Expert Validation of the C-A-RE Module Using Many-Facet Rasch Analysis for Sandwich Generation Workers

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Abstract. This study examined the psychometric quality of expert ratings of the C-A-RE module, a programme designed to reduce stress and enhance career adaptability and resilience among sandwich generation workers in public universities who manage caregiving responsibilities for ageing parents and dependent children alongside their professional duties. Eight experts participated, including five lecturers in counselling and psychology and three experienced counsellors. They evaluated six key items focusing on content relevance, feasibility and potential impact. Analysis using the Many-Facet Rasch Model indicated strong psychometric properties, with the variance explained by Rasch measures reaching 52.06 percent and an observed exact agreement of 75 percent, closely matching the expected 76.1 percent. Reliability indices showed moderate to high consistency, with values between 0.60 and 0.65 for raters and between 0.68 and 0.82 for items. The chi square of the fixed model for items ($X^2 = 6.6$, df = 5, p = 0.25) confirmed a good model fit. Item level analysis revealed particularly strong performance in stress, career adaptability and career resilience dimensions, with high point measure correlations of 0.92, 0.88 and 0.92 respectively, and an exact agreement of 80 percent in each case. Agreement on alignment with target group needs reached 77.5 percent, while time allocation received lower agreement at 57.5 percent. Overall, experts provided positive assessments, with an average rating of 4.67 out of 5. The findings provide encouraging initial evidence of the module's psychometric quality in expert appraisal and identify time allocation as an area requiring refinement before broader implementation and further evaluation.

Keywords: Keywords: Expert evaluation, module development, Many-Facet Rasch Measurement (MFRM), psychometric quality, C-A-RE module.

1 Introduction

The sandwich generation refers to individuals who simultaneously provide continuing care for dependent children and ageing parents while maintaining paid employment,

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placing them at the intersection of overlapping family and work responsibilities [1]-[3]. Super's lifespan, life-space theory provides a useful lens for understanding this situation because it conceptualises career development as occurring across the life span and within multiple life roles. The life-span dimension emphasises that career development is dynamic: individuals continually adapt their work-related priorities, decisions, and resources as they move through changing life stages. The life-space dimension emphasises that people enact several roles at the same time, including worker, parent, child, spouse, homemaker, and citizen, across social settings such as the workplace, family, and community [4]-[5].

For sandwich generation workers, the worker role must be negotiated alongside intensified parent and child roles, because they often care for both children and ageing parents. When caregiving demands increase without corresponding adjustments in occupational expectations, role conflict, role overload, and depleted personal resources may arise. These pressures can affect stress, career decision-making, adaptability, resilience, and sustained work participation [4]-[5]. Accordingly, Super's perspective is relevant to the present study because the C-A-RE module is designed to support workers in managing the interaction between their caregiving roles and career-related responsibilities, rather than treating work stress or career development as isolated domains.The sandwich generation refers to individuals who provide ongoing care for both dependent children and aging parents while simultaneously maintaining paid employment, placing them "in the middle" of overlapping family and work demands.

In the Malaysian higher education context, public university support staff who belong to the sandwich generation must navigate these simultaneous roles while also fulfilling critical administrative, technical, and service functions tied to national and institutional agendas, rendering them particularly vulnerable to chronic strain, work family conflict, and reduced productivity [6]-[7]. Despite these challenges, there remains a notable lack of structured, evidence based, and psychometrically validated interventions that are specifically designed for sandwich generation workers in this setting and that explicitly integrate stress, career adaptability, and career resilience within a single coherent programme. Existing caregiver and workplace interventions tend to prioritise general stress management or broad well-being and seldom embed career development constructs in a way that recognises the complex configuration of life roles described by Supers framework.

To address this gap, the C-A-RE module was developed as a comprehensive intervention focusing on stress reduction, enhancement of career adaptability, and strengthening of career resilience among sandwich generation workers in higher education. The module is theoretically grounded in Stress Appraisal and Coping Theory, which explains how individuals evaluate and respond to stressors [8]; Career Construction Theory, which emphasises meaning making and adaptability in career development [9]; Career Motivation Theory, which focuses on career related motives, competencies, and values [10]; the Career Resilience Framework, which conceptualises sustained effectiveness under changing conditions [11]; and Supers life span life space

perspective, which highlights the interplay of multiple life roles over time [4]-[5]. Collectively, these frameworks support a holistic view of sandwich generation workers as individuals whose work, family, and caregiving roles are deeply intertwined, and for whom career focused interventions must simultaneously address stress, adaptability, and resilience in order to be effective.

Accordingly, the present study examines the psychometric quality of expert ratings of the C-A-RE module using Many-Facet Rasch Measurement (MFRM). Specifically, the study investigates item functioning, variation in expert severity or leniency, and rating-scale performance in order to generate initial expert-based evidence to guide module refinement before broader implementation among Malaysian public university support staff who are members of the sandwich generation.

2 Methods

2.1 Design

This study employed a cross-sectional expert-evaluation design to examine expert judgments of the C-A-RE module for sandwich generation workers in Malaysian public universities. Expert ratings were analysed using Many-Facet Rasch Measurement (MFRM) to obtain rater-adjusted estimates of item endorsement and to evaluate rater severity, leniency, and rating-scale functioning. This design enabled the simultaneous consideration of items, raters, and scale categories as distinct facets and generated initial psychometric evidence to inform module refinement prior to implementation [12]-[13].

2.2 Module Description

The C-A-RE module is a structured, theory driven intervention developed to support sandwich generation workers in managing stress and sustaining their careers in higher education settings [4]-[5],[8]-[11]. It is organised into three core domains: stress management, career adaptability, and career resilience. The stress component focuses on helping participants understand stressors associated with dual caregiving and work, appraise their stress responses, and apply adaptive coping strategies [8]. The career adaptability component emphasises decision making, career exploration, planning, and problem solving, supporting participants in managing current role demands while preparing for future career transitions [4]-[5],[9]. The career resilience component targets self-empowerment, meaning making, value clarification, and the development of personal resources to remain effective under ongoing pressure [10]-[11]. The module is intended for delivery in workshop or programme formats for university support staff who are sandwich generation workers, using structured activities, reflective exercises, and guided discussions tailored to their caregiving and work contexts.

2.3 Expert Panel

Content validation was conducted by a purposive sample of eight external experts with advanced training in counselling, psychology, and intervention or module development [14]. All experts had between 7 and 22 years of relevant professional experience. The panel represented a balance of academic and practice-based perspectives, including senior lecturers and associate professors in counselling psychology as well as practising counsellors who routinely work with university staff. Experts were drawn from several Malaysian higher education institutions and held roles such as Deputy Chief Psychologist, Director or Head of Psychological or Counselling Services, and registered counsellor. This composition ensured diversity in institutional background, professional role, and practical experience with staff wellbeing and career related interventions [14]-[15].

2.4 Instrument and rating procedure

Expert appraisal of module content was conducted using a structured rating instrument comprising six items aligned with the central aims of the C-A-RE module, following recommended procedures for expert review of intervention materials [14]-[15]. The six items evaluated: (1) relevance of the module content to the target population, (2) clarity of objectives and overall coherence, (3) suitability of time allocation, (4) feasibility and implement ability in higher education settings, (5) expected contribution to reducing stress among sandwich generation workers, and (6) expected contribution to enhancing career adaptability and career resilience. Each item was rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). To minimize differences in interpretation, experts were provided with operational definitions for each item, detailed rating descriptors, and written guidelines explaining how to evaluate the module [14],[16]. Experts received a complete set of module materials, including session outlines and activity descriptions, together with the rating form and instructions. Ratings were completed independently, without group discussion, and were treated as anonymous in the analysis to reduce potential social desirability or conformity effects [15].

2.5 Many-Facet Rasch analysis

Expert ratings were analysed using MFRM with dedicated Rasch software (e.g., MINIFAC version 4.3.2) [12]. Three primary facets were specified: items (the six content validation statements), raters (the eight experts), and rating scale categories (1 to 5). For each facet, logit measures were estimated to locate items along the continuum of endorsement difficulty and raters along the continuum of severity or leniency [12]-[13]. Separation and reliability indices were calculated for both raters and items to evaluate the extent to which the model could distinguish between experts with different severity levels and between items with different levels of endorsement. Model fit was examined using infit and outfit mean square statistics for items and raters, with values near 1.00 interpreted as indicating acceptable fit to the Rasch model [12],[17]. The coherence of the Rasch-modelled ratings was examined through the percentage of

variance explained by Rasch measures. Fixed chi square tests were used to assess whether differences among item measures and rater severities were statistically significant [17]. Agreement between observed ratings and model expectations was summarised using observed and expected exact agreement indices. Rating scale diagnostics examined the ordering of categories, category thresholds, and the frequency of category use to determine whether the five-point scale functioned as intended or showed evidence of ceiling effects or under used categories [12],[17].

3 Result

This section reports the MFRM findings from eight experts' ratings of six C-A-RE module evaluation items. The analysis examines the distribution of item endorsement, variation in rater severity or leniency, agreement between observed and model-expected ratings, and item-level fit statistics. These results provide empirical information for interpreting the psychometric quality of the expert-rating data and for identifying aspects of the module that may require refinement.

Table 1. MFRM Summary Statistics for Expert Ratings of the C-A-RE Module.

Factors	Raters	Items
N	8	6
Measure Logit	3.81	0.00
Standard deviation (SD)	1.93	0.77
Root Mean Square error (RMSE)	1.42	1.13
Separation index	1.36	0.68
Strata	2.15	1.24
Reliability Index	0.65	0.68
Fixed Model ChiSquare	$X^2 = 25.9$ (df = 7, p=0.00)	$X^2 = 6.6$ (df=5, p=0.25)
Observe Exact Agreements (%)	75	
Expected Agreements (%)	76.1	
Variance Explained by Rasch measures (%)	52.06	

Table 1 summarises MFRM statistics for the rater and item facets. The mean rater measure was 3.81 logits, indicating that the experts generally provided favourable ratings. The rater separation index was 1.36 and rater reliability was 0.65, suggesting modest differentiation in the severity or leniency of ratings within this small expert panel. The significant fixed-model chi-square statistic for raters, $\chi^2 = 25.9$, df = 7, $p<.001$, indicates that the raters differed in their rating patterns; this finding supports the use of MFRM to account for rater effects.

Item measures were centred at 0.00 logits by model calibration. Item separation was 0.68 and item reliability was 0.68, indicating limited differentiation among the six

highly endorsed items. The fixed-model chi-square statistic for items was not statistically significant, $\chi^2 = 6.6$, df=5, p =.25, suggesting that the item measures were not clearly distinguishable in this dataset. Observed exact agreement was 75.0%, close to the expected agreement of 76.1%. Rasch measures explained 52.06% of the variance in the ratings, indicating a meaningful Rasch-modelled component in the experts' responses; this result should be interpreted as evidence of rating coherence rather than as definitive proof of unidimensionality.

Table 2. Item Level Analysis

No.	Item	Measure (Logit)	Infit MnSq	Outfit MnSq	Point Measure Correlation	Exact Agreement (%)
1	The contents of the C-A-RE Module meet the target population.	-2.34	0.53	0.27	0.65	77.5
2	The contents of the C-A-RE Module can be implemented successfully.	0.52	1.83	1.95	0.78	75.0
3	The contents of the C-A-RE Module are suitable for the allocated time.	1.57	1.97	2.26	0.40	57.5
4	The contents of the C-A-RE Module can help the sandwich generation workers in reducing their experienced stress.	0.52	0.27	0.22	0.92	80.0
5	The contents of the C-A-RE Module can help the sandwich generation workers increase career adaptability.	-0.79	0.26	0.19	0.88	80.0
6	The contents of the C-A-RE Module can help the sandwich generation workers increase career resilience.	0.52	0.27	0.22	0.92	80.0

Table 2 presents detailed MFRM statistics for each of the six C-A-RE module evaluation items. Item 1, concerning alignment of the module content with the target population, had the lowest measure, −2.34 logits, and was therefore the easiest item for experts to endorse. Item 3, concerning the suitability of the allocated time, had the highest measure, 1.57 logits, and was comparatively more difficult for experts to

endorse. This pattern suggests that experts were highly favourable about population relevance but less certain about whether the proposed time allocation was appropriate.

Items 4, 5, and 6, which address the module's anticipated contribution to stress reduction, career adaptability, and career resilience, had high point–measure correlations of 0.92, 0.88, and 0.92, respectively, and exact agreement of 80.0% for each item. Item 3 had the lowest point–measure correlation, 0.40, and the lowest exact agreement, 57.5%. It also showed elevated infit and outfit mean-square values of 1.97 and 2.26, respectively. These findings identify time allocation as the clearest priority for content and implementation refinement.

Table 3. Analysis Findings for Experts' Rating.

Expert	Measure (Logits)	Observed Average	Fair Average	Expert Rating
1	-0.07	4.00	3.99	Moderate
2	(5.98)	5.00	4.97	High (Extreme)
3	2.65	4.50	4.52	High
4	(5.98)	5.00	4.97	High (Extreme)
5	4.55	4.83	4.88	High
6	4.55	4.83	4.88	High
7	(5.98)	5.00	4.97	High (Extreme)
8	0.87	4.17	4.13	Moderate
Total	3.81	4.67	4.66	High

Table 3 indicates that the experts' ratings ranged from moderate to high. Experts 2, 4, and 7 assigned uniformly high ratings and were identified as extreme raters in the MFRM output. Experts 1 and 8 showed comparatively more moderate rating patterns. Observed average ratings ranged from 4.00 to 5.00, while fair averages ranged from 3.99 to 4.97. These findings indicate generally positive expert appraisal, while also showing meaningful variation in rater severity or leniency. Such variation reinforces the value of MFRM, which adjusts item estimates for systematic differences among raters.

Overall, the MFRM findings indicate generally favourable expert ratings of the C-A-RE module, with close observed and expected agreement and strong endorsement of the stress, career adaptability, and career resilience components. At the same time, the low item separation and the misfit of the time-allocation item indicate that the data do not support treating all items as equally well-functioning. The findings therefore provide initial psychometric evidence to guide refinement, particularly of the module's time allocation and implementation arrangements.

4 Discussion

The MFRM results provide encouraging initial evidence of the psychometric quality of expert ratings of the C-A-RE module, while also identifying specific aspects that require refinement. As reported in Table 1, experts provided a high overall observed average rating of 4.67 out of 5, observed exact agreement was 75.0%, and this closely approximated the model-expected agreement of 76.1%. Rasch measures accounted for 52.06% of variance in the ratings. Taken together, these findings suggest that the expert evaluations contained a meaningful and coherent measurement pattern. However, these results should not be interpreted as establishing a comprehensive validity argument, because broader evidence concerning response processes, implementation, outcomes, and generalisability is still required [18]-[20].

A central contribution of this study lies in the detailed examination of rater effects and fairness. The rater separation and reliability indices, alongside the significant chi square statistic for the rater facet, confirmed real differences in severity and leniency among the eight experts [21]. Rather than undermining the validation, this variability is an expected and desirable feature in early-stage expert evaluation studies, as it reflects the diversity of professional perspectives with which the module must ultimately align [20],[22]. MFRM is particularly well suited to such contexts because it explicitly models rater severity, self-consistency, and clustering, treating differences in ratings as systematic sources of information rather than mere measurement error [23]-[24]. By adjusting item estimates for rater effects, MFRM provides fairer, bias-adjusted measures of item quality and supports more defensible conclusions regarding the psychometric quality of the expert-rating evidence for the C-A-RE module.

At the same time, the pattern of ratings points to important considerations for future validation cycles. The heavy use of upper scale categories (4 and 5) and the relative underuse of the mid category (3) suggest lenient rating tendencies and potential ceiling effects. While these patterns are consistent with overall positive expert endorsement, they also indicate that future rounds of validation could benefit from strategies such as expanding the expert pool, deliberately including more critical raters, and refining rating descriptors to encourage fuller use of the scale across all categories [21],[25]. Such refinements would further enhance scale sensitivity and provide a more differentiated picture of expert judgments, particularly as the module moves from initial validation into broader dissemination.

The item-level findings in Table 2 clarify the substantive strengths of the module. Items 4 to 6, which address anticipated stress reduction, career adaptability, and career resilience, received the highest point–measure correlations (0.92, 0.88, and 0.92) and 80.0% exact agreement. This pattern indicates strong convergence among experts concerning the central components of the C-A-RE module. The finding is consistent with the module's theoretical integration of stress appraisal and coping, career construction, career motivation, and career resilience perspectives –, which together frame stress management, adaptability, and resilience as interconnected resources for

workers facing complex role demands. [27]-[28]. The strong performance of these items reinforces the relevance of career construction theory and related frameworks as conceptual anchors for the C-A-RE module [9],[29].

In contrast, the item-level findings in Table 2 identify time allocation as the principal area for refinement. Item 3, which assessed the suitability of the allocated time, was the most difficult for experts to endorse (1.57 logits) and showed the lowest point–measure correlation (0.40) and exact agreement (57.5%). Its elevated infit (1.97) and outfit (2.26) mean-square statistics also indicate that expert responses to this item were less consistent with the overall pattern of ratings than were responses to the other module-evaluation items. This pattern suggests that perceptions of time suitability may be influenced by organisational schedules, workload, competing caregiving demands, and local implementation arrangements, rather than reflecting a weakness in the module's core content on stress management, career adaptability, and career resilience [26],[32]. In comparison, Item 1, which assessed the alignment of module content with the target population, was the easiest item to endorse, indicating strong expert consensus that the C-A-RE module is appropriately tailored to sandwich generation workers. This finding is consistent with the need for interventions that are responsive to the distinctive work and caregiving circumstances of the target population. Accordingly, the module's session duration, pacing, content load, and delivery schedule should be reviewed to improve its practical feasibility before wider implementation.

The identification of time allocation and feasibility as relatively weaker aspects of the module has important implications for implementation. First, it suggests the need to review session duration, content load, and pacing to ensure that the programme is realistic for sandwich generation workers whose schedules are already compressed [32],[35]. Second, it highlights the value of clearer implementation guidelines, such as structured timetables, recommended group sizes, and suggestions for integrating sessions within working hours, to increase perceived feasibility and organisational readiness [32],[36]. Third, the variability in feasibility related items implies that implementation manuals, facilitator training, and explicit institutional support policies are likely necessary to mitigate differences across public universities and enhance consistency in delivery [29],[33].

In practice, this study responded to these signals by refining the modules delivery structure through iterative consultation with institutional stakeholders. The agreement on a 4-week, 12-hour implementation format, developed in collaboration with the Centre for Teaching and Learning Development and Human Resources, directly addressed the time feasibility concerns that emerged in the MFRM analysis. This structure balances therapeutic dosage with the realities of sandwich generation workers competing responsibilities and aligns with evidence that shorter, focused interventions achieve higher compliance rates among time constrained populations [35]. The use of protected time blocks during working hours and a sequential arrangement of sessions (from stress recognition to adaptive skills and resilience strategies) is consistent with Hobfolls [36] resource gain spiral and Banduras [33] emphasis on staged mastery

experiences, thereby integrating psychometric feedback with implementation science and career development theory.

Beyond its immediate practical contributions, the study adds meaningfully to the literature on sandwich generation workers and intervention development in the Malaysian context. Research has repeatedly documented the high stress, role conflict, and wellbeing challenges faced by sandwich generation employees, but there remains a paucity of structured, theory based, and psychometrically validated interventions tailored to this group, particularly within public universities [30],[32]. By introducing the C-A-RE module as an intervention explicitly grounded in stress appraisal and coping, career construction, career motivation, and career resilience, and by subjecting it to rigorous MFRM based validation, this study addresses a significant gap in the evidence base.

Importantly, the use of MFRM moves beyond traditional content quality assessment approaches, such as simple content quality ratios or average expert ratings, by providing nuanced, bias adjusted evidence on both item quality and rater behaviour [18]-[19]. This approach allows differentiation between disagreement that signals problematic items and disagreement that reflects healthy diversity among competent raters, thereby supporting an iterative refinement process rather than a purely pass-fail judgment [23]-[24]. The observed pattern of moderate reliability, meaningful rater clustering, and strong performance of theoretically central items aligns well with other early-stage validation studies that have used Rasch models to evaluate educational and psychological interventions [18]-[19],[22].

This study should be interpreted in light of several limitations. First, the analysis was based on the judgments of eight experts and six broad evaluation items; the limited number of observations may have constrained item separation and the stability of some estimates. Second, high use of the upper rating categories may have reduced discrimination among items and contributed to extreme ratings. Third, expert appraisal and MFRM findings alone do not establish a complete validity argument for the C-A-RE module. Future research should gather additional evidence from participants' response processes, feasibility testing, implementation fidelity, pre–post intervention outcomes, and replication with larger and more diverse samples.

Finally, this study sets a trajectory for future work. Longitudinal research is needed to examine the impact of the C-A-RE module on stress, career adaptability, and resilience over time and to explore its applicability beyond Malaysian public universities, including in private sector and international settings [9],[30],[32]. The mixed methods design that integrates quantitative Rasch analysis with qualitative feedback from participants and institutional stakeholders would yield a richer understanding of both psychometric and experiential dimensions of module effectiveness [37]. Exploring alternative delivery formats, such as shorter micro sessions or digital and blended modes, may further enhance accessibility and address ongoing time feasibility concerns [35].

Taken together, the present findings demonstrate that the C-A-RE module is a psychometrically sound, theoretically coherent, and contextually relevant intervention for sandwich generation workers in Malaysian higher education, while also highlighting specific areas notably time feasibility and implementation support that require continued attention. By combining advanced measurement techniques with institutional collaboration, the study illustrates how psychometric rigor and practical applicability can be integrated to support the wellbeing and career sustainability of a critical yet often overlooked segment of the academic workforce.

5 Conclusion

This study examined the psychometric quality of expert ratings of the C-A-RE module using Many-Facet Rasch Measurement. Experts gave generally favourable ratings, with an overall observed average of 4.67 out of 5, 75.0% observed exact agreement, and 52.06% variance explained by Rasch measures. The items addressing stress reduction, career adaptability, and career resilience showed strong point–measure correlations and high agreement, indicating that these central components were consistently endorsed by the expert panel.

The findings also identified time allocation as a priority for revision. The time-suitability item was comparatively difficult to endorse and displayed lower agreement, lower point–measure correlation, and elevated fit statistics. This result indicates that the practicality of scheduling, session duration, and implementation support should be refined in consultation with institutional stakeholders before wider delivery.

Overall, the study provides initial expert-based evidence concerning the psychometric quality and practical suitability of the C-A-RE module. Further research should evaluate implementation feasibility, participant experiences, intervention outcomes, and the module's performance across larger and more diverse samples of sandwich generation workers.

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