Educational Measurement and Evaluation Review (2015), Vol. 6

Brief Report: Rasch Analysis of the Locus-of-Hope Scale

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Abstract

The Locus-of-Hope Scale (LHS) was developed as a measure of the locus-of-hope dimensions (Bernardo, 2010). The present study adds to the emerging literature on locus-of-hope by assessing the psychometric properties of the LHS using Rasch analysis. The results from the Rasch analyses of the four subscales of LHS provided evidence on the reliability, validity, and measurement precision of the LHS.

Keywords: locus-of-hope, Rasch analysis, reliability, validity, measurement precision

Introduction

An important framework in our understanding of hope is Snyder's hope theory (1994; 2000) which conceptualizes hope as a cognitive motivational system that enables a person to engage in goal-directed behaviour even in the face of obstacles. Synder's hope theory defines hope as "the process of thinking about one's goals, along with the motivation to move toward those goals (agency), and the ways to achieve those goals (pathways)" (Snyder, 1995, p.355). The pathways and agency components of hope are assumed to be trait-like dispositions and are both regarded as necessary for hopeful thinking to occur in the pursuit of one's goals (Snyder et al., 2002). Recently, Bernardo (2010) extended Snyder's hope theory by proposing the *locus-of-hope* model whose core feature is the conceptualization of trait hope as having an *internal locus* and *external locus*. Bernardo (2010) argued that goal-directed agency and pathways may not necessarily be purely individualistic as they may also be grounded on other persons and external agents. Bernardo (2014) explained that the locus-of-hope model is consistent with the view that a conjoint model of agency may exist in many collectivist cultures that emphasizes the roles of other people in a person's goal attainment. Moreover, the locus-of-hope model (Bernardo, 2010; 2014) also identifies three distinct sub-dimensions for external locus of hope; *external locus-family* (hope is placed on one's family), *external locus-peers* (hope is placed on friends or peers), and *external locus-spiritual* (hope is placed on God or some superior spiritual being or force).

To empirically validate the locus-of-hope model, the Locus-of-Hope Scale (LHS) was developed by Bernardo (2010) as a measure of the locus-of-hope dimensions. In the LHS, there are four subscales corresponding to the four locus-of-hope dimensions. The LHS consists of 40 items and requires respondents to indicate how each item describes them using a Likert-type scale. The items in the internal locus-of-hope subscale were adapted from the

Dispositional Hope Scale (Snyder et al., 1991) which is a measure of hope as defined in Synder's hope theory (1994; 2000). To be consistent with Synder's theory and the original hope scale, each of the three external locus-of-hope subscales also has four items measuring agency and four items measuring pathways.

The psychometric validity of the LHS was examined in various studies and findings provided evidence that the LHS is a valid and reliable measure. For instance, results from confirmatory factor analysis (CFA) of the LHS using data from Filipino samples yielded acceptable factor loadings and goodness of fit indices (Bernardo, 2010; 2014). Measurement invariance of the LHS in terms of gender was also documented (Bernardo, 2014). There is also evidence for the cross-cultural validity of LHS as the instrument was deemed a valid measure of the locus-of-hope dimensions among a sample of college students from Macau and Hong Kong (Du, Bernardo, & Yeung, 2015). Nevertheless, the psychometric properties of the LHS have yet to be fully examined. There is actually no study yet on the psychometric validity of LHS other than studies using CFA or analysis of measurement models. Moreover, the reliability analysis of LHS using internal consistency measure (Cronbach alpha) yielded marginal reliability scores (< .75) on some of the subscales (e.g. Bernado, 2010; 2014; Du & King, 2013). Hence, there is a need to further examine the psychometric properties of the LHS. The purpose of the present study is to further validate the LHS through *Rasch analysis* using data from a sample of Filipino college students.

Method

Participants

Participants were 1,660 college students from a private university in Manila, Philippines. There were 1, 055 female and 604 male participants (one participant did not indicate his/her gender). The participants ages range from 16 to 25 years old (Mean age = 18.69 years).

Measure

The Locus of Hope Scale (LHS) was used to measure the participants' locus-of-hope. The LHS has four subscales that correspond to the four locus-of-hope dimensions. Each subscale is measured by 8 items and the full scale contains 8 additional items that serve as filler items. Utilizing a 4-point Likert-type scale, participants indicated the extent to which each item describes them using a scale of 1 (*definitely false*) to 4 (*definitely true*). Sample items are: "I can think of many ways to get out of a problem (internal locus), "My parents find many ways to help me solve my problems" (external locus-parent), "My friends usually help me find many ways to get out of problematic situations" (external locus-peer), and "God always finds ways to help resolve my problems" (external locus-spiritual).

Procedure

The LHS was administered to the students during SY 2014-2015. One of the researchers and a number of assistants administered the LHS and a survey questionnaire for the students' demographic profile during regular classes. Informed consent was provided by the students prior to the data gathering.

Data analysis

Since the unidimensionality of each of the four locus-of-hope subscales is a prerequisite for the conduct of Rasch analysis, a series of principal component analysis (PCA) were conducted. Results of the PCA as evidenced in the number of extracted factors, variance

explained of the first factor, and the scree plot in each of the subscales provided support for the unidimensionality of the four locus-of-hope subscales. Rasch analysis was then performed for each of the locus-of-hope subscales using the Rasch Rating Scale Model (RRSM). Specifically, the software WINSTEPS was used to generate and examine the reliability, separation, threshold, item fit, and item difficulty estimates of the LHS.

Results and Discussion

Reliability

Rasch analysis yielded the following reliability estimates for the LHS subscales: Internal Locus-of-Hope (IL) = .99 (RMSE =.05); External Locus-of-Hope- Parent (ELPA) = .99 (RMSE = .06); External Locus-of-Hope- Peer (ELPE) = .99 (RMSE =.05); External Locus-of-Hope-Spiritual (ELSP) =.97 (RMSE = .07). The item reliability estimates indicate very high internal consistency for the items of each subscale. These reliability estimates are much larger than the reliability estimates measured through Cronbach alpha that were reported in studies which made use of the LHS (e.g. Bernardo, 2010; 2014; Du et al., 2015; Du & King, 2013). As seen in the RMSE values, the errors associated with the reliability estimates for all subscales are very low. For person reliability, the following are the obtained estimates: IL= .77 (RMSE=.73); ELPA = .84 (RMSE=.79); ELPE = .86 (.77); ELSP =.88 (RMSE=.86). The person reliability estimates indicate high internal consistency, except for IL which is reflective of moderate internal consistency. However, the errors associated with these estimates are high which suggests lack of measurement precision.

Separation

Item separation estimates for each of the four subscales indicate sufficient spread of items as evidenced by the following estimates: IL = 8.31; ELPA= 8.74; ELPE = 11.49; ELSP =5.36. These estimates suggest that the persons who answered a subscale are able to efficiently separate the items used in that subscale (e.g. internal locus-of-hope). On the other hand, person separation estimates for each of the four subscales indicate acceptable spread: IL = 1.83; ELPA = 2.32; ELPE = 2.44; ELSP =2.64. These estimates suggest that the items of a subscale are able to adequately separate the persons measured by the subscale.

Thresholds

Structure calibration or Rasch-Andrich threshold refers to the calibrated measure of transition between categories and it indicates how difficult it is to observe each category (Hart, Mueller, Royal, & Jones, 2013). There should be a monotonic increase in threshold values as category values increase. Hence, higher scale categories must reflect higher threshold values. As can be observed in Table 1, the threshold values increase as the category values increase and this is consistent across all subscales of the LHS. Moreover, the distances between threshold estimates are within the recommended distance of 1.4 to 5 (Linacre, 1999). These results provide evidence that the participants in the study were able to distinguish between categories of the response options.

Item Fit

Item fit statistics indicate the degree to which the data fits model expectations. INFIT and OUTFIT statistics can provide information on whether or not an item is noisy or may be producing calibrations that are not desirable for productive measurement (Hart et al., 2013). Table 2 shows the item fit statistics of the four locus-of-hope subscales. For rating

scales, item fit values ranging from 0.6 to 1.4 are considered desirable (Wright & Linacre, 1994). Using the aforementioned criteria, the INFIT and OUTFIT mean square statistics for all the items in all LHS subscales demonstrated fit or noise-free calibrations, except for Item 5 of the External Locus-Peer (ELPE) subscale. While the fit statistics of item 5 is not degrading to measurement as it is within reasonable range, the content of this item should be reviewed to assess how similar or different it is in comparison with the other items of the ELPE subscale.

Table 1
Threshold Estimates of the LHS Subscales

Subscale	Category*	Threshold
Internal Locus	1	NONE
	2	-3.00
	3	-0.47
	4	3.47
External Locus-Parent	1	NONE
	2	-3.89
	3	-0.23
	4	4.12
External Locus-Peer	1	NONE
	2	-3.60
	3	-0.54
	4	4.14
External Locus-Spiritual	1	NONE
	2	-4.18
	3	-0.39
	4	4.57

* 1 = definitely false; 2 = mostly false; 3 = mostly true; 4 = definitely true

Item Difficulty

Table 2 also displays the item difficulty estimates. In Rasch analysis of a rating scale, difficulty refers to the amount of ability or trait required for agreement with an item. An item with higher difficulty calibrations means a higher level of locus-of-hope dimension (e.g. external locus-parent) is required for participants to agree with that item. The results show that relatively high level of internal locus-of-hope is needed to agree with items 1, 23, and 30 whereas relatively high level of external locus-of-hope-parent is required to agree with items 16, 24, 32, and 39. Meanwhile, relatively high level of external locus-of-hope-peer is required for agreement with items 5, 26, and 38 and relatively high level of external locus-of-hope-spiritual is necessary for agreement with items 9, 17, 34, and 36. As observed, there is reasonable spread of item difficulty calibrations in all subscales. The adequate number of both easy and difficult items in each subscale means that the subscales can measure the locus-of-hope dimensions at either extreme (low and high level).

Table 2
Item Difficulty and Item Fit of the LHS Subscales

Subscale	Difficulty	INFIT MSNQ	OUTFIT MSNQ
Internal Locus			
Item 1	0.17	0.94	0.94
Item 6	-0.08	1.06	1.05
Item 14	-0.00	1.02	1.02
Item 20	-0.53	0.89	0.87
Item 23	0.81	1.02	1.05
Item 27	-0.22	0.89	0.87
Item 30	-0.51	1.21	1.22
Item 40	0.36	0.95	0.93
External Locus-Parent			
Item 3	-1.21	1.14	1.17
Item 7	-0.01	0.93	0.91
Item 11	-0.04	0.99	0.95
Item 16	0.26	0.96	0.93
Item 21	-0.09	1.21	1.24
Item 24	0.30	0.82	0.80
Item 32	0.22	0.92	0.91
Item 39	0.57	1.01	1.00
External Locus-Peer			
Item 5	1.12	1.54	1.58
Item 10	-1.08	1.23	1.22
Item 13	-0.50	0.91	0.85
Item 19	-0.03	0.94	0.90
Item 26	0.43	0.76	0.72
Item 33	-0.06	0.84	0.81
Item 35	-0.18	0.92	0.85
Item 38	0.30	0.79	0.76
External Locus-Spiritual			
Item 2	-0.24	1.08	1.07
Item 9	0.16	1.02	1.00
Item 15	-0.71	0.82	0.74
Item 17	0.59	1.25	1.25
Item 22	-0.31	0.93	0.87
Item 28	-0.03	0.85	0.81
Item 34	0.15	1.04	1.00
Item 36	0.39	0.95	0.90

Conclusion

The present study provides additional evidence on the reliability and validity of the LHS as a measure of the locus-of-hope dimensions and provides preliminary evidence on the measurement precision of LHS. In general, the results of the Rasch analysis show that the LHS has sound psychometric properties but may need further analysis especially on the item level. On the basis of the findings of this study, researchers and counselors are encouraged to use the LHS as a measure of the locus-of-hope dimensions.

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