

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

**Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across
Scottish and Australian adults living with severe and enduring mental illness**

IN PRESS AT *STIGMA AND HEALTH*

Simon C. Hunter^{1,2}, Chris Groot³, Imogen Rehm^{3,4}, Jo Finlay⁵, Derek Ewens⁶, Iwo Paszula¹,
Lee Knifton^{5,7}, Pamela Jenkins⁵, Karen Lally⁸, Julie Cameron⁵, Wendy Halliday⁸, Bridey
Rudd⁵, Beth Hobern³, Cal Andrews³, & Michelle Blanchard³.

¹Department of Psychology, Glasgow Caledonian University, Glasgow, UK.

²Graduate School of Education, The University of Western Australia, WA, Australia.

³Melbourne School of Psychological Sciences, University of Melbourne, Melbourne,
Australia.

⁴Institute of Health and Sport, Victoria University, Melbourne, Australia.

⁵Mental Health Foundation (Scotland), Glasgow, UK.

⁶The Lines Between, Edinburgh, UK.

⁷Management Science, University of Strathclyde, Glasgow, UK.

⁸See Me, Glasgow, UK.

Page count: 13, including cover pages; 11 excluding cover pages.

Number of tables: Two.

Number of references: 17.

Author note:

Correspondence concerning this article should be addressed to Prof Simon C. Hunter,
Department of Psychology, Glasgow Caledonian University, Glasgow, UK. Email:

simon.hunter@gcu.ac.uk

Simon C. Hunter ORCID: <https://orcid.org/0000-0002-3922-1252>

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

Chris Groot ORCID: <https://orcid.org/0000-0001-8445-4760>

Imogen Rehm ORCID: <https://orcid.org/0000-0002-0053-2272>

Lee Knifton ORCID: <https://orcid.org/0000-0002-2227-7305>

Beth Holburn ORCID: <https://orcid.org/0000-0001-8998-4330>

Bridey Rudd ORCID: <https://orcid.org/0000-0003-4245-6578>

Positionality statement: Our identities and experiences can influence our approach to science (Roberts et al., 2020). With respect to gender, six authors self-identified as men and nine as women. With respect to race, all authors self-identified as white with national identities including Scottish, British, Irish, Polish, and Australian. Our team included authors with lived experience relating to mental illness.

Declarations

Funding: The Scottish Mental Illness Stigma study was funded by See Me. The Our Turn to Speak survey was funded by the Paul Ramsay Foundation.

Ethics approval: The School of Health & Life Sciences Research Ethics Committee at Glasgow Caledonian University granted permission to conduct this research in Scotland (approval code HLS/PSWAHS/21/009). The University of Melbourne Human Research Ethics Committee granted permission to conduct this research in Australia (Ethics ID: 13332).

Consent to participate: Informed consent to participate was obtained from all participants.

Availability of data and material: The data sets used in this paper are available on request from SCH and CG.

Author contributions: Study conception and design: SCH, CG, IR, JF, DE, LK, PJ, KL, JC, WH, MB, CA, BH; data collection: CG, IR, JF, DE; MB, CA, BH; analysis and interpretation

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

of results: SCH, CG, IR, JF, BR; draft manuscript preparation: SCH, CG, IR. All authors reviewed the results and approved the final version of the manuscript.

Acknowledgements: We thank everyone who was involved in the working groups associated with these projects (In Scotland, the Research Advisory Group and the Lived Experience Advisory Group; in Australia, the National Stigma Report Card Steering Committee and Our Turn to Speak Expert Reference Group), without whom the research would not have been delivered to such a high standard. The Australian research team would also like to acknowledge the support of SANE Australia and its Anne Deveson Research Centre.

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness

Abstract

People living with severe and enduring mental illnesses experience stigma and discrimination from multiple sources in society. Internalisation of negative cultural messages about one's experience of mental illness can lead to negative outcomes such as reduced self-esteem and help-seeking behaviors. Understanding whether these experiences differ across countries is important as efforts to tackle stigma are taking place internationally. This study estimates the measurement invariance of an adapted short form of a commonly used measure of internalised stigma, namely the Self-Stigma of Mental Illness Scale – Short Form (SSMIF-SF; Corrigan et al., 2012), across Scotland and Australia. Data were collected, using two cross-sectional surveys, from adults living with severe, complex, and/or enduring mental health issue(s) in Scotland (N=346; Mean_{age} = 39.80, S.D._{age} = 13.74) and Australia (N=1912; Mean_{age} = 39.21, S.D._{age} = 12.82). Confirmatory factor analyses led to the Harm to Self-esteem factor being removed from the SSMIF-SF. However, the resulting three-factor scale did not demonstrate measurement invariance across Scotland and Australia, raising questions about its use as a tool with which to conduct international comparisons.

Clinical Impact Statement: People living with severe and enduring mental illnesses experience stigma and discrimination. Understanding whether these experiences differ across countries is important as efforts to tackle stigma are taking place internationally. This study reports on whether a commonly used measure of self-stigma produces scores that can be directly compared across Scotland and Australia. Using survey data, we show that the “Harm to Self-esteem” factor should not be considered a component of the most commonly used

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

measure of self-stigma. Furthermore, we find that the resulting three-factor scale does not evidence comparable scores across samples from Scotland and Australia, raising questions about its use as a tool to conduct international comparisons.

Keywords: Mental illness; Mental health; Stigma; Discrimination; Measurement invariance.

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness

Worldwide, people who live with mental illness experience stigma and discrimination related to a broad range of their life experiences (Morgan et al., 2021). Stigma involves devaluing a personal characteristic so that a ‘normative’ identity is made to seem ‘abnormal’ or ‘deviant’ (Goffman, 2009). This may include, for example, beliefs that a person with a mental illness is dangerous, unpredictable, and weak (Gaebel et al., 2017). This is a particular problem for adults living with complex mental illnesses with low prevalence rates such as schizophrenia, bipolar disorder, and personality disorders (Morgan et al., 2021). When people living with mental illnesses are aware of stigmatising attitudes, evidence indicates that these can be internalised and that it reduces the likelihood that they will seek and/or maintain support for their illness (Corrigan et al., 2006, 2012). Understanding whether the effects of stigma and discrimination differ across countries is important as efforts to tackle stigma are occurring internationally (see Gaebel et al., 2017).

In this context, this study estimates the measurement invariance of the short form of a commonly used measure of stigma, namely the Self-Stigma of Mental Illness Scale – Short Form (SSMIF-SF; Corrigan et al., 2012) using data collected in Scotland and Australia. Both these countries have attempted to tackle stigma relating to mental illness (e.g., Szeto & Dobson, 2010) and both are English-speaking with comparable mental health systems and policies, reflecting their shared historical-cultural ties as Commonwealth countries. As national surveys of mental illness stigma and discrimination using shared methodologies had recently occurred in both countries (Ewens et al., 2022; Groot et al., 2020), and included administration of the SSMIF-SF, the current study presented a unique opportunity to examine its measurement invariance.

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

The SSMIS-SF (Corrigan et al., 2012) contains 20 items and assesses 1) awareness of negative public stereotypes; 2) agreement with these negative beliefs; 3) application of stereotypes to the self; and 4) harm to self-esteem. Good internal reliability, discriminant validity, and convergent validity have been documented (e.g. Corrigan et al., 2012; Maunder & White, 2022). However, the scale has been subject to neither exploratory nor confirmatory factor analysis and measurement invariance using international comparison data has not yet been established. These are important considerations if meaningful comparisons are to be drawn across countries (Cheung & Rensvold, 2002).

The current study sought to document the factor structure of the SSMIS-SF using confirmatory factor analysis to investigate whether the SSMIS-SF demonstrates measurement invariance across Scottish and Australian adults living with severe and enduring mental illness.

Method

Participants

In Scotland, 346 adults living with severe, complex, and/or enduring mental health issue(s) participated ($N_{\text{female}} = 201$, $N_{\text{male}} = 95$, $N_{\text{non-binary}} = 24$, $N_{\text{other}} = 26$). Of these, 328 reported their age, and this ranged from 18-83 years old (Mean = 39.80, S.D. = 13.74). In Australia, 1,912 adults living with severe, complex, and/or enduring mental health issue(s) participated ($N_{\text{female}} = 1,508$, $N_{\text{male}} = 344$, $N_{\text{non-binary}} = 93$, $N_{\text{other}} = 26$). These respondents were aged 18-86 years old ($M = 39.21$, S.D. = 12.82). In both countries, respondents were required to have experienced stigma and discrimination because of those mental health issues in the preceding 12 months.

Measures

The Self-Stigma of Mental Illness Scale – Short Form (SSMIS-SF)

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

The SSMIS-SF (Corrigan et al., 2012) has four factors and five items per factor: Stereotype Awareness (e.g., “I think the public believe that... Most people with mental illness are unpredictable”); Stereotype Agreement (e.g., “I think that... Most people with mental illness are unpredictable”); Stereotype Application (e.g., “Because I experience mental health issues... I am unpredictable”); and Harm to Self-esteem (e.g., “I currently respect myself less because... I am unpredictable”). In the Scottish Mental Illness Stigma Survey (Scotland), the term “mental illness” was used in the opening text and in all items of the SSMIS-SF measure. However, project development for the National Stigma Report Card (Australia), involving people with lived experience of mental illness, indicated a preference for the term “mental health issues” in place of “mental illness” in the preamble to each subscale, although “mental illness” was retained for individual items. For example, the preamble to the Stereotype Agreement section read: “*Next, we would like to know what you think about people living with mental health issues*” (as opposed to “mental illnesses”). Responses were recorded using a 6-point Likert scale (0 = “Strongly disagree”, 1 = “Disagree”, 2 = “Slightly disagree”, 3 = “Slightly agree”, 4 = “Agree”, 5 = “Strongly agree”).

The SSMIS-SF was completed, in both countries, as part of larger pieces of data collection. In Scotland, the Scottish Mental Illness Stigma Survey (SMISS; Ewens et al., 2022) defined stigma as “*The negative attitudes or beliefs based on a preconception, misunderstanding or fear of mental health and/or mental health problems*” and in Australia, the National Stigma Report Card (NSRC; Groot et al., 2020) defined it as “*The negative attitudes and emotions that some people can have about mental health issues.*” Discrimination was defined in SMISS as “*When a person performs an action, whether intentional or unintentional, that creates barriers and inequality for people with lived experience of mental health problems*” and in the NSRC as “*Being subjected to unfair treatment because of the*

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

negative attitudes and emotions that some people have about mental health issues.”

Participants in both countries were asked about the frequency of stigma and discrimination across 14 life domains (e.g., employment, mental healthcare services, relationships with friends and family, mass media, etc.) (for more details see: Ewens et al., 2022; Groot et al., 2020).

Procedure

Ethical approval for SMISS was gained from Glasgow Caledonian University and ethical approval for the NSRC from the University of Melbourne. Scottish responses were collected between 26th November 2021 and 7th March 2022 and Australian responses between 25th October 2019 and 6th April 2020. In both territories, recruitment was achieved using a mixture of targeted advertising (e.g., third-sector partners sharing adverts directly with members and/or sharing on social media) and general advertising (e.g., advertising in local or national media).

Data Analysis

A set of confirmatory factor analyses (CFA) were conducted in Mplus Version 7.31 (Muthén & Muthén, 2008) with a combined sample in order to establish a satisfactory baseline model. The WLSMV estimator was used to account for the ordinal nature of indicators. The following indices of fit were used to evaluate each CFA: (i) the Root Mean Square Error of Approximation (RMSEA) and its 90% confidence interval (CI), where a value of less than 0.05 is viewed as ‘good’, up to 1.00 is ‘mediocre’, and above 1.00 is ‘poor’ (Byrne, 2016); (ii) the Comparative Fit Index (CFI), where scores over .90 are considered ‘good’ and those over .95 are considered ‘excellent’ (Byrne, 2016); (iii) the Weighted Root Mean Square Residual (WRMR), where a score below 1.0 can be taken to reflect a good fitting model (Yu, 2002, cited in DiStefano et al., 2017).

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

Upon identifying a good fitting model, configural, metric, and scalar models were estimated using Mplus Version 7.31. The configural model included the same factor structure and factor loadings in both Scotland and Australia; the metric model additionally held factor loadings equal across countries; finally, the scalar model added equal intercepts/thresholds. To support invariance, the difference in the CFI, when progressing to one model from the preceding model, should be less than 0.01, and the change in the RMSEA should be below 0.015 (Cheung & Rensvold, 2002). The RMSEA point estimate of the preceding model should be included in the 90% CIs of the new model. Chi-square tests were not reported as they are sensitive to sample size (Cheung & Rensvold, 2002).

Results

The original SSMIS-SF did not demonstrate a good fit to the data (see Table 1). To resolve this, the model was estimated without the Harm to Self-esteem factor on the basis that it lacks face validity as it does not appear to assess self-stigma per se; rather, it assesses an outcome of experiencing self-stigma. The revised model demonstrated good fit (see Table 1).

Invariance testing indicated that the three-factor model (the original SSMIS-SF minus the Harm to self-esteem factor) did not demonstrate invariance across the Scottish and Australian samples recruited here (see Table 2). The final model's three factors demonstrated good internal reliability when tested using the combined sample: $\alpha_{\text{StereotypeAwareness}} = .87$, $\alpha_{\text{StereotypeAgreement}} = .84$, and $\alpha_{\text{StereotypeApplication}} = .69$.

Insert Tables 1 and 2 about here

Discussion

There is a need to confirm the factor structure of the SSMIS-SF and to investigate whether the SSMIS-SF demonstrates international measurement invariance. Using data from Scottish and Australian adults living with severe and enduring mental illness, this study

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

suggested that the Harm to Self-esteem factor may not be an appropriate inclusion in the SSMIS-SF. Additionally, the remaining three-factor version of the SSMIS-SF does not demonstrate measurement invariance across Scotland and Australia, raising questions over its use when seeking to make international comparisons across at least these two countries.

Future research, strengths, and limitations

The invariance of the SSMIS-SF ought to be assessed in more countries to support a breadth of international comparisons. It is important to note that our results do **not** invalidate the importance of the Harm to Self-esteem factor in the SSMIS-SF; rather, we argue that it reflects a concept which is separate from those assessed in the rest of the SSMIS-SF and that it deserves development and validation work specific to itself.

The surveys reported here had many strengths, including the extensive involvement of people with lived experience in their development and collection of data from large samples of hard-to-reach populations across two countries. One limitation is the somewhat differing definitions used for stigma and discrimination, though the fact that invariance was still displayed argues for these differences being functionally irrelevant. A second limitation may be the use of samples which vary in size, and future research may usefully collect samples of more comparable sizes. Although not specifically a limitation of our research, it is also worthy of note that the concept of measurement invariance is not without its detractors and that a lack of invariance may not be fatal to cross-cultural work (Welzel et al., 2023).

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

References

- Byrne, B. M. (2016). *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Routledge, Taylor & Francis Group.
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*(2), 233-255.
https://doi.org/10.1207/S15328007SEM0902_5
- Corrigan, P. W., Michaels, P. J., Vega, E., Gause, M., Watson, A. C., & Rüsçh, N. (2012). Self-stigma of mental illness scale—short form: Reliability and validity. *Psychiatry Research*, *199*(1), 65–69. <https://doi.org/10.1016/j.psychres.2012.04.009>
- Corrigan, P. W., Watson, A. C., & Barr, L. (2006). The Self–Stigma of mental illness: Implications for self–esteem and self-efficacy. *Journal of Social and Clinical Psychology*, *25*(8), 875–884. <https://doi.org/10.1521/jscp.2006.25.8.875>
- Corrigan, P. W., Watson, A. C., Heyrman, M. L., Warpinski, A., Gracia, G., Slopen, N., & Hall, L. L. (2005). Structural stigma in state legislation. *Psychiatric Services*, *56*(5), 557–563. <https://doi.org/10.1176/appi.ps.56.5.557>
- DiStefano, C., Liu, J., Jiang, N., & Shi, D. (2018). Examination of the weighted root mean square residual: Evidence for trustworthiness?. *Structural Equation Modeling: A Multidisciplinary Journal*, *25*(3), 453-466.
<https://doi.org/10.1080/10705511.2017.1390394>
- Ewens, D., Finlay, J., Hunter, S. C., Simpson, L., Graham, A., Sharp, A., Allan, K., Christie, I., & Jenkins, P. (2022). *The Scottish Mental Illness Stigma Study: Final report*. The Mental Health Foundation and See Me.
- Gaebel, W., Rössler, W., & Sartorius, N. (Eds.). (2017). *The stigma of mental illness - end of the story?* Springer International Publishing.

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

Goffman, E. (2009). *Stigma: Notes on the management of spoiled identity*. Simon and Schuster.

Groot, C., Rehm, I., Andrews, C., Hobern, B., Morgan, R., Green, H., Sweeney, L., &

Blanchard, M. (2020). *Report on Findings from the Our Turn to Speak Survey: Understanding the impact of stigma and discrimination on people living with complex mental health issues*. Anne Deveson Research Centre, SANE Australia.

Mauder, R. D., & White, F. A. (2022). The relationship between contact with peers and self-stigma in people with mental illness. *Counselling Psychology Quarterly*, 35(4), 880-896. <https://doi.org/10.1080/09515070.2021.1970514>

Morgan, A. J., Wright, J., & Reavley, N. J. (2021). Review of Australian initiatives to reduce stigma towards people with complex mental illness: What exists and what works? *International Journal of Mental Health Systems*, 15(1), 10. <https://doi.org/10.1186/s13033-020-00423-1>

Muthén, L. K., & Muthén, B. O. (2008). *Mplus User's Guide* (7th ed). Muthén & Muthén.

Szeto, A. C., & Dobson, K. S. (2010). Reducing the stigma of mental disorders at work: a review of current workplace anti-stigma intervention programs. *Applied and Preventive Psychology*, 14(1-4), 41-56. <https://doi.org/10.1016/j.appsy.2011.11.002>

Welzel, C., Brunkert, L., Kruse, S., & Inglehart, R. F. (2023). Non-invariance? An overstated problem with misconceived causes. *Sociological Methods and Research*, 52(3), 1368-1400. <https://doi.org/10.1177/004912412199>

Yu, C.-Y., & Muthen, B. (2002). *Evaluation of model fit indices for latent variable models with categorical and continuous outcomes*. In annual meeting of the American Educational Research Association, New Orleans, LA.

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

Table 1

Results of Confirmatory Factor Analyses

	CFI	RMSEA (90%CI)	WRMR
SSMIS-SF	0.864	0.125 (0.122,0.127)	4.569
SSMIS-SF, minus Harm to Self-esteem	0.959	0.071 (0.067,0.075)	2.265

NB. SSMIS-SF: Self-Stigma of Mental Illness Scale – Short Form (Corrigan et al., 2006); CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval; WRMR = Weighted Root Mean Square Residual.

This is the author accepted manuscript of: Hunter, S., Groot, C., Rehm, I., Findlay, J., & Knifton, L. (in press). Measurement invariance of the Self-Stigma of Mental Illness Scale (Short Form) across Scottish and Australian adults living with severe and enduring mental illness. *Stigma and Health*.

Table 2

Results of Invariance Testing

	CFI	Change in CFI	RMSEA (90%CI)	Change in RMSEA	Is preceding model's RMSEA point estimate within model's 90%CI?	WRMR
<i>SSMIS-SF, minus Harm to Self-Esteem.</i>						
Model 1 (Configural)	0.948	0.012	0.079 (0.076,0.083)	0.008	No	2.659
Model 2 (Metric)	0.938	0.004	0.084 (0.080,0.088)	0.005	No	2.914
Model 3 (Scalar)	0.927	0.005	0.080 (0.076,0.083)	0.004	No	3.228

NB. SSMIS-SF: Self-Stigma of Mental Illness Scale – Short Form (Corrigan et al., 2006); CFI = comparative fit index; RMSEA = root-mean-square error of approximation; CI = confidence interval; WRMR = Weighted Root Mean Square Residual.