn from baseline OMS data from an ongoing research evaluation of multisite EbyE led nurse education curricula (the Commune Project).

Participants and setting

The participants in this research were nursing undergraduate students from universities located in North-Western Europe and Australia. Students at Irish universities were undertaking a four-year specialist degree that leads to qualifications in mental health nursing. The remaining students were undertaking a comprehensive nursing program, preparing them for registration as a nurse without a specific specialist field of practice. Eighty-one per cent of participants (n=423) were female and around 80% were between 18 and 25 years of age. Percentages of the total sample by country were Australia (27.4%), Ireland (15.8%), Norway (27.9%), Finland (16.3%) and the Netherlands (12.5%).

Instrument

The Opening Minds Scale for Health Care Providers (OMS-HP) is a self-report measure of forms of stigma of mental illness (Kassam et al., 2012). The full OMS-HP has 20 statements to be rated on a range of (dis)agreement:*1-strongly agree*, *2-agree*, *3-neither agree nor disagree*, *4-disagree*, *5-strongly disagree*. Three scales have been found for the OMS when data have involved multiple health care provider groups: Social Distance, Attitudes of Health Care Providers and Disclosure/Help-Seeking (Modgill et al., 2014). An example of an item argued to be representative of the Attitudes scale is: "There is little I can do to help people with mental illness". An item considered

for the Social Distance Scale is: "If a colleague with whom I work with told me they had a managed mental illness, I would be as willing to work with him/her". For the Disclosure/Help Seeking Scale, an item includes: "I would be reluctant to seek help if I had a mental illness."

Procedure

Before the co-produced module began, students were informed about the purpose of the research and invited to participate, both verbally and in writing. Those who agreed to participate were given a hardcopy of the OMS to complete.

Research ethics

All aspects of this research program were approved by the relevant University Research Ethics Committees (specific name left out to ensure anonymous review). Potential participants were informed that participation was voluntary and data would be collected and managed in a confidential manner. They were also informed that the research outcomes will be submitted for publication and presented at conferences.

Analysis

To rigorously assess the OMS, two highly regarded analytic approaches to scales were applied – Confirmatory Factor Analysis (CFA) and Rasch Modelling. Following an emerging best practice approach to measure evaluation in health contexts (Pallant et al., 2016), factor analysis is applied first to test multiple factor models, followed by Rasch analysis to further assess unidimensionality.

Descriptive statistics were conducted in SPSS (IBM, 2017), CFA in *MPlus* (Muthén & Muthén, 1998-2006), and Rasch Analysis in RUMM2030 (Andrich, Lyne, Sheridan, & Luo, 2003). There was a very low incidence of missing data. For any one item, the highest number of cases of missing data was four (less than 1%), for item 4.

Confirmatory Factor Analysis

Confirmatory Factor Models were evaluated in line with several of the criteria outlined in Byrne (2012). Model fit was taken as p-values over .05 for χ^2, the Root Mean Square Error of Approximation (RMSEA) with a 90% confidence interval was considered, and over .95 for the Tucker Lewis Index (TLI) and Confirmatory Fit Index (CFI).

For CFA, a significant change in the chi-square statistic was used to compare models (Byrne, 2012). For the model that demonstrated best relative fit, refinements were then considered, based equally on item content (i.e. face validity), and cross-loading for each item based on Expected Parameter Change indices.

Rasch Analysis

As stated by Tennant and Conaghan (2007): "The model assumes that the probability of a given respondent affirming an item is a logistic function of the relative distance between the item location and the respondent location on a linear scale." (pp. 1358-1359). As the OMS response format is polytomous, use of the Partial Credit Model variation of the Rating Scale Model in RUMM2030 is appropriate (Tennant & Conaghan, 2007).

Rasch analytics involve parameter estimation for items and separately for persons; there are model fit statistics for each (Andrich et al., 2003). Overall fit was based on the chi-square that is not statistically significant as well as residual standard deviations under 1.4 for items and persons (Pallant, Haines, Hildingsson, Cross, & Rubertsson, 2014). For the chi-square test, the cut-off value of .05 was Bonferroni corrected to take into account frequency of items; for instance, an alpha of .0125 for 4 items. Local fit indices for individual items were taken to be deviations within and including ±2.5 (Pallant et al., 2014).

Ordering of categories was checked via the 'threshold maps' in RUMM2030. In the event of disordered thresholds, items may be rescored and the renewed categories analysed. Also, just as for factor analysis, item removal may be required in order to come to a unidimensional scale.

Reliability

Internal consistency was estimated based on Cronbach's alpha (Cronbach, 1951), consistent with previous assessments of the OMS (Modgill et al., 2014). Rasch Analysis provides a parallel measure of reliability, called the Person Separation Index (PSI). Cronbach's alpha was computed in SPSS and the PSI in RUMM2030.

Results

The polychoric correlation matrix for all 20 OMS items is presented in Supplementary Material 1. Descriptive statistics for individual items of the OMS are reported elsewhere (author details removed to permit anonymous review).

Confirmatory Factor Analysis

Table 1 presents the CFA findings for models ranging from one factor to four factors. The three-factor version specified the structure of items reported by

Modgill et al. (2014). The χ^2 difference test suggested the three-factor model was a better fit than the one factor model. The CFI results for the three-factor model, especially the modification indices, suggested that items 6 and 18 were cross-loading. These were subsequently removed, one at a time, after considering changes to model fit at each step.

[Table 1 about here]

Figure 1 shows the final three-factor model, including standardized factor loadings. Standardized loadings ranged from .44 to .71. The negative covariance between Social Distance and the other two factor reflects how higher scores for the items reflected lower social distancing. The highest between-factor correlation was between Social Distance and Negative Attitude, with a coefficient of .76. The Cronbach alpha was .65 for Negative Attitudes and .71 for Social Distancing.

[Figure 1 about here]

Rasch Modelling

Rasch analytics were applied to the 13 items remaining after the CFAs. Table 2 presents the Rasch findings. Disordered thresholds were apparent for each of the sets of items. Combining response categories (rescoring) of all of these items resulted in ordered thresholds. Overall fit was observed for two of the

three scales: Social Distance and Disclosure/Help-seeking. Although the Negative Attitude items did not demonstrate overall fit on the chi-square value, it did for items and persons. The most consistent results for model fit and unidimensionality was for the Social Distance scale. PSIs were low, ranging from .51 to .69.

[Table 2 about here]

Discussion

The overall finding is that on the basis of CFA and Rasch analysis, the OMS has some encouraging psychometric features. This is important to note as the OMS is increasingly been considered for anti-stigma intervention evaluations where stigma is often thought to be multi-faceted (Modgill et al., 2014). Our final version of the OMS retains 13 of the 15-item version that is proposed by the most prominent analysis of OMS in the literature, which was based on pooled baseline data from several anti-stigma program evaluations in Canada, summing to 1,305 participants (Modgill et al., 2014). In terms of inclusion of items, the Social Distance subscale items remained unchanged. Item 4 was removed from the Disclosure/Help Seeking Scale. Although the current scales had slightly different set of items, the range of internal reliabilities were in a similar range as found previously for the nursing sub-group of 102, reported in Modgill et al. (2014): between .6 to .8.

Previous evaluation of OMS has relied on CFA (Chang et al., 2017; van der Maas et al., 2018). A key contribution of this paper is the introduction of the Rasch analysis to assessment of the OMS. Rasch analytics are proven an important supplement to CFA at both item level, in terms of reliability, and in deliberating when it is appropriate to engage in overall scoring. There were items accorded to the three OMS scales that demonstrated disordered thresholds (6 in all).

The most significant implications of this research is that applying an overall OMS score is not likely to be a valid or appropriate measure. Briefly put, the Rasch findings do not support the notion of OMS data as a global estimate of stigma. Thus far, it is a common practice to use a total score on the OMS, for example, to estimate the efficacy of anti-stigma interventions (e.g. Beaulieu et al., 2017). The current findings, however, suggest it may be inappropriate as the overall set of items clearly do not form a unidimensional scale. We exhort researchers to rethink applying the overall OMS or, at a minimum, at least first determine if it is unidimensional. Rasch analysis is valuable in this regard. Those strictly in need for a single score for their anti-stigma evaluation, should also consider whether alternatives to the OMS offer such purpose. One of the advantages of Rasch is to convert a set of ordinal scores for a scale into a linear metric appropriate for popular pre-post analysis (Tennant & Conaghan, 2007), such as for anti-stigma educational evaluation. As there was fairly supportive evidence for unidimensionality for the Social Distancing and Disclosure sub-scales of the OMS, conversion tables are now available

(see Supplementary Material 2). These tables may be used to convert total subscale scores to a Rasch score between 0 and 100.

The aforementioned recommendations are qualified by the fact that the current research was on university nursing students, whereas the main 'target' of the OMS are current health care providers. Despite this, if there is already data on the OMS that has been acquired (Modgill et al., 2014; van der Maas et al., 2018), this data can conceivably be Rasch analysed. Therefore, further research must focus on larger samples needed for psychometric analysis, and also involve returning to already available data and applying Rasch as a form of expanded post-hoc analysis.

This report is based on a research project that is likely to be the most international one yet on the OMS – spanning five countries. This aspect is important to highlight as apart from USA, Australia and the UK, there have been very low relative frequencies of locations for health literacy research (Wei et al., 2015). However, a limitation of our international combined analysis is that there was not an adequate sample size and evenness of numbers within each sub-group (e.g. country) to assess item bias (Differential Item Functioning). Further international research is needed to provide the scale of data needed for a more comprehensive evaluation of the OMS.

Conclusion

The current findings suggest the Opening Minds Scale could be further considered in mental stigma research, with particular focus on its dimensionality and reliability. For more robust evaluations of the measures used in anti-stigma programs, analysts are encouraged to apply CFA in conjunction with Rasch Analysis, rather than CFA on its own. The combination of these methods can verify whether it is valid to derive a total score on the OMS and subsequently base evaluations on changes on such scores.

Figure caption

Figure 1 - Structure of Three-Factor Model of Opening Minds Scale

Table captions

Table 1. Summary of Confirmatory Factor Analysis

Table 2. Summary of Rasch Analyses of the Opening Minds Scale

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Table 1. Summary of Confirmatory Factor Analysis

	Df	X^2	RMSEA (90% Confidence Interval)	CFI	TLI	WRMR
1 Factor, 15 items	90	572.68	.11 (.10, .12)	.79	.75	1.70
3 Factor, 15 items *Modgill et al., 2014*	87	288.30	.07 (.07, .08)	.91	.89	1.17
3 Factor items 18 & 6 removed	62	167.08	.06 (.05, .07)	.95	.93	.98

Table 2. Summary of Rasch Analyses of the Opening Minds Scale

	First model	Changes	Final Model	PSI	Uni-dimensionality test (t-test)
Social Distance *Items: 3, 8, 9, 17, 19*	Disordered: 3, 9, 17	Rescored: 3, 9	χ^2 (30)=41.06, p=.086 Item fit residual SD: 0.52 Person fit residual SD: 1.05	.69	4.02%
Disclosure & Help seeking *Items: 4, 7, 10*	Disordered: 7	Rescored: 7	χ^2 (12)=12.42, p=.412 Item fit residual SD: 1.62 Person fit residual SD: 1.25	.50	Not tested due to low number of items
Attitudes: *Items: 1, 12, 13, 14, 20*	Disordered: 12, 20	Rescored: 12, 20	χ^2 (30)=54.47, p=.004 Item fit residual SD: 1.21 Person fit residual SD: 1.05	.61	Not tested due to low number of items

Figure 1. Structure of Three-Factor Model of Opening Minds Scale