Psychometric Properties Of Medical Professionals Resilience Scale (Mers) For Medical Doctors In Pakistan

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Research Article

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Abstract

Background: Medical Professionals Resilience Scale (MeRS) is a four-point Likert scale for measuring resilience in the domains of control, resourcefulness, involvement, and growth. This 37-item inventory was previously validated among Malaysian health professionals. To increase the evidence of validity of MeRS, this study attempted to cross validate and perform psychometric analysis of MeRS among medical doctors of Pakistan.

Methods: A cross sectional study was conducted in two different hospitals of Pakistan. Prior to the study, ethical approval was obtained from the ERC/IRB committee of SKBZAN/AK CMH Rawalakot. The MeRS was distributed to 201 medical doctors, comprising of 102 house officers and 99 medical officers. Data was analyzed for descriptive statistics, reliability analysis and confirmatory factor analysis using the Statistical Package for the Social Sciences software version 26, and the Analysis of a Moment Structures software version 26 respectively.

Results: The four-domain, 37-item MeRS has a good internal consistency with Cronbach's alpha value of 0.90. The reliability of growth, control, involvement and resourceful domains are 0.76, 0.86, 0.79 and 0.79 having 15, 6, 12 and 4 items respectively. The confirmatory factor analysis yields the same four-domain with 14-items (3 each for growth and resourceful and 4 each for control and involvement) version as the best fit model for MeRS, with X^2= 99.556, P-value=0.008, GFI=0.934, RMSEA=0.048, TLI=0953, CFI=0.965, NFI=0.899 and X^2/df=1.464. Cross validation across two different hospitals for Pakistani doctors yields stable constructs of MeRS to measure resilience among medical doctors.

Conclusion: This study concludes that MeRS is a valid and reliable tool for measurement of resilience in health professionals. The confirmatory factor analysis A performed on the original 37-item MeRS exhibited stable constructs. The new Modified MeRS Model with 14 items and same four domains showed high goodness of fit indices.

Introduction

Resilience is described as the ability to adapt on the face of adversity despite of challenges, losses and difficulties. It's the individual's capacity to "bounce back" from negative experiences, relational, health and workplace problems in variable social contexts [(1)]. Resilience gives a positive and optimistic outlook to life [(2)]. Resilience directly influences self-esteem, self-efficacy, life satisfaction and well-being, and thus is a protective factor against mental health disorders [(3)(4)]. Improved resilience in doctors not only prevent burnout but also improves doctors performance [(5)(6)]. A resilient person copes with daily life adversities in a more positive and healthier way as compared to a non-resilient person. As William S Churchill said and I quote " Success is not final, failure is not fatal, it's the courage to continue that counts", this courage to continue despite falling is resilience.

Resilience is a very holistic term and different characteristic inclinations are identified in literature depending upon the underlying conceptual framework, defining boundaries and manner of relating different component

concepts. Therefore, resilience as trait [7], as process[8], as ability [9], as an outcome [10][11] and as a dynamic entity [12] are identifiable across the spectrum of educational research.

Measurement of resilience, its practice, maintenance and improvement over time requires valid, reliable, and economic tool. Various resilience measuring tools exist in the literature, whereby the diversity of the constructs measured in these tools are attributable to differences in concept definition, underlying theoretical and conceptual frameworks, and differences in operationalization of constructs [13]. Some researchers used tools that focus on “immune resources” for resilience measurement, namely General self-efficacy scale or Sense of coherence scale [13] , while other’s use specific resilience tools. Among them, Resilience Scale (RS), Brief Resilience Scale (BRS), Resilience Scale-5 (RS-5), Connor—Davidson Resilience Scale (CD-RISC), Dispositional Resilience Scale (DRS) [14][2], the Ego-Resiliency Scale (ERS) [15], Psychological Resilience (PR), the Resilience Scale for Adults (RSA, Resilience Process Questionnaire (RPQ) [16][13] are the notable ones. However, quite a few resilience scales are developed for specific use in health professionals [17]. Medical professional’s resilience scale (MeRS) was developed by Rahman et al. in 2021 and was validated among Malaysian population of health professionals [18].

MeRS is a self-administered questionnaire which defines resilience as a dynamic process based on Integrated Resilience Model (IRM), which has four domains of control, resourcefulness, involvement and growth (Figure I). The relationships of the four themes of resilience are defined across two continuums of state (present and future) and condition (internal and external). Based on IRM, resilience is a combination of traits (exclusive and shared constructs), processes (state and condition) and outcomes (the four emerging themes) [12]. The questionnaire comprises of 37 questions in total and has good validity and reliability indices.

Healthcare professionals have a highly demanding job with tremendous work pressure and have the highest propensity to burnout [5]. Research suggests that improved resilience in doctors yields positive impacts on their work and patient dealing [6]. However, there is no unified or integrated view about resilience [18]. Literature suggests a strong influence of context and culture on resilience definition and dimensions. By far, MeRS is the only tool available to assess resilience in health professionals defining it as a dynamic entity [18]. This study aimed to evaluate the evidence of validity and reliability of MeRS among medical doctors of Pakistan to ensure its robustness and test for its suitability across different culture.

Methods

A cross sectional study was done on 201 medical doctors from two different tertiary care hospitals in Pakistan. The sample size was calculated with 5% margin of error, 95% confidence interval and 50% response distribution using OpenEpi sample size calculator. According to recommendations of Costello and Osborne the subjects required for studies involving factorial analysis should be at least five times greater than the number of items in questionnaire [19]. Hence, for a 37-item questionnaire, a minimum of 185 subjects is required for this study. Ethical approval was obtained from ERC/IRB committee of SKBZAN/AK CMH Rawalakot (Ref# AK-

CMH/ERC/IRB/03/0821), which duly approved the procedure of obtaining verbal informed consent. The study was conducted conforming to both local guideline and regulations and in accordance with the principles of declaration of Helsinki for research on human subjects.

Participants were recruited using stratified random sampling in strata of house officers and medical officers. Both male and female doctors in clinical practice at tertiary care hospital were included. Consultant specialists and doctors at administrative posts were excluded . A total of 104 doctors were engaged from each hospital and were stratified according to designation (50% house officers and 50% medical officers). After obtaining verbal informed consent from the participants, a self-administered questionnaire comprising of demographic details and the 37 items of MeRS was distributed to the participants in printed copy. The participants returned the filled questionnaire immediately. No incentive or reward was given to the participants for inclusion. Seven participants who did not return the questionnaires or had submitted an incomplete response were excluded from the study.

Data was entered, cleaned, prepared, and analyzed using the Statistical Package for the Social Sciences (SPSS) software version 26. Descriptive statistics were calculated for demographic details of age, gender and designation and are represented as frequencies and percentage. Confirmatory Factor analysis (CFA) and reliability analysis (Cronbach alpha) were performed to assess psychometric properties of MeRS using the Analysis of a Moment Structures (AMOS) software version 26 . Cronbach's alpha reflecting internal consistency is considered to be good if above 0.7 , satisfactory if between 0.6-0.7 and, poor if below 0.6 (citation). Pearson correlation coefficient was used for all correlations.

Instrument

Medical Professionals Resilience Scale (MeRS)) was developed by Rahman et al. in 2021, defining resilience as dynamic entity, and was validated in Malaysian medical professionals' population[18]. MeRS is a 4-point Likert scale comprising of 37 items in total. It defines resilience based on integrated resilience model in four domains namely control, resourcefulness, involvement and growth with six, four, 12 and 15 items in each domain respectively. In a broad sense, items under control domain measure medical professionals' ability of being composed under adversity, while items underlying the resourceful domain reflects the medical professional's ability to find solution to adversity from available resources. As for the involvement domain., the items underlying it measure medical professionals' commitment, and the items for growth domains reflect the ability of medical professionals to be stronger after facing adversity(Figure I).

The scale has scale-content validity index (S-CVI) of 0.84 and good reliability with Cronbach's alpha value of 0.914. All items have content and face validity indices of more than 0.80 indicating good individual validity and reliability of the test items. The internal consistency of the inventory ranges from acceptable to good as the Cronbach alpha value of the four domains ranges from 0.719 to 0.891. The scale has no reverse scoring or negative item. Maximum score for the scale is 148 and the minimum score is 37. Three levels of resilience competency are defined based upon the score ranges; exceptional (119-148), established (67-118), and developing (37-66). Higher score of MeRS indicates a greater resilience.

Results

Demographic profile:

A total of 201 medical doctors participated in the study, comprising of 102 (50.7%) house officers, and 99 (49.3%) medical officers. A total of 91 (45.3%) participants are males while 110 (54.7%) are females. In terms of age strata 77 (38.3%) participants were between 20–25 years, 80 (39.8%) participants between 25–30 years of age while 44 (21.9%) were between 30–35 years.

Internal Consistency:

The Cronbach's alpha value for the whole 37 item scale was 0.90. The reliability of subscales of growth, control, involvement and resourceful is 0.76, 0.86, 0.79 and 0.79 respectively. The modified MeRS-14 has a scale reliability of 0.87 while domain reliability is also good (Table 1).

Factorial analysis:

The CFA was used to confirm domain conformability of MeRS. The CFA for the original 37 item, 4 domain model indicated poor fit with $X^2/df < 5$ but RMSEA > 0.08, NFI and all other indices < 0.9 (Figure II). To improve the model fit of the original MeRS, the analysis was performed step wise till the desired results were obtained. In the first step, seven items with a factor loading of less than 0.6 were removed which yielded Model B with improved indices. In the second step, six items were removed, and correlation established between these six items within the domains based on MI's, standardized residual covariance and factor loading to yield Model C. Further removal of six items and co relation between two items yielded Model D with RMSEA < 0.08 but NFI still < 0.9 (Table 1).

Table 1
Models of MeRS and its goodness of fit indices

Model	Items& domains	X^2 (df)	P-value	X^2/df	GFI	RMSEA	TLI	CFI	AGFI	NFI
Initial model **MeRS-37**	37 items 4 domains	1889.74 (623)	< 0.01	3.033	0.652	0.101	0.605	0.631	0.608	0.539
	Cronbach's alpha values Scale = 0.90 Growth = 0.76 Control = 0.86 Involvement = 0.79 Resourceful = 0.79									
Final Best fit model	14 items 4 domains	99.557 (68)	< 0.01	1.464	0.934	0.048	0.953	0.965	0.899	0.899
MeRS-14	Cronbach's alpha values Scale = 0.87 Growth = 0.74 Control = 0.83 Involvement = 0.77 Resourceful = 0.78									

Final Best Fit Model:

In the final step with removal of three items and establishment of correlation between two items, the final model MeRS-14 was found fit with high goodness of fit indices, with RMSEA < 0.08 and all other indices closest to 0.9. The reliability of each factor in the scale was high. The discriminant validity of the final best fit model was good as the correlation between domains was < 0.85 (Figure III).

Discussion

Resilience is a dynamic entity and is highly contextualized, with both internal and external factors influencing its conceptualization [20]. Only identification of resilience traits does not serve the purpose alone, a detailed insight into the phenomenon is needed. As resilience measurement is not a stable trait so the main focus should be resilience development, tracking progress and focusing on resilience reintegration. Studies in health professional's context describe different sets of related themes of resilience across different physician specialties [3, 7, 11, 17, 21]. Hence, there is a dire need of a valid and reliable tool for resilience measurement in health professionals in order to measure, track, improve and report effectiveness of resilience interventions.

This study aimed to cross evaluate the validity and reliability of MeRS-37, which was originally developed and validated among Malaysian medical doctors, in Pakistan context. The findings of this study highlighted several important findings. First, MeRS-37 showed a good reliability in Pakistani health professionals' population with Cronbach's alpha value of 0.90, and thus confirming that MeRS-37 possesses high internal consistency and is a cross valid tool for reliability measurement. Second, the internal consistency of the four

domains of MeRS ranges from 0.7 to 0.86 indicating acceptable to good reliability. Third MeRS possess a positive factorial structure, as 35 out of 37 items achieved standardized factor loading value of greater than 0.5, which indirectly supports its internal structure validity. Fourth, MeRS depicts high discriminant validity as its domains are exclusive and independent and showed a correlation value of less than 0.85. Lastly, CFA yielded that MeRS-37 was a poor fit model, Modified MeRS or MeRS-14 (with 4 domains and 14 items) is the best fit model for resilience measuring for health professionals with high goodness of fit indices.

This study provides evidence that MeRS is a valid and a reliable tool. Reliability is represented by internal consistency and stability, and it refers to the ability of a tool to reproduce similar results if repeated over time [(22)]. The original MeRS-37 has scale reliability of 0.90 with domain reliability ranging from 0.76–0.86 [(18)]. The modified MeRS-14 has a scale reliability of 0.87 while domain reliability ranges from 0.78–0.83. Both the scales show reliability in acceptable ranges [(23)] and have values close to each other. These values are in accordance with the recommendations by Briggs and Cheek (1989) for obtaining balance between amplitude of measurement and internal consistency [(24)]. However, in terms of internal consistency, the original MeRS-37 is superior to MeRS-14. In comparison to CD-RISC (Connor- Davidson resilience scale) with Cronbach's alpha value of 0.794 [(25)], BRS (Brief Resilience Scale) with 0.80 [(26)], ARS (Academic Resilience Scale) with 0.82 [(27)] and READ (Resilience Scale for Adolescents) with 0.79 [(28)], the Cronbach's alpha value of both MeRS-37 and MeRS-14 are higher, and thus suggesting a higher reliability comparable to other scale for resilience measurement. Furthermore, this study was conducted at two different hospitals of Pakistan with two different cohorts of house officers and medical officers. The heterogeneity of the subjects strengthened its validity across Pakistani health professional's context.

The CFA for MeRS-37 showed that 95% of the items achieved standardized factor loading of greater than 0.55, which indicates its good factorial structure [(29)]. Higher factor loading indicates that items have high contribution towards the construct being measured. Yet it is a poor fit for goodness of fit indices. With step wise removal of item and establishment of corelations, the goodness of fit indices improved for MeRS-14 making it the best fit model, with 100% of items achieving standardized factor loading of greater than 0.64. In the first step, items with factor loading of less than 0.55 were removed, in the next step, items with factor loading less than 0.6 were removed and the absolute and incremental fit indices were improved. Furthermore, the items were examined individually for multiple overlapping corelations with other items and identification of problematic items was done. Subsequent removal of those items improved the indices, and thus yielded a 14 item best fit model. The poor fit indices of MeRS-37 may be attributable to number of variances in data sample as compared to the original sample it was made on. The contextual variance between Malaysian and Pakistani cultures, the differences in hierarchy of health professionals, working environment of medical doctors, population characteristics, personality differences, provision of formal or informal resilience training and nature of medical training provided at undergraduate levels are all grass root level variances, which could have contributed to the results. MeRS-14 represents the same constructs of resilience as MeRS-37 but with less number of items and improved goodness of fit indices. So, this study needs to be replicated at different levels of same population and also verified for different populations across the globe in order to yield a universal best fit model of MeRS.

The discriminant validity for both MeRS-37 and – 14 are high with correlation values of less than0.4. Discriminant validity refers to the ability of the domains of the tool to measure constructs independently with low corelation. A value of less than 0.85 between the factors indicates good discrimination [30]. This indicates that items in the scale are well defined, non-redundant and measure the desired constructs efficiently.

Thus, in short MeRS is a valid and reliable tool for resilience measurement in health professionals. MeRS-37 has higher reliability and discriminant validity as compared to MeRS-14 but was a poor fit for goodness of fit indices. MeRS-14 has better factorial structure with best fit for goodness of fit indices. Both these tools provide a useful measurement criterion for benchmarking resilience levels.

This study is unique as it is the first study that cross validate MeRS in different geographical context. This study provides evidence to support validity and reliability of MeRS in Pakistani population. It incorporated participants from two different tertiary care hospitals in two different working categories thus making the sample more heterogenous. It further paves pay for the replication of study at different levels of medical and health personals and practitioners, namely medical students, clinicians, medical teachers, nursing staff and para medics. However, the study was conducted on a small scale at a snapshot with only two strata of doctors involved, which is its limitation. A study involving health professionals at population level and recruiting a more diverse and versatile sample will further elaborate on its psychometric properties. Secondly a lot of items were removed from the original MeRS during analysis. This needs further verification through data triangulation by replication of the study in different settings with variable data sets. Other sources of validity such as construct validity, consequence validity, response process validity and content validity should also be measured in order to ensure suitability & usefulness of this tool.

Conclusion

This study, focused on cross validation of MeRS in Pakistani doctors, concludes that it is a valid and reliable tool for measurement of resilience in health professionals. The CFA performed on the original 37 item MeRS exhibited stable constructs. A new Modified MeRS Model with 14 items and 4 domains showed high goodness of fit indices. It paves way for further studies to measure resilience in health professionals with different data sets, at different levels, in different cultures and to study effects of interventions on resilience. This study provides evidence to support validity and reliability of MeRS in cross cultural population with heterogenous sample thus indicating its robustness for use across different populations of health professionals.

Declarations

- Ethics approval and consent to participate

Ethical approval was obtained from ERC/IRB committee of SKBZN/AK CMH Rawalakot

(Ref# AK-CMH/ERC/IRB/03/0821) dated 30th Aug 2021.

Data was collected after obtaining verbal informed consent from the participants prior to the filling of questionnaire.

- Consent for publication

Not Applicable

- Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available as it was a part of data confidentiality and participant privacy as approved by the ethical committee at the time of approval. However the data is available from the corresponding author on reasonable request.

- Competing interests

The authors declare that they have no competing interests

- Funding

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- Authors' contributions

MS conceived, designed, collected data, did analysis, writing and editing of manuscript

MSBY supervised, did analysis, review and final approval of manuscript

SNHH supervised and approved final manuscript

ABO supervised and approved final manuscript

HR did data collection, writing of a part of manuscript

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Figures

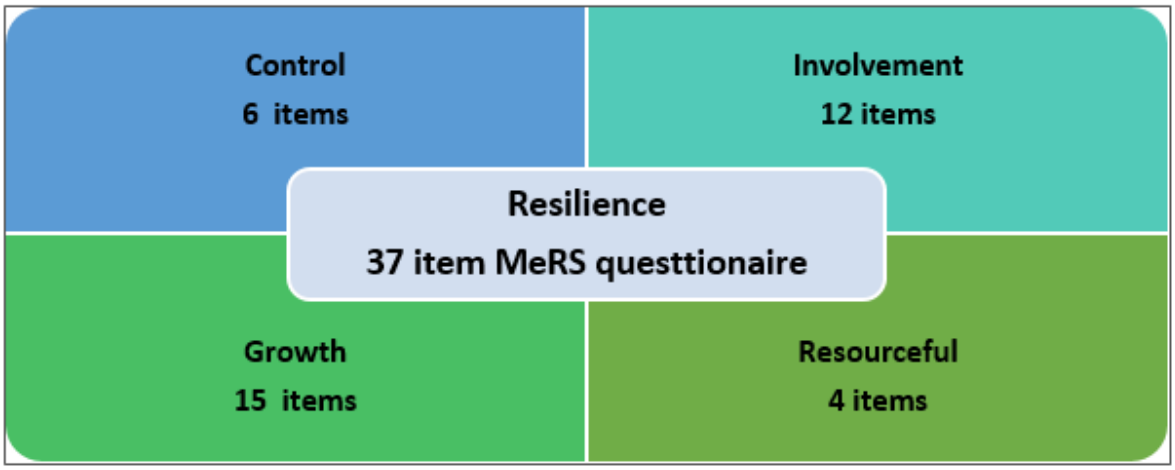

Figure 1

MeRS questionnaire based on Integrated Resilience Model [12]

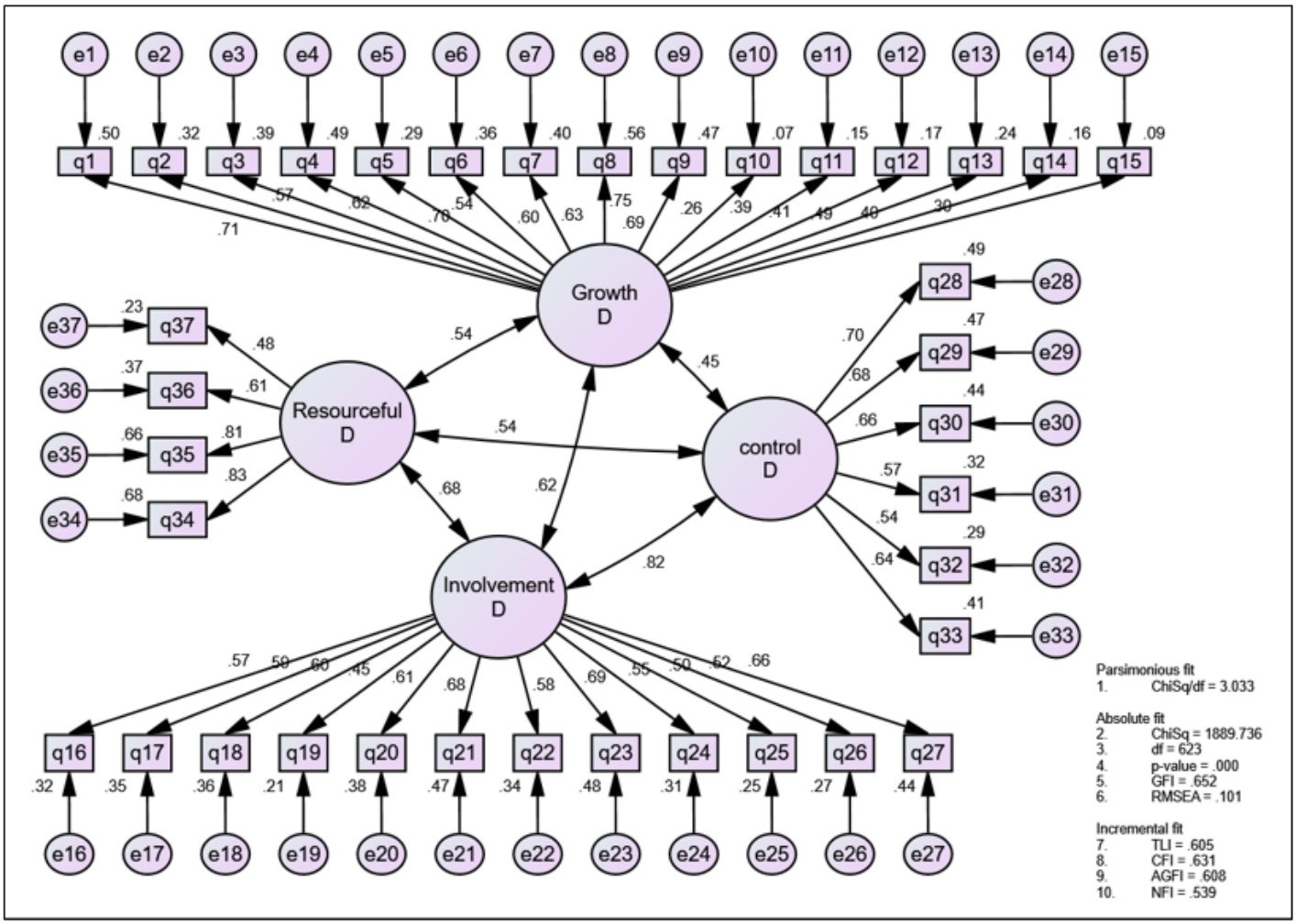

Figure 2

Standardized factor loading of original MeRS-37 (Initial model)

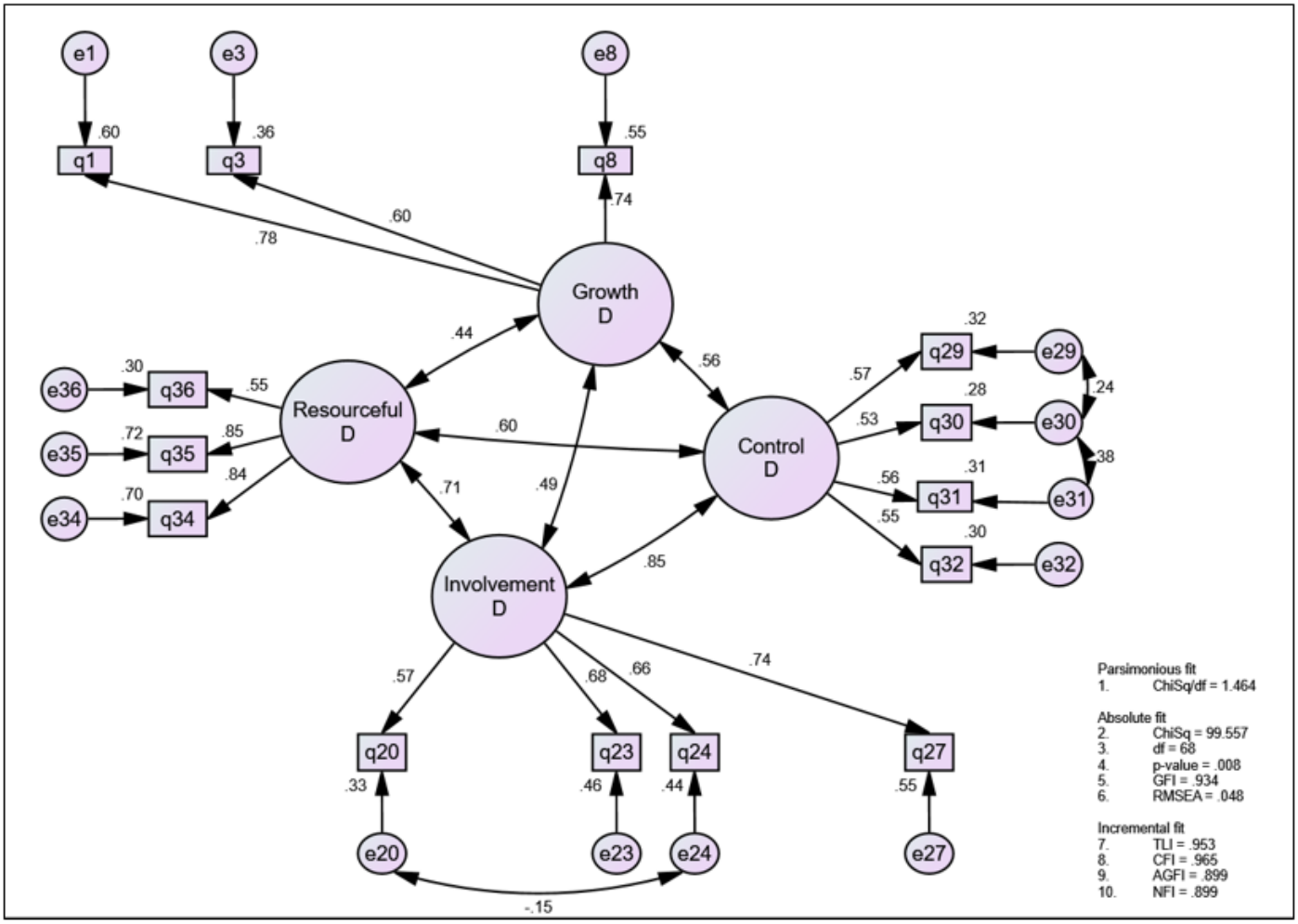

Figure 3

Standardized factor loading of final MeRS-14 (Best Fit Model)