

BUKTI KORESPONDENSI
ARTIKEL JURNAL INTERNASIONAL BEREPUTASI

Judul artikel : Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics

Jurnal : Journal of Psychoeducational Assessment, 2020, volume 38(2), 195 – 208

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No.	Perihal	Tanggal
1.	Bukti konfirmasi submit artikel dan artikel yang disubmit	26 Juni 2018
2.	Bukti konfirmasi review dan hasil review pertama	7 Okt 2018
3.	Bukti konfirmasi submit revisi pertama, respon kepada reviewer, dan artikel yang diresubmit	3 Nov 2018
4.	Bukti konfirmasi review dan hasil review kedua	29 Des 2018
5.	Bukti konfirmasi submit revisi kedua, respon kepada reviewer, dan artikel yang diresubmit	2 Jan 2019
6.	Bukti konfirmasi artikel accepted	16 Jan 2019
7.	Bukti konfirmasi artikel published online	11 Feb 2019

**1. Bukti Konfirmasi Submit Artikel
dan Artikel yang Disubmit
(26 Juni 2018)**



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Journal of Psychoeducational Assessment - Manuscript ID JPA-18-0139

Journal of Psychoeducational Assessment <onbehalf@manuscriptcentral.com>

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**Development and Initial Validation of Perceived Research
Environment Scale
for Higher Education Academics**

Journal:	<i>Journal of Psychoeducational Assessment</i>
Manuscript ID	Draft
Manuscript Type:	Regular Article
Keywords:	perceived research environment, scale development, academics, university, higher education
Abstract:	There is a growing interest in the perceived research environment for higher education academics. As there is no existing, psychometrically sound scale that directly measures perceived research environment for higher education academics, we designed and validated the Perceived Research Environment Scale for use with this population. In Phase 1, items were developed based on a review of literature, six focus groups, and expert judgment. In Phase 2, the items were then administered to a sample of Indonesian academics (N = 306, M age = 42.29 years). Item analysis and exploratory factor analysis were used to reduce the number of items and determine the factor structure. In Phase 3, confirmatory factor analyses were used on a hold-out sample (N = 292, M age = 43.39) to confirm this structure. In Phase 4, we provided evidence for construct validity. The practical uses of this newly-developed scale are discussed.

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Development and Initial Validation of Perceived Research Environment Scale
for Higher Education Academics

Introduction

Education, research, and services are the three key functions characterizing the academic profession in modern-day, higher education systems (Eam, 2015), although academic research and publications have been increasingly emphasised at most universities around the world, as involvement in research-related activities is recognised as an effective means to upgrade a university’s profile (Nguyen, Klopper, & Smith, 2016). Previous studies have demonstrated that engagement in research potentially improves teaching quality and enhances knowledge and competence that contributes to high quality research supervision, which is critical for developing graduate students as independent researchers (Lindsay, Breen, & Jenkins, 2002).

Reflecting this, there has been a continuing trend for universities in developed countries to increase their focus on research, and this tendency has spread to developing countries, where research is increasingly viewed as a high priority (Nguyen et al., 2016). Consequently, research has become an important function for academics everywhere, as research productivity is now a primary consideration in several important organisational decisions, such as hiring, maintenance of tenure, promotions, and salary increases for academics (Chen, Gupta, & Hoshower, 2006). As academics are required to publish their research results nationally and internationally in high quality, peer-refereed journals (Nguyen et al., 2016), researchers have been interested in identifying the predictors of research involvement and performance in academics (e.g., Whelan & Markless, 2013).

This research has shown that, among the factors that influence research productivity, environmental factors are some of the most powerful ones (Bland & Ruffin, 1992), which has lead researchers to identify the elements that characterise a good research environment (e.g.,

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Holden, Pager, Golenko, & Ware, 2012). Owen (1992) identified four important components of a good research environment: research funding, research infrastructure, having active researchers, and the availability of supportive research administrators. White, James, Burke, and Allen (2012) demonstrated that a good research environment is one that provides opportunities to access key resources and support from colleagues and the wider university. More recently, Nguyen et al. (2016) conducted a qualitative study in Vietnam to examine the affordances, barriers, and motivations that drive research engagement in academics. Financial support for research activities was perceived as the main affordance, teaching load as the main hindrance, and having a collaborative research environment and supportive research policy settings and practices as motivations for academics to engage in research.

The important role of the research environment is consistent with Bronfenbrenner's (1979) ecological systems theory. The behaviour of academic peers can be considered a "micro-environment", which is embedded in larger environments, such as the university department or research centre, which, in turn, are influenced by university-level policies and resources. The micro-environment comprises the academic's mentors' and colleagues' behaviours (i.e., role models and collaborators), other aspects of the department-level environment (e.g., requirements and recognition), and the university-level environment (e.g., incentives and policy guidelines; Mallinckrodt, 1997).

In the nursing area, Pranulis and Gortner (1985) identified several characteristics of high productivity university departments: faculty competent in research skills, research valued as desirable outcome goal, role responsibilities included time for faculty to engage in research activities, compatibility between faculty research activities and organisational mission and goals, as reflected in the support and rewards for research, support for, and encouragement of, faculty's efforts to seek extramural funding for research, administrative

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support for research, and a psychosocial climate supportive of research and beginning investigators.

In the area of psychology, Duffy et al. (2013) interviewed 17 of the most research-productive counselling psychologists within the American Psychological Association accredited counselling psychology program. Participants who were successful in their early career had received mentorship/support while in graduate school, chose research topics that were salient to them and they were passionate about, managed their time effectively, had good collaboration with students and professionals, had structured strategies for writing, worked in a supportive environment, and spent a considerable amount of time outside of work with family or participating in hobbies. The work environment (i.e., participants’ day-to-day experiences at work) was identified as one of the main contributing factors. However, despite this evidence regarding the importance of the research environment, no measure has been created specifically to assess the perceived research environment (PRE) of university academics.

Previous Measures of Research-Related Environments

While there is no scale suitable to measure the research environment from the perspective of academics in a university setting, Young and Rice (1983) devised The Research Environment Scale, a 24-item, six-point, Likert-type scale, specifically for nurses. This scale measures aspects of the clinical research environment, such as educational opportunities for nurses to learn about the research process. A sample item: “Nurses have qualified mentors for conducting research”. Marsh and Brown (1992) removed six items that were unrelated to the clinical research setting, and used an 18-item version of this scale in a sample of nurses.

Holden et al. (2012) devised the Research Capacity and Culture Tool for use with health professionals to measure indicators of research capacity at the individual, team, and

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organisation levels. This scale consists of a series of statements, which participants rate on a scale of 1-10. Sample items: “Find relevant literature” (individual level), “Provide resources to support staff research training” (team), and “Has a plan or policy for research development” (organisational).

Previous studies also have demonstrated that the research environment is critical for advancing graduate student productivity (Royalty, Gelso, Mallinckrodt, & Garrett, 1986); for example, the research training environment is an important factor in the training of graduate students in applied areas in psychology (Kahn & Gelso, 1997). Gelso (1979) suggested that there were 10 ingredients in the research training environment (i.e., all factors in graduate training programs, departments, and universities that reflect positive attitudes toward research), including modelling appropriate research behaviours and attitudes, positive reinforcement and support for research efforts, early and minimally threatening involvement in research, decoupling research and statistics, facilitating inward reflection for research ideas, emphasizing that science can be a partly social experience, teaching that all research is flawed and limited in some way, teaching varied investigative approaches to research, teaching how science and clinical practice can be wedded, and focusing on how scholarly activities can be accomplished in practice settings.

Royalty et al. (1986) devised the 45-item Research Training Environment Scale (RTES) to measure nine of the 10 ingredients of the research training environment that Gelso (1979) suggested to be influential in promoting students' research interest. The 10th ingredient (i.e., focusing on how scholarly activities can be accomplished in practice settings) was omitted, as this was considered an advanced skill. Then, Gelso (1993) abandoned the idea of “decoupling research and statistics” as there was no empirical support for this aspect. Gelso, Mallinckrodt, and Judge (1996) reformulated this concept as “teaching relevant statistics and the logic of research design”, and included this in their revision, the 54-item

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Research Training Environment Scale-Revised (RTES-R). A sample item: “My advisor offers much encouragement to me for my research activities and accomplishments”.

Kahn and Gelso (1997) introduced the idea of instructional and interpersonal factors within the research training environment. Interpersonal factors include early involvement, faculty modelling, positive reinforcement, and research as a social experience; and instructional factors include that all experiments are flawed, looking inward, teaching relevant statistics, varied investigative styles, and wedding of science and practice. Kahn and Miller (2000) created a short, 18-item form of the RTES-R by selecting one positively worded item and one negatively worded item from each subscale based on corrected item-total correlations.

Present Study

We employed a standard, classic test development approach (cf. DeVellis, 2016) to develop and provide initial validation support for the PRE Scale for academics. We conducted a literature review to determine the underlying domains for the construct, and hold focus group discussions with higher education academics to validate these domains and ensure that the items developed would be specific to the population’s experience. Next, we generated a list of approximately 70 items, had a group of experts rate them to examine their content validity, and administered the items along with supporting validity scales to a large sample of university-based academics. We used item analysis and exploratory factor analysis (EFA) on one half of the data to trim the number of items to 25 and determine the factor structure, and applied confirmatory factor analyses (CFA) on the second half of the data to confirm the factor structure. The reliability and initial validity were then assessed.

Phase 1 - Item Development

The aim of this phase was to create sufficient items to form the basis for the new scale, which was anticipated, for practical research purposes, to be approximately 25 items in

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length. We originated approximately twice as many items as would appear in the final measure (Hinkin, 1998; Kline, 2000). Items were generated based on a review of the literature (e.g., Gelso, 1979) and a series of six focus groups conducted by the first, third, and fourth authors, to engage with the target participants, validate the underlying domains of the construct identified in the literature review, and enhance content validity of the scale items (Vogt, King, & King, 2004). Participants were 42 academics (7 per group) from a state university in Central Java, Indonesia, who were requested to reflect on and discuss their own experiences and to give their opinions regarding characteristics of their university environment that might motivate or impede them in the conduct of research-related activities. We recorded the focus groups for later reference.

Accordingly, we identified five broad domains of PRE salient to higher education academics: beneficial social relationships, positive reinforcement, support and expectations, focus on research, and positive role models; and created 70 positively worded items (i.e., positively worded to minimize response bias; Salazar, 2015), which were written in English to represent these five domains. Four independent reviewers rated the suitability of each item to reflect a specific dimension of the construct. We removed 10 items that were considered overlapping or irrelevant, and adjusted several others, leaving a final list of 60 items.

Following Ægisdóttir, Gerstein, and Cinnarbas (2008), the first author translated the items into Bahasa Indonesia, and two Indonesian academics examined the expression. The items were then back-translated blindly into English by two bilingual Indonesian academics. All authors compared the back-translated versions with the originals, and adjusted the inaccuracies. The final items were then piloted with five Indonesian academics to check for readability.

Phase 2 - Item Analysis and EFA

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The aim of this phase was to identify items to be retained in the scale and to determine the final factor structure. We used item and EFA procedures.

Method

Participants. We obtained data from 598 academics who were recruited from four universities in Central Java, Indonesia, and divided this sample into two sub-samples using a random split procedure to allow for a cross-validation test of results and to reduce sample-specific effects that could potentially influence reliability and validity (Byrne, 2010). Sample A from the split ($N = 306$) was used for Phase 2, and Sample B ($N = 292$) was used for Phase 3 and Phase 4.

Sample A consisted of 50.3% female academics (3.9% did not report gender), whose mean age was 42.29 years ($SD = 10.12$; 52.3% did not report age). A large majority (69.3%) had a masters' degree, and 21.6% a doctorate (9.2% did not report education level). Only a small proportion (1.3%) were professors, 22.5% associate professors, 27.8% assistant professors, 16% lecturers, and 4.6% junior lecturers (27.8% did not report position). The mean tenure was 16.57 years ($SD = 10.04$; 12.7% did not report tenure).

Sample B consisted of 54.1% female academics (3.4% did not report gender). The mean age was 43.39 years ($SD = 9.74$; 49% did not report age), most (62.7%) had a masters' degree and 29.5% a doctorate (7.9% did not report education level). One percent were professors, 20.5% associate professors, 35.6% assistant professors, 15.4% lecturers, and 3.1% junior lecturers (24.3% did not report position). Mean tenure was 16.68 years ($SD = 9.67$; 13% did not report tenure).

There were no differences between Sample A and Sample B on any of the demographic variables: age, $t(1060) = 0.46, p = .65$, gender, $\chi^2(1) = 0.82, p = .37$, tenure, $\chi^2(2) = 6.93, p = .06$, and level of education $\chi^2(2) = 0.20, p = .65$.

Materials

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The 60 items generated in Phase 1 which were expected to reflect the five domains of PRE were administered in a questionnaire along with Organisational Culture/Support for Research (OCSR) and Research Involvement (RI) Scales, which were used to test for construct validity. Higher scores reflect higher levels of each construct.

PRE. This was assessed using the 60 items generated in Phase 1. Example items: “At my university, academics often informally discuss research ideas in their day-to-day discussions” (beneficial social relationship), “At my university, successful researchers have high status” (positive reinforcement), “My university assists researchers to publish by helping them with manuscript preparation (e.g., writing workshops)” (support and expectations), “At my university, academics think research is important” (focus on research), and “At my university, many academics publish their research in high quality academic journals” (positive role models); 6-point-scale of 1 = *strongly disagree* to 6 = *strongly agree*.

Organisational culture/support for research. We used the 20-item OCSR Scale (Kortlik, Bartlett, Higgins, & Williams, 2002) to assess academics’ perceptions of the organisational culture or support for conducting research. Sample item: “My peers support my efforts to publish in refereed research journals”; 6-point scale of 1 = *strongly disagree* to 6 = *strongly agree*. Cronbach alpha was reported as .88, and validity was supported by finding positive correlations with scales of research confidence (Kortlik et al., 2012).

Research involvement. We used the 24-item Research Involvement (RI) Scale (Whelan et al., 2003) to assess participants’ level of engagement in research. Sample item: “Participating in research as part of a collaborative team”; 6-point scale from 1 = *not at all* to 6 = *a great deal*. Alpha has been reported as .98, and construct validity has been supported by finding positive correlations with evidence of greater research output (Whelan et al., 2013).

Procedure

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The survey was administered by the chief researchers and assistants during working hours. This study was conducted with approval from the authors’ university ethics committee, and participants gave their permission to participate.

Results

Item analysis. We assessed: item skew to identify any item whose distribution indicated floor or ceiling effects; the inter-item correlations to identify any pairs of items that were too highly correlated ($r \geq .80$), which might indicate that the items were redundant; the corrected item-total correlations to identify any items with a weak or negative correlation with the total scale ($r < .30$), which might indicate items that were not tapping the construct of PRE; and age, gender, position, tenure, and level of education in relation to each item to identify items that might be responded to differently depending on demographic variables (Kline, 2000). No items were identified as problematic; thus, no items were eliminated.

EFA. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.94) and statistically significant Bartlett’s test of sphericity ($p < .001$) confirmed that the 60 items were suitable for factor analysis. The common variance is of interest in determining the underlying factor structure, thus, we used common factor analysis (i.e., principal-axis factor analysis; Hair, Black, Babin, & Anderson, 2010). As the five anticipated factors were expected to be correlated aspects of an overall perceived environment measure, we utilised a direct oblimin rotation (Hair et al., 2010). Following Hayton, Allen, and Scarpello (2004), we used several criteria to determine the number of factors: the scree plot, Velicer’s minimum average partial test, parallel analysis (O’Connor, 2000), at least three items loading on a factor (Costello & Osborne, 2005), and factor interpretability (Hinkin, 1998).

In the first EFA, the scree plot indicated five factors with eigenvalues > 1.0 . Velicer’s minimum average partial test and the parallel analysis also suggested a five-factor solution. We accepted this solution as these five item groupings were interpretable theoretically and

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reflected the five domains initially identified. Then, 35 items were deleted from the solution because they did not load meaningfully on any factor, or the factor loadings were $< .4$ and/or less than twice as strong on the appropriate factor as on the other factor (Hinkin, 1998). The final five-factor solution accounted for 65.58% of the variance: Factor 1 = 32.94%, factor 2 = 15.56%, factor 3 = 6.81%, factor 4 = 5.40%, and factor 5 = 4.86%. Table 1 displays factor loadings and eigenvalues.

Factor 1 (5 items; “beneficial social relationship”) includes the situation where individuals perceive that their social relationships support their participation in research-related activities ($\alpha = .88$, $M = 23.01$, $SD = 3.85$). Factor 2 (5 items; “positive reinforcement”) refers to the situation where individuals perceive positive social and non-social reinforcement for achievements in research-related activities ($\alpha = .92$, $M = 20.62$, $SD = 5.90$). Factor 3 (5 items; “support and expectations”) reflects perceived support and expectations from the university for conducting research-related activities ($\alpha = .86$, $M = 24.85$, $SD = 3.21$). Factor 4 (5 items; “focus on research”) includes perceived emphasises on research-related activities ($\alpha = .92$, $M = 22.69$, $SD = 4.53$). Factor 5 (5 items; “positive role models”) reflects perceived availability of positive role model for conducting research-related activities ($\alpha = .89$, $M = 21.81$, $SD = 4.36$). The associations among the five factors (range .10 to .47; all $p < .001$) were in line with the results from the EFA indicating that the subscales were somewhat independent, but with overlap among them. Alpha for the full scale was .92.

Insert Table 1 about here

Phase 3 - CFA

This phase aimed to validate the factor structure of the PRE Scale with Sample B. Using CFA (AMOS Version 4.0; Arbuckle & Wothke, 1995). We examined the 5-factor structure identified in Phase 2, and then compared this model with a 1-factor model, a hierarchical, 2nd-order model, and a bifactor model (Reise, Bonifay, & Haviland, 2013).

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We used the χ^2 statistic, the normed χ^2 (χ^2/df), the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA) to examine model fit. A significant χ^2 , $\chi^2/\text{df} < 3.0$, CFI and TLI values $> .92$, and RMSEA $< .08$ indicate satisfactory fit when sample size < 250 and observed variables number between 12 and 30. We then compared the different models using the χ^2 -difference test and the Akaike Information Criterion (AIC), where the lower value indicates a better fit (Hair et al., 2010).

The 5-factor model identified in Phase 2 generated satisfactory fit statistics (see Table 2 for fit statistics for all models). All factor loadings were statistically significant ($p < .001$) and ranged from .72 to .84 (beneficial relationship), .83 to .91 (positive reinforcement), .55 to .89 (support and expectations), .76 to .89 (focus on research), and .70 to .89 (positive role models). Correlations among the latent variables ranged from .10 to .62.

The 2nd-order model (correlations with 2nd-order factor = .43 to .87) and the bifactor model, but not the 1-factor model, also had satisfactory fit statistics. However, the best-fitting model was the bifactor model, which was statistically different from the 5-factor model, and generated the lowest AIC. The bifactor model included a general latent variable (i.e., dependent on all 25 items) and five subscale latent variables (i.e., five uncorrelated factors dependent on their respective five items). This model showed that each item is an indicator of both a total and subscale aspect, with the results for the total variable representing common sources of variance after controlling for subscale variances, and the subscale variables representing variances after controlling for the total variance (Reise et al., 2013).

Insert Table 2 about here

As our results supported multi-dimensionality of the scale (i.e., the 5-factor, 2nd-order, and bifactor models all had acceptable fit statistics), it needed to be determined whether the scale should be interpreted at the global or subscale level. We calculated bifactor model-based reliability estimates and compared the variances explained for the total and subscale

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interpretations. Following Rodriguez et al. (2016), we used the Bifactor Indices Calculator (Dueber, 2017) to calculate Omega, OmegaH, Relative Omega, and the explained common variance (ECV). Omega, the estimate of the proportion of variance accounted for when considering all items in a factor, was .96 (general factor), and .91, .94, .86, .92, and .90 (specific factors), indicating high reliability for the general factor and sound to high reliability for the specific factors, and suggesting all factors have acceptable reliability. OmegaH, the proportion of unique variance explained by a factor, was .71 (general factor), and was .37, .62, and .52, .62, and .25 (specific factors). Relative Omega, the proportion of reliable variance in the multidimensional composite due to a factor, was .74 (general factors), and was .41, .68, .60, .67 and .28 (specific factors), indicating the majority of reliable variance in the total scores resides within the general factor. Last, the ECV, the proportion of all common variance explained by a factor, was .40 (general factors), and was .09, .21, .10, .14, and .06 (specific factors), suggesting a moderately strong global factor, with much less variance explained by the specific factors. Thus, it can be concluded that interpretation at the total level (and not the subscale level) will give the more useful measure of PRE, as the total factor will account for more meaningful levels of variance in the construct.

Phase 4: Construct Validity

This phase aimed to evaluate the initial construct validity of the scale by correlating scores from the PRE Scale with scores from OCSR and RI Scales. Individuals who reported stronger research training environments were more likely to perceive their environment to be more research supportive (Kahn & Miller, 2000), and those who perceived a more research supportive work environment were more likely to report a positive attitude towards research and greater research engagement (Royalty et al., 1986). Thus, we expected PRE Scale to be associated positively with OCSR and RI Scales. These analyses were conducted using Sample B ($N = 292$). All correlations were statistically significant and in the expected

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directions, as reported in Table 3. The results demonstrated that the PRE Scale was associated with the two other constructs as expected; supporting convergent validity of the scale.

Insert Table 3 about here

Discussion

We devised and reported initial validity evidence for a psychometrically sound, 25-item scale to assess PRE for higher education academics: The Perceived Research Environment (PRE) Scale. We operationalised PRE as the organisational environment perceived by academics, which enables and supports them to learn and conduct research-related activities and yield scientific publications. The salient domains identified were beneficial social relationships, positive reinforcement, support and expectations, focus on research, and positive role models. Content validity was supported by a review of the literature, focus groups, pilot testing, and use of expert reviewers, whereas construct validity was supported by the EFAs and CFAs, which indicated that the new scale reflected the five anticipated inter-correlated domains. The measure can most productively be applied at the global level, that it is internally reliable, and that the positive associations with the OCSR and the RI Scale supported its convergent validity.

Previous research has shown the importance of PRE in academics (e.g., Duffy et al., 2013). The present study provided a comprehensive measure of PRE, which assesses various aspects of the PRE construct. At 25 items, the scale will be practical and suitable to be used simultaneously with other scales in both research and practice. Extending PRE research using this scale has the potential to add to our knowledge and understanding of the PRE from the perspective of higher education academics, for example when designing research studies, identifying its nomological network, and examining its across-time correlates.

The PRE Scale also will be of use to those who work with academics at any stage of their career when they have issues with research-related performance, and it will be useful to

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help explore helps and blockages related to their research-related progress and achievement. Practitioners can use the scale as a diagnostic tool at an early stage of career counselling, as well as an evaluation instrument after a series of counselling sessions. At the organisational level, the scale can be used for human resource mapping as a foundation for formulating policies at department, research centre, and university levels.

Limitations

Our study was conducted using a sample of higher education academics from several universities in Central Java. Hence, the conclusions of this study need to be tested on other academic populations. We examined content and construct validity of the scale, and future researchers could focus on establishing predictive validity by, for example, testing the longitudinal associations between scores on the scale at one point in time and subsequent outcomes. We showed that the scale was unrelated to several demographic variables (e.g., age, gender, tenure, level of education), suggesting no inherent bias based on these characteristics; however, future studies need to examine structural invariance on these and other variables to support these results.

Conclusion

The current research has demonstrated support for a scale to measure PRE for higher education academics, although future studies are needed to extend support for its validity and to test its applicability on more diverse populations. Our findings contribute to the body of literature on academics' PRE, and open the way for improved career counselling for academics, research development interventions, and organisational policies.

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References

Ægisdóttir, S., Gerstein, L. H., & Cinnarbas, C. D. (2008). Methodological issues in cross-cultural counselling research: Equivalence, bias, and translations. *The Counseling Psychologist*, 36, 188-219. doi:10.1177/0011000007305384

Arbuckle, J. L. & Wothke, W. (1995). *Amos 4.0 user's guide*. Chicago, IL: Small Waters Corporation.

Bland, C. J., & Ruffin, M. T. (1992). Characteristics of a productive research environment: Literature review. *Academic Medicine*, 67, 385-397. doi:10.1097/00001888-199206000-000-10

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.

Byrne, B. (2010). *Structural equation modelling with AMOS: Basic concepts, applications, and programming*. New York, NY: Routledge.

Chen, Y., Gupta, A., & Hoshower, L. (2006). Factors that motivate business faculty to conduct research: An expectancy theory analysis. *Journal of Education for Business*, 81, 179-189. doi:10.3200/JOEB.81.4.179-189

Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, 10, 1-9. Retrieved from <http://pareonline.net/pdf/v10n7.pdf>

DeVellis, R. F. (2016). *Scale development: Theory and applications* (Vol. 26). Los Angeles, CA: Sage.

Dueber, D. M. (2017). Bifactor Indices Calculator: A Microsoft Excel-based tool to calculate various indices relevant to bifactor CFA models. <https://dx.doi.org/10.13023/edp.tool.01> [Available at <http://sites.education.uky.edu/apslab/resources/>]

PERCEIVED RESEARCH ENVIRONMENT SCALE

- Duffy, R. D., Torrey, C. L., Bott, E. M., Allan, B. A., & Schlosser, L. Z. (2013). Time management, passion, and collaboration: A qualitative study of highly research productive counseling psychologists. *The Counseling Psychologist, 41*, 881-917. doi: 10.1177/0011000012457994
- Eam, P. (2015). Investigating relationship among research self-efficacy, research outcome expectations, and research interest of Cambodian faculty: Testing social-cognitive theory. *International Journal of Sociology of Education, 4*, 199-224. doi:10.17583/rise.2015.1752
- Gelso, C. J. (1979). Research in counseling. Methodological and professional issues. *The Counseling Psychologist, 8*, 7-35.
- Gelso, C. J. (1993). On the making of a scientist-practitioner: A theory of research training in professional psychology. *Professional Psychology: Research and Practice, 24*, 468-476. doi:10.1037/0735-7028.24.4.468
- Gelso, C. J., Mallinckrodt, B., & Judge, A. B. (1996). Research training environment, attitude toward research, and research self-efficacy. The revised Research Training Environment Scale. *The Counseling Psychologist, 24*, 304-322. doi:10.1177/0011000096242010
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. (2010). *Multivariate data analysis. A global perspective*. (7th ed.). New Jersey, NJ: Prentice Hall.
- Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods, 7*, 191-205. doi:10.1177/1094428104263675
- Hinkin, T. R. (1998). A brief tutorial on the development of measures for the use in survey questionnaires. *Organizational Research Methods, 1*, 104-121. doi:10.1177/109442819800100106

PERCEIVED RESEARCH ENVIRONMENT SCALE

Holden, L., Pager, S., Golenko, X., & Ware, R. S. (2012). Validation of the Research Capacity and Culture (RCC) tool: Measuring RCC at individual, team, and organisation levels. *Australian Journal of Primary Health, 18*, 62-67. doi:10.1071/PY10081

Kahn, J. H., & Gelso, C. J. (1997). Factor structure of the Research Training Environment Scale – Revised: Implications for research training in applied psychology. *The Counseling Psychologist, 25*, 22-37. doi:10.1177/0011000097251004

Kahn, J. H., & Miller, S. A. (2000). Measuring global perceptions of the Research Training Environment Using A Short Form of the RTES-R. *Measurement and Evaluation in Counseling and Development, 33*, 103-119. Retrieved from <https://search.proquest.com/docview/195607998?pq-origsite=gscholar>

Kortlik, J. W., Bartlett II, J. E., Higgins, C. C., & Williams, H. A. (2002). Factors associated with research productivity of agricultural education faculty. *Journal of Agricultural Education, 43*, 1-10. doi:10.5032/jae.2002.03001

Lindsay, R., Breen, R., & Jenkins, A. (2002). Academic research and teaching quality. The views of undergraduate and postgraduate students. *Studies in Higher Education, 27*, 309-327. doi:10.1080/03075070220000699

Mallinckrodt, B. (1997). Discovering the research training environments that fit the students we select: The challenge of providing for diverse needs. *The Counseling Psychologist, 25*, 68-73. doi:10.1177/0011000097251006

Marsh, G. W., & Brown, T. L. (1992). The measurement of nurses' attitudes towards nursing research and the research environment in clinical settings. *Journal of Clinical Nursing, 1*, 315-322. doi:10.1111/j.1365-2702.1992.tb00425.x

Nguyen, Q., Klopper, C., & Smith, C. (2016). Affordances, barriers, and motivations: Engagement in research activity by academics at the research-oriented university in

PERCEIVED RESEARCH ENVIRONMENT SCALE

Vietnam. *Open Review of Educational Research*, 3, 68-84.

doi:10.1080/23265507.2016.1170627

Owen, M. (1992). Research at small Canadian universities. *The Canadian Journal of Higher Education*, 22, 1-14. Retrieved from

<http://journals.sfu.ca/cjhe/index.php/cjhe/article/view/183130/183106>

Pranulis, M. F., & Gortner, S. R. (1985). Researchmanship: Characteristics of productive research environments in nursing. *Western Journal of Nursing Research*, 7, 127-131.

doi:10.1177/00920055X8500700112

Reise, S. P., Bonifay, W. E., & Haviland, M. G. (2013). Scoring and modelling psychological measures in the presence of multidimensionality. *Journal of Personality Assessment*, 95,

129-140. doi:10180/00223891.2012.725437

Rodriguez, A., Reise, S. P., & Haviland, M. G. (2016). Evaluating bifactor models:

Calculating and interpreting statistical indices. *Psychological Methods*, 21, 137-150.

doi:10.1037/met0000045

Royalty, G. M., Gelso, C. J., Mallinckrodt, B., & Garrett, K. (1986). The environment and the student in counselling psychology: Does the research training environment influence graduate students' attitudes toward research? *The Counseling Psychologist*, 14, 9-30.

doi:10.1177/0011000086141002

Salazar, M. (2015). The dilemma of combining positive and negative items in scales.

Psicothema, 27, 192-199. doi:10.7334/psicothema2014.266

Shivy, V. A., Worthington, E. L., Wallis Jr, A. B., & Hogan Jr, C. (2003). Doctoral research training environments (RTEs): Implications for the teaching in psychology. *Teaching of*

Psychology, 30, 297-302. doi:10.1207/S1528023TOP3004_03

PERCEIVED RESEARCH ENVIRONMENT SCALE

Vogt, D. S., King, D. W., & King, L. A. (2004). Focus groups in psychological assessment: Enhancing content validity by consulting members of the target population. *Psychological Assessment, 16*, 231-243. doi:10.1037/1040-3590.16.3.231

Whelan, K., & Markless, S. (2012). Factors that influence research involvement among registered dietitians working as university faculty: A qualitative interview study. *The Academy of Nutrition and Dietetics, 112*, 1021-1028. doi:10.1016/j.jand.2012.03.002

Whelan, K., Copeland, E., Oladitan, L., Murrells, T., & Gandy, J. (2013). Development and validation of a questionnaire to measure research involvement among registered dietitians. *Journal of the Academy of Nutrition and Dietetics, 113*, 563-568. doi:10.1016/j.jand.2012.08.027

White, C. S., James, K., Burke, L. A., & Allen, R. S. (2012). What makes a “research star”? Factors influencing research productivity of business faculty. *International Journal of Productivity and Performance Management, 61*, 584-602. doi:10.1108/17410401211249175

Young, K., & Rice, M. (1983). Measurement of attitude toward the nursing research environment in the university setting. Paper presented at the First Annual Scientific Meeting on Research in Nursing Education, San Francisco, California.

Table 1
Factor Loadings for the PRE Scale: Sample A (N = 306)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1. At my university, academics are willing to involve their colleagues in research projects	.86	-.10	-.04	-.07	-.01
2. At my university, academics support one another in their research projects	.83	.11	.13	-.04	.01
3. At my university, academics often informally discuss research ideas in their day-to-day discussions	.83	-.09	-.04	.03	-.01
4. There is a sense at my university that academics enjoy their research activities	.71	.06	.04	.05	.22
5. At my university, researchers actively involve students in their research projects	.70	-.09	-.01	.20	-.01
6. My university rewards successful researchers	.03	-.90	-.01	.07	.01
7. My university is well known for its research expertise	-.01	-.89	.01	-.03	.04
8. At my university, researchers who do well are highly respected by their colleagues	.04	-.85	.09	-.01	-.02
9. At my university, there are incentives for successful research activities (e.g., getting published or obtaining a research grant	-.01	-.83	.03	.11	-.09
10. At my university, we all celebrate when a colleague is successful (e.g., gets published or obtains a research grant	.08	-.76	.13	-.09	.11
11. My university sets clear expectations regarding research output for academics	.01	.01	.82	-.06	.01
12. My university has specific programs and funds to help new academics get their research started	.04	.01	.79	-.02	.05
13. My university assists researchers to publish by helping them with manuscript preparation (e.g., writing workshops)	-.01	-.03	.78	.02	-.03
14. My university has clear expectations that academics will engage in research	.09	-.08	.76	.07	-.05
15. Academics at my university know it is expected of them that they attend conferences and present their research	-.08	-.07	.68	.11	-.05
16. At my university, academics are encouraged to use a wide variety of research methods in their research	-.01	.05	.06	-.91	-.01
17. At my university, researchers are always on the look-out for research collaborators	.06	-.02	.04	-.86	.03
18. At my university, academics thinks research is important	.03	.02	.03	-.85	-.04
19. At my university, new faculty members are encouraged to publish as soon as they commence work	-.05	-.14	-.08	-.79	.09
20. At my university, opportunity for academics to actualize themselves in research is widely open	.08	.16	.08	-.78	.07
21. Academics at my university give high priority to their research	.02	.04	.14	-.03	.86
22. At my university, many academics publish their research in high quality academic journals	.01	-.03	-.06	-.01	.86
23. Academic at my university are strongly focused on research	-.13	.03	-.05	.09	.83
24. Academics at my university strive to publish their research in high quality journals	.13	.01	.10	-.01	.77
25. Many academics at my university are working on important research projects	.14	-.05	.01	.04	.70
Eigenvalues	8.57	4.21	2.06	1.69	1.55
% variance explained	32.94	15.56	6.81	5.40	4.86

Note. Factor 1 = Beneficial social relationships, Factor 2 = Positive reinforcement, Factor 3 = Support, Factor 4 = Encouragement, Factor 5 = Role model; Main loadings highlighted in bold.

PERCEIVED RESEARCH ENVIRONMENT SCALE

Table 2

Model Fit Indices of the 3-Factor, 1-Factor, 2nd-Order Factor, and Bifactor Models for Sample B (N = 292)

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	χ^2_{Diff}	AIC
5-factor	559.69***	256	2.19	.94	.94	.06	-	697.69
1-factor	2324.78***	270	8.61	.63	.59	.16	$p < .001$	2434.78
2 nd order	749.03***	269	2.78	.91	.90	.08	$p < .001$	861.03
Bifactor	513.33***	244	2.10	.95	.94	.06	$p < .001$	675.33

Note. χ^2_{Diff} statistics refer to differences with 5-factor model. *** $p < .001$

PERCEIVED RESEARCH ENVIRONMENT SCALE

Table 3

Summary Data for Sample B (N = 292; correlations above diagonal)

Indonesian												
Scale	M	SD	Range	α	1	2	3	4	5	6	7	8
1. Full scale	112	16.65	28-145	.93	-	.81**	.65**	.63**	.80**	.64**	.47**	.49**
2. Subscale 1 (beneficial social relationship)	22.87	4.29	5-30	.90		-	.40**	.48**	.52**	.54**	.30**	.35**
3. Subscale 2 (positive reinforcement)	20.36	6.22	5-30	.94			-	.12*	.49**	.10*	.14*	.24**
4. Subscale 3 (support and expectations)	24.44	3.70	6-30	.87				-	.38**	.49**	.38**	.32**
5. Subscale 4 (focus on research)	22.53	4.80	5-30	.91					-	.39**	.54**	.58**
6. Subscale 5 (positive role models)	21.79	4.59	5-30	.89						-	.35**	.27**
7. Organisational culture/ support for research	67.24	15.40	24-144	.93							-	.54**
8. Research involvement	100.82	21.12	18-108	.97								-

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

**2. Bukti Konfirmasi Review dan
Hasil Review Pertama
(7 Okt 2018)**



Dian Sawitri <dian.r.sawitri@gmail.com>

Journal of Psychoeducational Assessment - Decision on Manuscript ID JPA-18-0139

Journal of Psychoeducational Assessment <onbehalf@manuscriptcentral.com>

Sun, Oct 7, 2018 at 2:08 AM

Reply-To: tobin@temple.edu

To: dian.r.sawitri@gmail.com

Cc: dsaklofs@uwo.ca

06-Oct-2018

Dear Dr. SAWITRI:

Manuscript ID JPA-18-0139 entitled "Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics" which you submitted to Journal of Psychoeducational Assessment, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter. I appreciate your patience with the review process.

The reviewers noted strengths in the manuscript, particularly its methods and execution; however, the reviewers also expressed concerns about it. Based on the reviewers' responses, I ask that you revise your manuscript to address their comments in a revision. The reviewers were helpful in detailing ways to think about these issues and adjust the manuscript accordingly, so I encourage you to examine their comments carefully as you revise. It is likely I will send your revised manuscript to one of these initial reviewers. As with any manuscript, I cannot guarantee that these efforts will translate to acceptance in JPA.

To revise your manuscript, log into <https://mc.manuscriptcentral.com/jopa> and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

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Because we are trying to facilitate timely publication of manuscripts submitted to Journal of Psychoeducational Assessment, your revised manuscript should be submitted within 30 days from receipt of this letter. If it is not possible for you to submit your revision in this amount of time, please advise the Associate Editor before the 30 day period as the link to your article will expire and you will not be able to re-submit your paper without making a specific request.

Once again, thank you for submitting your manuscript to Journal of Psychoeducational Assessment and I look forward to receiving your revision.

Sincerely,
Dr. Renée Tobin
Associate Editor, Journal of Psychoeducational Assessment
tobin@temple.edu

Don Saklofske
Editor

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author

Thank you for the opportunity to review this manuscript (JPA-18-0139). This article described the development and validation of the Perceived Research Environment Scale (PRES), a faculty-report measure for use in higher education institutions. I hope the following comments will assist the authors in revising their manuscript.

1.) This study seems to lack of a cohesive, unifying theoretical framework. The authors vaguely reference potential applications of Bronfenbrenner's ecological theory, but it is unclear how this theory guided instrument development and the analyses. The authors also reference several studies exploring various aspects of research environments, but these variables do not seem to be united in any particular framework. It would have been more compelling for the authors to apply a specific theoretical framework to guide the development of the measure.

2.) On page 7, the authors describe a method for randomly assigning participants to Samples A and B. They contend that the groups were comparable with respect to several demographic variables; however, I am most interested in knowing whether the groups were comparable with respect to institution. Participants came from only four institutions, and it is likely that participants from the same university would rate their research environments similarly (given that they are likely experiencing similar pressures). Is it possible that either Samples A or B consisted of a disproportionately large or small number of faculty from any one of the four institutions? This might impact the results. Ideally, the sample would have comprised faculty from a variety of different institutions.

On a related note, it might be interesting to see whether faculty from the same institution had similar ratings of their research environments. I suppose the ratings might be similar for some items (availability of funding) but less similar for items that vary more across individuals (e.g., access to informal mentoring).

3.) The authors note that there were no significant differences between Sample A and Sample B with respect to age. I'm not sure how meaningful this assertion is, given that approximately 50% of participants in both samples did not report their ages. This constitutes a fairly large amount of missing data.

In general, how were missing data handled in this study? This is important to discuss in the manuscript.

4.) I would have liked to have had some more information about the 42 academics included in the focus groups as well as the four independent reviewers who rated the suitability of the items (p. 6). For example, who were the reviewers and what qualified them for this task?

5.) The authors administered a measure of research involvement (i.e., the Research Involvement Scale). I would be curious to know if Samples A and B differed with respect to scores on this measure. If one group were more involved in research than the other, the two samples would not be comparable on a very important dimension (especially given the nature of the instrument the authors are developing).

6.) The authors sampled participants with a wide range of academic roles, including professors and lecturers. I can imagine that some of these positions are not inherently or contractually research roles. Would respondents with positions that were non-research oriented be the best respondents for this type of measure?

7.) The sample included very few full professors (i.e., approximately 1% of each subsample), which seems problematic for a couple of reasons. First, how might this have impacted the authors attempts to determine whether items were responded to differently by faculty in various positions? Were subsamples for each position (e.g., full professor, associate professor, assistant professor) large enough (and comparable enough in size) to detect response differences across groups? Second, full professors may have more institutional knowledge and research experience than associate and assistant professors. To have so few in the sample appears to be a notable limitation of this study.

8.) I would have also recommended that the authors collect data regarding the length of time participants had been at their respective institutions. Newer faculty might not have had enough time to form opinions about their respective research environments.

9.) I would have been interested to see the internal consistency values for the PRES total score and subscale scores in Sample B. I would recommend the authors report these values.

10.) For the CFA, the authors suggest that three of the four models (i.e., 2nd order model, 5-factor model, and bifactor model) had satisfactory fit statistics. However, CFI values for the 5-factor and 2nd order models were below .95. Some research has suggested that a more appropriate criterion for CFI values is .95 or greater (rather than .90

or greater). The authors may wish to revise their language accordingly. (Please see Hu and Bentler, 1999; reference provided below.)

11.) Minor comments:

- a. On page 3, the authors write, "Duffy et al. (2013) interview 17 of the most research-productive counselling psychologists within the American Psychological Association accredited counselling program." Did the authors mean 17 faculty across a variety of APA-accredited programs?
- b. In the implications section, I would further emphasize the potential value of the PRES for informing organizational change. This point is a good one and should be further developed. For example, more detail about the specific uses of the instrument for facilitating organizational improvement would be interesting (and would ultimately make the paper more compelling).

Reference

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis. Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55.

Reviewer: 2

Comments to the Author

This manuscript reports on the development and psychometric evolution of a measure of perceived research environment. Specifically, the measure is designed to tap into a construct comprised of a number of dimensions related to an individual's perception of the availability of resources, support, and appreciation of research efforts within the institution in which the individual is employed. I found the manuscript to be clear and well-written. The authors did a nice job explaining the concept of the perceived research environment and why it is important, as well as the previous attempts to at psychometric instruments to capture the construct. As illustrated in the introduction, previous measures have been quite specific to either certain fields (e.g., nursing), or populations (e.g., graduate students). Thus, the authors make a good case for a general perceived research environment scale that could be applicable to Universities or other research institutions, regardless of the specific discipline. However, I would recommend the authors add a paragraph at the end of the introduction, before the "Present Study" section, summarizing this and making this rationale more explicit.

There are other strengths of this paper, including conducting item analyses, evaluation of the internal structure with EFA followed by a CFA in a random hold-out sample to confirm the factor structure. The factor analytic methods were appropriate and fit the theoretical conception of the construct, including use of principal axis factoring, direct oblimin rotation, which allows for correlations among the rotated factors, and the use of Velicer's MAP and parallel analysis to inform the decision on the number of factors to retain. With that said, there are also some areas that should be addressed to improve the paper and the contribution of the study.

I appreciate the fact that the authors conducted focus groups as one of the methods for identifying the important domains of the construct. It would probably be useful if the authors provided a bit more detail about how the information from the focus groups was analyzed, and what dimensions they identified, independent of the dimensions that the identified from the literature review.

The conduct of the item analyses, including evaluation of item response distributions, item-total correlations, and inter-item correlations was appropriate, and an often over-looked step in the process of test development. Although the authors indicated that none of the items were eliminated based upon the item analyses, it would still be useful information to present the results of the item analyses in a table, including mean, standard deviation, skewness, kurtosis, and item-total correlation of each item, as well as the mean item-total correlation, if not for the original set of items, at least for the final set of items after eliminating items due to factor loading issues.

For the EFA, the authors indicate that both the minimum average partial (MAP) and parallel analysis procedures indicated 5 factors, but they do not present the results of the analysis. It is good practice to provide the numbers generated from these procedures that lead to the conclusion. So, for the parallel analysis, the first 6 actual and random eigenvalues can be presented.

Regarding the CFA, the procedures were reasonable, and the fit statistics were appropriate. The computation of Omega's was also useful. My one suggestion here would be to present a table or figure showing the loadings of the bifactor model, which was determined to be the best fitting model.

The validity analyses were fairly limited in scope, but the measures used were reasonable and the correlations found were supportive of construct validity.

The Discussion section was a bit lacking in content. Given that construct validation requires a multitude of evidence from different methods and perspectives, what is especially needed in the discussion section is suggestions for further developments, such as other constructs, measures, and criterion variables would be useful to further establish the nomological network and construct validity of scores from this measure. I found the statement that the measure

would be useful for “early stages of career counseling” to be perplexing. Perhaps I am missing something, but it seems this measure would only be applicable to someone who is already working in an institution with some kind of research focus. Otherwise, what “research environment” are they reporting on. In addition, it is premature to recommend a measure for applied use after one development study.

**3. Bukti Konfirmasi Submit Revisi Pertama,
Respon kepada Reviewer,
dan Artikel yang Diresubmit
(3 Nov 2018)**



Dian Sawitri <dian.r.sawitri@gmail.com>

Journal of Psychoeducational Assessment - Manuscript ID JPA-18-0139.R1

Journal of Psychoeducational Assessment <onbehalf@manuscriptcentral.com>

Sat, Nov 3, 2018 at 8:08 PM

Reply-To: JPA@sagepub.com

To: dian.r.sawitri@gmail.com, p.creed@griffith.edu.au, harlina_nc@yahoo.com, anggun.resdasari@gmail.com

03-Nov-2018

Dear Dr. SAWITRI:

Your manuscript entitled "Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics" has been successfully submitted online and is presently being given full consideration for publication in Journal of Psychoeducational Assessment.

Your manuscript ID is JPA-18-0139.R1.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at <https://mc.manuscriptcentral.com/jopa> and edit your user information as appropriate.

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Sincerely,
Journal of Psychoeducational Assessment Editorial Office

RESPONSE TO THE REVIEWERS OF THE JOURNAL OF PSYCHOEDUCATIONAL ASSESSMENT

MANUSCRIPT ID: JPA – 18 – 0139

Reviewer: 1

Comments to the Author

Thank you for the opportunity to review this manuscript (JPA-18-0139). This article described the development and validation of the Perceived Research Environment Scale (PRES), a faculty-report measure for use in higher education institutions. I hope the following comments will assist the authors in revising their manuscript.

1.) This study seems to lack of a cohesive, unifying theoretical framework. The authors vaguely reference potential applications of Bronfenbrenner's ecological theory, but it is unclear how this theory guided instrument development and the analyses. The authors also reference several studies exploring various aspects of research environments, but these variables do not seem to be united in any particular framework. It would have been more compelling for the authors to apply a specific theoretical framework to guide the development of the measure.

Response:

We updated our previous explanations regarding Bronfenbrenner's theory and this section on pages 2-3:

The important role of the research environment for academics is consistent with Bronfenbrenner's (1979, 1986) ecological systems theory. This perspective emphasises that, compared to the objective environment, perceptions of the environment are of primary significance, because it is these that affect and guide behaviour. Bronfenbrenner argued that developing individuals are surrounded by interrelated systems. The inner circle, or microsystem, is where academics have direct, face-to-face contact with significant others, primarily their colleagues. Clusters of microsystems are called mesosystems (e.g., academics talking to colleagues from other departments constitutes a linkage between two systems). Beyond this are settings (i.e., exosystems) that are not experienced directly by the academics, but nonetheless influence their microsystem through links such as communications from management. Bronfenbrenner also described a macrosystem, which incorporated the wider society and culture. The influences here come via policy and reward systems in the university. Bronfenbrenner further proposed a chronosystem, which captures change over time in the characteristics of the individual (e.g., career-related transitions) and environmental change (e.g., national pressure to increase scientific publications and social conditions).

For the individual academic in the research-focused environment, a relational viewpoint, which focuses on the developing individual in a changing context, is considered a useful perspective from which to comprehensively understand occupational and career behaviours (Vondracek, Lerner, & Schulenberg, 1986). These theorists argued that due to the continually changing nature of the individual and the context, a dynamic interactional approach, or a developmental contextual perspective, should be applied to understand occupational and career development. A developmental contextual point of view proposes that the context is not only continually changing, but also that the changes are influenced by the individuals and their characteristics. When considered from this perspective, occupation and career development reflect an interactive process where individuals both affect and are

affected by the features of their environment, including social, cultural, and physical conditions.

In line with Bronfenbrenner's (1979, 1986) ecological systems theory and Vondracek et al.'s (1986) person-context relationships proposition, individuals will function better, demonstrate adapted outcomes, and be more satisfied when their characteristics fit the demands of the environment. Individuals with a good person-environment fit are also likely to receive favourable feedback and input from the surroundings. Conversely, mismatched individuals will tend to demonstrate poorer outcomes and receive less positive feedback.

Person factors (e.g., personality) and background contextual variables (e.g., socio-economic status) also shape learning experiences and thus affect occupational and career behaviours. From a social cognitive perspective (Bandura, 1991; Lent, Brown, & Hackett, 1994), individual interpretations of these experiences shape the development of self-efficacy (beliefs about one's ability to successfully manage and perform courses of action) and outcome expectations (beliefs about the consequences of given actions). Further, self-efficacy fosters favourable outcome expectations, and both self-efficacy and outcome expectations, independently and jointly, foster interests (e.g., research interests and activity) and the development of goals (e.g., intentions to engage in research activities), which, in turn, motivate research-related actions (e.g., research involvement). The success or failure that follows these actions promotes further learning, which then prompts individuals to revise their self-efficacy and outcome expectations, and, in turn, leads to a change in interests and goals. Thus, providing direct and vicarious research-related experiences, giving the opportunity to engage in various research tasks, and opening up research possibilities, should lead to differentiated beliefs about the academic's own capabilities and consequences of performing a particular behaviour, which, in turn, should cultivate research-focused interests and goals that will become more crystallised over time.

2.) On page 7, the authors describe a method for randomly assigning participants to Samples A and B. They contend that the groups were comparable with respect to several demographic variables; however, I am most interested in knowing whether the groups were comparable with respect to institution. Participants came from only four institutions, and it is likely that participants from the same university would rate their research environments similarly (given that they are likely experiencing similar pressures). Is it possible that either Samples A or B consisted of a disproportionately large or small number of faculty from any one of the four institutions? This might impact the results. Ideally, the sample would have comprised faculty from a variety of different institutions.

On a related note, it might be interesting to see whether faculty from the same institution had similar ratings of their research environments. I suppose the ratings might be similar for some items (availability of funding) but less similar for items that vary more across individuals (e.g., access to informal mentoring).

Response:

The composition of academics from the four institutions did not differ significantly across Sample A and Sample B, $\chi^2(3) = 6.31, p = .10$. We added information regarding this on pages 10 and 17.

With respect to the related note on whether academics from the same university reported similar ratings of their research environment, we did not calculate this, for while it might be interesting, we considered it more relevant for future studies, for example, related to whether different research environments were related to different levels of research output.

3.) The authors note that there were no significant differences between Sample A and Sample B with respect to age. I'm not sure how meaningful this assertion is, given that approximately 50% of participants in both samples did not report their ages. This constitutes a fairly large amount of missing data.

In general, how were missing data handled in this study? This is important to discuss in the manuscript.

Response:

We retained all cases from participants who completed all of the questionnaire items, as all participants were academics. Only a small number of responses (24 survey booklets) had missing scale data, and these were omitted from the analyses.

Some participants did not complete some of their demographic variables. We did not delete these cases or estimate any of the demographic data, as these data were used primarily to describe the sample. We added a statement to this effect in the Limitations section:

"We showed that the scale was unrelated to several demographic variables (e.g., age, gender, tenure, level of education, and institutions), suggesting no inherent bias based on these characteristics; however, we had missing demographic data, and future studies need to confirm this, and examine structural invariance on these and other variables to support the usefulness of the scale."

4.) I would have liked to have had some more information about the 42 academics included in the focus groups as well as the four independent reviewers who rated the suitability of the items (p. 6). For example, who were the reviewers and what qualified them for this task?

Response:

We added these statements on page 6: "The independent reviewers who rated the suitability of the items consisted of 1 professor in psychology who had expertise in career development and test development and 3 doctoral-level psychology academics who had expertise in test development."

We also added these statements on page 7: "The 42 academics included in the focus groups consisted of 6 professors, 12 associate professors, 12 assistant professor, 6 lecturers, and 6 junior lecturers....."

5.) The authors administered a measure of research involvement (i.e., the Research Involvement Scale). I would be curious to know if Samples A and B differed with respect to scores on this measure. If one group were more involved in research than the other, the two samples would not be comparable on a very important dimension (especially given the nature of the instrument the authors are developing).

Response:

The scores of the Research Involvement Scale for Sample A and Sample B did not differ significantly, $t(596) = -.33$ ($p = .74$). We added this information on page 10.

6.) The authors sampled participants with a wide range of academic roles, including professors and lecturers. I can imagine that some of these positions are not inherently or contractually research roles. Would respondents with positions that were non-research oriented be the best respondents for this type of measure?

Response:

All academics sampled had a research component to their role. The practice of employing academics who are teaching-only or administration-only is rarely employed in Indonesia, unlike in some Western countries.

7.) The sample included very few full professors (i.e., approximately 1% of each subsample), which seems problematic for a couple of reasons. First, how might this have impacted the authors attempts to determine whether items were responded to differently by faculty in various positions? Were subsamples for each position (e.g., full professor, associate professor, assistant professor) large enough (and comparable enough in size) to detect response differences across groups? Second, full professors may have more institutional knowledge and research experience than associate and assistant professors. To have so few in the sample appears to be a notable limitation of this study.

Response:

We added this comment to the Limitation section on page 16:

“We only had a very small number of professors in the samples, and the number of associate professors, assistant professors, and lecturers were not proportional. Future studies need to consider the proportion of their sample when collecting data in academics, as this will affect the response regarding perceived research environment.”

8.) I would have also recommended that the authors collect data regarding the length of time participants had been at their respective institutions. Newer faculty might not have had enough time to form opinions about their respective research environments.

Response:

We did have these data, but originally did not consider it as a way to describe the sample. We have now reported these details in the Participants section on page 9-10.

9.) I would have been interested to see the internal consistency values for the PRES total score and subscale scores in Sample B. I would recommend the authors report these values.

Response:

We added this ~~ese~~ statements on page 13: “In Sample B, Alpha for the full scale was .93 ($M = 112$, $SD = 16.65$), Factor 1 ($\alpha = .90$, $M = 22.87$, $SD = 4.29$), Factor 2 ($\alpha = .94$, $M = 20.36$, $SD = 6.22$), Factor 3 ($\alpha = .87$, $M = 24.44$, $SD = 3.70$), Factor 4 ($\alpha = .91$, $M = 22.53$, $SD = 4.80$), and Factor 5 ($\alpha = .89$, $M = 21.79$, $SD = 4.59$).”

10.) For the CFA, the authors suggest that three of the four models (i.e., 2nd order model, 5-factor model, and bifactor model) had satisfactory fit statistics. However, CFI values for the 5-factor and 2nd order models were below .95. Some research has suggested that a more appropriate criterion for CFI values is .95 or greater (rather than .90 or greater). The authors may wish to revise their language accordingly. (Please see Hu and Bentler, 1999; reference provided below.)

Response:

Hair, Black, Babin, and Anderson (2010) provide fit statistics recommendations that are sensitive to sample size and the number of observed variables to be estimated. For example, a significant χ^2 , $\chi^2/df < 3.0$, CFI and TLI values $> .92$, and RMSEA $< .08$ indicate satisfactory fit when sample size > 250 and observed variables number between 12 and 30. The CFI

values should be greater than .95 when sample size > 250 and observed variables number below 12.

Our sample size was 292 and the number of observed variables were 15.

11.) Minor comments:

a. On page 3, the authors write, “Duffy et al. (2013) interview 17 of the most research-productive counselling psychologists within the American Psychological Association accredited counselling program.” Did the authors mean 17 faculty across a variety of APA-accredited programs?

Response:

The sample was comprised of counseling psychology faculty who were the most cumulatively productive. Duffy et al. 's (2013) study focused on a very specific group of psychologists within one subfield of psychology, i.e., counseling psychology. We clarified this statement in the text on page 4.

b. In the implications section, I would further emphasize the potential value of the PRES for informing organizational change. This point is a good one and should be further developed. For example, more detail about the specific uses of the instrument for facilitating organizational improvement would be interesting (and would ultimately make the paper more compelling).

Response:

We accepted your advice. We added the uses of the instrument for facilitating organizational improvement in the implication section.

Reference

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis. Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6, 1-55.

References:

Duffy, R. D., Torrey, C. L., Bott, E. M., Allan, B. A., & Schlosser, L. Z. (2013). Time management, passion, and collaboration: A qualitative study of highly research productive counseling psychologists. *The Counseling Psychologist*, 41, 881-917. doi: 10.1177/0011000012457994

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. (2010). *Multivariate data analysis. A global perspective*. (7th ed.). New Jersey, NJ: Prentice Hall.

Reviewer: 2

Comments to the Author

This manuscript reports on the development and psychometric evolution of a measure of perceived research environment. Specifically, the measure is designed to tap into a construct comprised of a number of dimensions related to an individual's perception of the availability of resources, support, and appreciation of research efforts within the institution in which the individual is employed. I found the manuscript to be clear and well-written. The authors did a nice job explaining the concept of the perceived research environment and why it is important, as well as the previous attempts to at psychometric instruments to capture the

construct. As illustrated in the introduction, previous measures have been quite specific to either certain fields (e.g., nursing), or populations (e.g., graduate students). Thus, the authors make a good case for a general perceived research environment scale that could be applicable to Universities or other research institutions, regardless of the specific discipline. However, I would recommend the authors add a paragraph at the end of the introduction, before the “Present Study” section, summarizing this and making this rationale more explicit.

Response:

We accepted your suggestion. We added these statements on page 6: “It is obvious that there is no general perceived research environment scale suitable for academics. We address this gap by designing a brief, multidimensional, and psychometrically sound instrument that could be applicable to universities and other research institutions regardless of specific disciplines.”

There are other strengths of this paper, including conducting item analyses, evaluation of the internal structure with EFA followed by a CFA in a random hold-out sample to confirm the factor structure. The factor analytic methods were appropriate and fit the theoretical conception of the construct, including use of principal axis factoring, direct oblimin rotation, which allows for correlations among the rotated factors, and the use of Velicer’s MAP and parallel analysis to inform the decision on the number of factors to retain. With that said, there are also some areas that should be addressed to improve the paper and the contribution of the study.

I appreciate the fact that the authors conducted focus groups as one of the methods for identifying the important domains of the construct. It would probably be useful if the authors provided a bit more detail about how the information from the focus groups was analyzed, and what dimensions they identified, independent of the dimensions that the identified from the literature review.

Response:

We accepted your suggestion. We added these statements on page 7: “The independent reviewers who rated the suitability of the items consisted of 1 professor in psychology who had expertise in career development and test development and 3 doctoral-level psychology academics who had expertise in test development. They independently reviewed the discussions and determined the core ideas, and the team met to synthesise the results. The team identified five salient aspects: of beneficial social relationships, positive reinforcement, support, encouragement, and role modelling.”

The conduct of the item analyses, including evaluation of item response distributions, item-total correlations, and inter-item correlations was appropriate, and an often over-looked step in the process of test development. Although the authors indicated that none of the items were eliminated based upon the item analyses, it would still be useful information to present the results of the item analyses in a table, including mean, standard deviation, skewness, kurtosis, and item-total correlation of each item, as well as the mean item-total correlation, if not for the original set of items, at least for the final set of items after eliminating items due to factor loading issues.

Responses:

We accepted your suggestion and added this table:

Table 2
Results of the item analyses

Item	Skewness	Kurtosis	Mean	SD	Item-total correlation
1.	-1.18	2.00	4.57	.93	.62
2.	-1.20	2.43	4.61	.97	.64
3.	-1.05	1.48	4.56	.97	.51
4.	-.73	1.17	4.61	.83	.63
5.	-.97	1.16	4.66	.97	.62
6.	-.90	.14	4.2	1.35	.63
7.	-.81	.10	4.05	1.36	.55
8.	-1.17	.63	4.28	1.32	.56
9.	-.99	.29	4.21	1.34	.52
10.	-.55	-.43	3.88	1.34	.65
11.	-.69	.93	4.96	.78	.41
12.	-.80	1.17	5.15	.73	.37
13.	-.78	.38	4.96	.92	.39
14.	-.68	.70	4.90	.83	.50
15.	-.58	.79	4.87	.76	.39
16.	-1.08	1.32	4.52	1.03	.73
17.	-.83	1.10	4.44	1.02	.72
18.	-1.08	1.38	4.67	1.08	.65
19.	-.81	.71	4.41	1.03	.69
20.	-1.08	1.14	4.53	1.08	.74
21.	-.34	.03	4.08	1.02	.41
22.	-.35	-.46	4.20	1.20	.33
23.	-.55	.15	4.35	1.06	.56
24.	-.61	.22	4.52	1.01	.58
25.	-.69	.91	4.66	.92	.51

For the EFA, the authors indicate that both the minimum average partial (MAP) and parallel analysis procedures indicated 5 factors, but they do not present the results of the analysis. It is good practice to provide the numbers generated from these procedures that lead to the conclusion. So, for the parallel analysis, the first actual and random eigenvalues can be presented.

Responses:

We added this statement on page 11: “The first eigenvalues are: 14.93, 5.20, 2.38, 1.83, and 1.61.”

Regarding the CFA, the procedures were reasonable, and the fit statistics were appropriate. The computation of Omega’s was also useful. My one suggestion here would be to present a table or figure showing the loadings of the bifactor model, which was determined to be the best fitting model.

Response:

We added these statements on page 14: “Item loadings for factor 1 ranged from .28 to .62, factor 2 from .80 to .89, factor 3 from .30 to .80, factor 4 from .53 to .80, factor 5 from .32 to .55. Item loading for perceived research environment ranged from .35 to .77.”

The validity analyses were fairly limited in scope, but the measures used were reasonable and the correlations found were supportive of construct validity.

The Discussion section was a bit lacking in content. Given that construct validation requires a multitude of evidence from different methods and perspectives, what is especially needed in

the discussion section is suggestions for further developments, such as other constructs, measures, and criterion variables would be useful to further establish the nomological network and construct validity of scores from this measure. I found the statement that the measure would be useful for “early stages of career counseling” to be perplexing. Perhaps I am missing something, but it seems this measure would only be applicable to someone who is already working in an institution with some kind of research focus. Otherwise, what “research environment” are they reporting on. In addition, it is premature to recommend a measure for applied use after one development study.

Response:

We accepted your suggestions and revised our statements on page 17:

“Practitioners can use the scale as a diagnostic tool at an early stage of individual’s career stage as academics, as well as an evaluation instrument in the next career stages.”

And also added these statements on page 17:

“Finally, further developments, such as testing the relationships with other constructs, measures, and criterion variables would be useful to establish the nomological network and construct validity of scores from this measure.”

Journal of Psychoeducational Assessment

Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics

Journal:	<i>Journal of Psychoeducational Assessment</i>
Manuscript ID	JPA-18-0139.R1
Manuscript Type:	Regular Article
Keywords:	perceived research environment, scale development, academics, university, higher education
Abstract:	There is a growing interest in the perceived research environment for higher education academics. As there is no existing, psychometrically sound scale that directly measures perceived research environment for higher education academics, we designed and validated the Perceived Research Environment Scale for use with this population. In Phase 1, items were developed based on a review of literature, six focus groups, and expert judgment. In Phase 2, the items were then administered to a sample of Indonesian academics (N = 306, M age = 42.29 years). Item analysis and exploratory factor analysis were used to reduce the number of items and determine the factor structure. In Phase 3, confirmatory factor analyses were used on a hold-out sample (N = 292, M age = 43.39) to confirm this structure. In Phase 4, we provided evidence for construct validity. The practical uses of this newly-developed scale are discussed.

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Development and Initial Validation of Perceived Research Environment Scale
for Higher Education Academics

Introduction

Education, research, and services are the three key functions characterizing the academic profession in modern-day, higher education systems (Eam, 2015), although academic research and publications have been increasingly emphasised at most universities around the world, as involvement in research-related activities is recognised as an effective means to upgrade a university’s profile (Nguyen, Klopper, & Smith, 2016). Previous studies have demonstrated that engagement in research potentially improves teaching quality and enhances knowledge and competence, and this contributes to high quality research supervision, which is critical for developing graduate students as independent researchers (Lindsay, Breen, & Jenkins, 2002).

Reflecting this, there has been a continuing trend for universities in developed countries to increase their focus on research, and this tendency has spread to developing countries, where research is increasingly viewed as a high priority (Nguyen et al., 2016). Consequently, research has become an important function for academics everywhere, as research productivity is now a primary consideration in several important organisational decisions, such as hiring, maintenance of tenure, promotions, and salary increases for academics (Chen, Gupta, & Hoshower, 2006). As academics are required to publish their research results nationally and internationally in high quality, peer-refereed journals (Nguyen et al., 2016), researchers have been interested in identifying the predictors of research involvement and performance in academics (e.g., Whelan & Markless, 2013).

This research has shown that, among the factors that influence research productivity, environmental factors are some of the most powerful ones (Bland & Ruffin, 1992), which has led researchers to identify the elements that characterise a good research environment

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(Holden, Pager, Golenko, & Ware, 2012). Owen (1992) identified four important components of a good research environment: research funding, research infrastructure, having active researchers, and the availability of supportive research administrators. White, James, Burke, and Allen (2012) demonstrated that a good research environment is one that provides opportunities to access key resources and support from colleagues and the wider university. More recently, Nguyen et al. (2016) conducted a qualitative study in Vietnam to examine the affordances, barriers, and motivations that drive research engagement in academics. Financial support for research activities was perceived as the main affordance, teaching load as the main hindrance, and having a collaborative research environment and supportive research policy settings and practices as motivators for academics to engage in research.

The important role of the research environment for academics is consistent with Bronfenbrenner's (1979, 1986) ecological systems theory. This perspective emphasises that, compared to the objective environment, perceptions of the environment are of primary significance, because it is these that affect and guide behaviour. Bronfenbrenner argued that developing individuals are surrounded by interrelated systems. The inner circle, or microsystem, is where academics have direct, face-to-face contact with significant others, primarily their colleagues. Clusters of microsystems are called mesosystems (e.g., academics talking to colleagues from other departments constitutes a linkage between two systems). Beyond this are settings (i.e., exosystems) that are not experienced directly by the academics, but nonetheless influence their microsystem through links such as communications from management. Bronfenbrenner also described a macrosystem, which incorporated the wider society and culture. The influences here come via policy and reward systems in the university. Bronfenbrenner further proposed a chronosystem, which captures change over time in the characteristics of the individual (e.g., career-related transitions) and environmental change (e.g., national pressure to increase scientific publications and social conditions).

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For the individual academic in the research-focused environment, a relational viewpoint, which focuses on the developing individual in a changing context, is considered a useful perspective from which to comprehensively understand occupational and career behaviours (Vondracek, Lerner, & Schulenberg, 1986). These theorists argued that due to the continually changing nature of the individual and the context, a dynamic interactional approach, or a developmental contextual perspective, should be applied to understand occupational and career development. A developmental contextual point of view proposes that the context is not only continually changing, but also that the changes are influenced by the individuals and their characteristics. When considered from this perspective, occupation and career development reflect an interactive process where individuals both affect and are affected by the features of their environment, including social, cultural, and physical conditions.

In line with Bronfenbrenner’s (1979, 1986) ecological systems theory and Vondracek et al.’s (1986) person-context relationships proposition, individuals will function better, demonstrate adapted outcomes, and be more satisfied when their characteristics fit the demands of the environment. Individuals with a good person-environment fit are also likely to receive favourable feedback and input from the surroundings. Conversely, mismatched individuals will tend to demonstrate poorer outcomes and receive less positive feedback.

Person factors (e.g., personality) and background contextual variables (e.g., socio-economic status) also shape learning experiences and thus affect occupational and career behaviours. From a social cognitive perspective (Bandura, 1991; Lent, Brown, & Hackett, 1994), individual interpretations of these experiences shape the development of self-efficacy (beliefs about one’s ability to successfully manage and perform courses of action) and outcome expectations (beliefs about the consequences of given actions). Further, self-efficacy fosters favourable outcome expectations, and both self-efficacy and outcome expectations,

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independently and jointly, foster interests (e.g., research interests and activity) and the development of goals (e.g., intentions to engage in research activities), which, in turn, motivate research-related actions (e.g., research involvement). The success or failure that follows these actions promotes further learning, which then prompts individuals to revise their self-efficacy and outcome expectations, and, in turn, leads to a change in interests and goals. Thus, providing direct and vicarious research-related experiences, giving the opportunity to engage in various research tasks, and opening up research possibilities, should lead to differentiated beliefs about the academic's own capabilities and consequences of performing a particular behaviour, which, in turn, should cultivate research-focused interests and goals that will become more crystallised over time.

Consistent with the above, Pranulis and Gortner (1985) identified several characteristics of high productivity university departments: faculty competent in research skills, research valued as desirable outcome goal, time for faculty to engage in research activities, compatibility between faculty research activities and organisational mission and goals (i.e., reflected in research support and rewards), support and encouragement of faculty's efforts to seek research funding, administrative support for research, and a psychosocial climate supportive of research and beginning investigators. Duffy, Torrey, Bott, Allan, and Schlosser (2013) interviewed 17 of the most research-productive counselling psychologists in the American Psychological Association. These scholars had received mentorship while in graduate school, chose research topics that they were passionate about, managed their time effectively, had good collaborations with others, had structured strategies for writing, worked in a supportive environment, and spent time outside of work with family or at hobbies. In both these examples, the work environment was one of the main contributing factors. However, despite this, no measure has been created specifically to assess the perceived research environment of university academics.

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Previous Measures of Research-Related Environments

While there is no scale suitable to measure the research environment from the perspective of academics in a university setting, Young and Rice (1983) devised The Research Environment Scale, a 24-item, six-point, Likert-type scale, specifically for nurses. This scale measures aspects of the clinical research environment, such as educational opportunities for nurses to learn about the research process (sample item: “Nurses have qualified mentors for conducting research”). Marsh and Brown (1992) modified this scale by removing six items and used an 18-item version. Holden et al. (2012) devised the Research Capacity and Culture Tool to measure indicators of research capacity in health professionals at the individual, team, and organisation levels. Sample items are “Find relevant literature” (individual level), “Provide resources to support staff research training” (team), and “Has a plan or policy for research development” (organisational; 10-point ratingscale).

Previous studies also have demonstrated that the research environment is critical for advancing graduate student productivity (Royalty, Gelso, Mallinckrodt, & Garrett, 1986). For example, the research training environment is an important factor in the training of graduate students in applied areas in psychology (Kahn & Gelso, 1997). Gelso (1979) suggested that there were 10 ingredients in the research training environment that contribute to positive outcomes, including modelling appropriate research behaviours and attitudes, positive reinforcement and support for research efforts, early and minimally threatening involvement in research, decoupling research and statistics, facilitating inward reflection for research ideas, emphasizing that science can be a partly social experience, teaching that all research is flawed and limited in some way, teaching varied investigative approaches to research, teaching how science and clinical practice can be wedded, and focusing on how scholarly activities can be accomplished in practice settings.

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Royalty et al. (1986) devised the 45-item Research Training Environment Scale (RTES) to measure nine of the 10 ingredients that Gelso (1979) indicated were influential in promoting students' research interest (focusing on how scholarly activities can be accomplished in practice settings was omitted, as it was considered an advanced skill). Then Gelso, Mallinckrodt, and Judge (1996) revised this measure by broadening the "decoupling research and statistics" component to "teaching relevant statistics and the logic of research design". A sample item for this in their 54-item Research Training Environment Scale-Revised (RTES-R) is "My advisor offers much encouragement to me for my research activities and accomplishments".

Kahn and Gelso (1997) introduced the idea of instructional and interpersonal factors within the research training environment. Interpersonal factors include early involvement, faculty modelling, positive reinforcement, and research as a social experience; and instructional factors include that all experiments are flawed, looking inward, teaching relevant statistics, varied investigative styles, and wedding of science and practice. Kahn and Miller (2000) created a short, 18-item form of the RTES-R by selecting one positively worded item and one negatively worded item from each subscale based on corrected item-total correlations.

It is obvious that there is no general perceived research environment scale suitable for academics. We address this gap by designing a brief, multidimensional, and psychometrically sound instrument that could be applicable to universities and other research institutions regardless of specific disciplines.

Present Study

We employed a standard, classic test development approach (cf. DeVellis, 2016) to develop and provide initial validation for the Perceived Research Environment (PRE) Scale for academics. We conducted a literature review to determine the underlying domains for the

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construct, and held focus group discussions with higher education academics to validate these domains and ensure that the items developed would be specific to the population’s experience. The independent reviewers who rated the suitability of the items consisted of 1 professor in psychology who had expertise in career development and test development and 3 doctoral-level psychology academics who had expertise in test development. They independently reviewed the discussions and determined the core ideas, and the team met to synthesise the results. The team identified five salient aspects: of beneficial social relationships, positive reinforcement, support, encouragement, and role modelling.

Next, we generated a list of approximately 70 items, had a group of experts rate them to examine their content validity, and administered the items along with supporting validity scales to a large sample of university-based academics. We used item and exploratory factor analysis (EFA) on one half of the data to trim the number of items to 25 and determine the factor structure, and applied confirmatory factor analyses (CFA) on the second half of the data to confirm the factor structure. Reliability and initial validity were then assessed.

Phase 1 - Item Development

The aim of this phase was to create sufficient items to form the basis for the new scale, which was anticipated, for practical research purposes, to be approximately 25 items in length. We wrote approximately twice as many items as would appear in the final measure (Hinkin, 1998; Kline, 2000). Items were generated based on a review of the literature (e.g., Gelso, 1979) and a series of six focus groups, where we engaged with target participants, validated the underlying domains of the construct identified in the literature review, and enhanced content validity of the scale items (Vogt, King, & King, 2004). The 42 academics included in the focus groups consisted of 6 professors, 12 associate professors, 12 assistant professor, 6 lecturers, and 6 junior lecturers from one large state university in Central Java, Indonesia, who were requested to reflect on and discuss their own experiences and to give

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their opinions regarding characteristics of their university environment that might motivate or impede them in the conduct of research-related activities. We then recorded the focus groups for later reference.

From the focus groups, we confirmed the five broad domains of perceived research environment, which were consistent with those identified from the literature review for being salient to academics (i.e., beneficial social relationships, positive reinforcement, support and expectations, focus on research, and having positive role models). We then created 70 positively worded items (i.e., to minimize response bias; Salazar, 2015), which were written in English to represent these five domains. Four independent reviewers rated the suitability of each item to reflect a specific dimension of the construct. We removed 10 items that were considered overlapping or irrelevant, and adjusted several others, leaving a final list of 60 items.

Following Ægisdóttir, Gerstein, and Cinnarbas (2008), the first author translated the items into Bahasa Indonesia, and two Indonesian academics examined the expression. The items were then back-translated blindly into English by two bilingual Indonesian academics. All authors compared the back-translated versions with the originals, and adjusted the inaccuracies. The final items were then piloted with five Indonesian academics to check for readability.

Phase 2 - Item Analysis and EFA

The aim of this phase was to identify items to be retained in the scale and to determine the final factor structure. We used item analysis and EFA procedures.

Method

Participants. We obtained data from 598 academics who were recruited from four universities in Central Java, Indonesia, and divided this sample into two sub-samples using a random split procedure to allow for a cross-validation test of results and to reduce sample-

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specific effects that could potentially influence reliability and validity (Byrne, 2010). Sample A from the split ($N = 306$) was used for Phase 2, and Sample B ($N = 292$) was used for Phase 3 and Phase 4.

Sample A consisted of 50.3% female academics (3.9% did not report gender), whose mean age was 42.29 years ($SD = 10.12$; 52.3% did not report age). A large majority (69.3%) had a masters' degree, and 21.6% a doctorate (9.2% did not report education level). Only a small proportion (1.3%) were professors, 22.5% were associate professors, 27.8% assistant professors, 16% lecturers, and 4.6% junior lecturers (27.8% did not report position). The mean tenure was 16.57 years ($SD = 10.04$; 14.5% did not report tenure).

Sample B consisted of 54.1% female academics (3.4% did not report gender). The mean age was 43.39 years ($SD = 9.74$; 49% did not report age), most (62.7%) had a masters' degree and 29.5% a doctorate (7.9% did not report education level). One percent were professors, 20.5% associate professors, 35.6% assistant professors, 15.4% lecturers, and 3.1% junior lecturers (24.3% did not report position). Mean tenure was 16.68 years ($SD = 9.67$; 13% did not report tenure).

There were no differences between Sample A and Sample B on any of the demographic variables: age, $t(1060) = 0.46, p = .65$, gender, $\chi^2(1) = 0.82, p = .37$, tenure, $\chi^2(2) = 6.93, p = .06$, level of education $\chi^2(2) = 0.20, p = .65$, and institution $\chi^2(3) = 6.31, p = .10$. The total score on the Research Involvement Scale for Sample A and Sample B did not differ significantly, $t(596) = -.33 (p = .74)$.

Materials

The 60 items generated in Phase 1, which were expected to reflect the five domains of PRE, were administered in a questionnaire along with the Organisational Culture/Support for Research Scale and the Research Involvement Scale, which were used to test for construct validity. Higher scores reflect higher levels of each construct.

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Perceived Research Environment. This was assessed using the 60 items generated in Phase 1. Example items: “At my university, academics often informally discuss research ideas in their day-to-day discussions” (beneficial social relationship), “At my university, successful researchers have high status” (positive reinforcement), “My university assists researchers to publish by helping them with manuscript preparation (e.g., writing workshops)” (support and expectations), “At my university, academics thinks research is important” (focus on research), and “At my university, many academics publish their research in high quality academic journals” (positive role models); 6-point-scale of 1 = *strongly disagree* to 6 = *strongly agree*.

Organisational culture/support for research. We used the 20-item Organisational Culture/Support for Research Scale (OCSR; Kortlik, Bartlett, Higgins, & Williams, 2002) to assess academics’ perceptions of the organisational culture or support for conducting research. Sample item: “My peers support my efforts to publish in refereed research journals”; 6-point scale of 1 = *strongly disagree* to 6 = *strongly agree*. Cronbach alpha was reported as .88, and validity was supported by finding positive correlations with scales of research confidence (Kortlik et al., 2012).

Research involvement. We used the 24-item Research Involvement Scale (RI; Whelan et al., 2003) to assess participants’ level of engagement in research. Sample item: “Participating in research as part of a collaborative team”; 6-point scale from 1 = *not at all* to 6 = *a great deal*. Alpha has been reported as .98, and construct validity has been supported by finding positive correlations with evidence of greater research output (Whelan et al., 2013).

Procedure

The survey was administered by the chief researchers and assistants during working hours. This study was conducted with approval from the authors’ university ethics committee, and participants gave their permission to participate.

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Results

Item analysis. We assessed: item skew to identify any item whose distribution indicated floor or ceiling effects; the inter-item correlations to identify any pairs of items that were too highly correlated ($r \geq .80$), which might indicate redundancy; the corrected item-total correlations to identify any items with a weak or negative correlation with the total scale ($r < .30$), which might indicate items that were not tapping the construct of PRE; and age, gender, position, tenure, and level of education in relation to each item to identify items that might be responded to differently depending on demographic variables (Kline, 2000). No items were identified as problematic; thus, no items were eliminated.

EFA. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.94) and statistically significant Bartlett’s test of sphericity ($p < .001$) confirmed that the 60 items were suitable for factor analysis. The common variance is of interest in determining the underlying factor structure, thus, we used common factor analysis (i.e., principal-axis factor analysis; Hair, Black, Babin, & Anderson, 2010). As the five anticipated factors were expected to be correlated aspects of an overall perceived environment measure, we utilised a direct oblimin rotation (Hair et al., 2010). Following Hayton, Allen, and Scarpello (2004), we used several criteria to determine the number of factors: the scree plot, Velicer’s minimum average partial test, parallel analysis (O’Connor, 2000), at least three items loading on a factor (Costello & Osborne, 2005), and factor interpretability (Hinkin, 1998).

In the first EFA, the scree plot indicated five factors with eigenvalues > 1.0 . Velicer’s minimum average partial test and the parallel analysis also suggested a 5-factor solution. The first eigenvalues are: 14.93, 5.20, 2.38, 1.83, and 1.61. We accepted this solution as these five groupings were interpretable theoretically and reflected the five domains initially identified. Then, 35 items were deleted from the solution because their factor loadings were $< .4$ and/or less than twice as strong on the appropriate factor as on other factors, or they did not load

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meaningfully on any factor (Hinkin, 1998). The final 5-factor solution accounted for 65.58% of the variance: Factor 1 = 32.94%, Factor 2 = 15.56%, Factor 3 = 6.81%, Factor 4 = 5.40%, and Factor 5 = 4.86%. Table 1 displays the results of the item analysis and Table 2 displays factor loadings and eigenvalues.

Insert Table 1 and Table 2 about here

Factor 1 (5 items; “beneficial social relationship”) represents the situation where individuals perceive that their social relationships support their participation in research ($\alpha = .88$, $M = 23.01$, $SD = 3.85$). Factor 2 (5 items; “positive reinforcement”) refers to the situation where individuals perceive positive social and non-social reinforcement for achievements in research ($\alpha = .92$, $M = 20.62$, $SD = 5.90$). Factor 3 (5 items; “support and expectations”) reflects perceived support and expectations from the university for conducting research ($\alpha = .86$, $M = 24.85$, $SD = 3.21$). Factor 4 (5 items; “focus on research”) includes perceived emphasises on research-related activities ($\alpha = .92$, $M = 22.69$, $SD = 4.53$). Factor 5 (5 items; “positive role models”) reflects perceived availability of positive research role models ($\alpha = .89$, $M = 21.81$, $SD = 4.36$). The associations among the five factors (range .10 to .47; all $p < .001$) were in line with the results from the EFA indicating that the subscales were somewhat independent, but with overlap among them. Alpha for the full scale was .92.

Phase 3 - CFA

This phase aimed to validate the factor structure of the PRE Scale with Sample B. Using CFA (AMOS Version 4.0; Arbuckle & Wothke, 1995). We examined the 5-factor structure identified in Phase 2, and then compared this model with a 1-factor model, a hierarchical, 2nd-order model, and a bifactor model (Reise, Bonifay, & Haviland, 2013). *In Sample B, Alpha for the full scale was .93 ($M = 112$, $SD = 16.65$), Factor 1 ($\alpha = .90$, $M = 22.87$, $SD = 4.29$), Factor 2 ($\alpha = .94$, $M = 20.36$, $SD = 6.22$), Factor 3 ($\alpha = .87$, $M = 24.44$,*

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SD = 3.70), Factor 4 ($\alpha = .91$, $M = 22.53$, $SD = 4.80$), and Factor 5 ($\alpha = .89$, $M = 21.79$, $SD = 4.59$).

We used the χ^2 statistic, the normed χ^2 (χ^2/df), the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA) to examine model fit. A significant χ^2 , $\chi^2/df < 3.0$, CFI and TLI values $> .92$, and RMSEA $< .08$ indicate satisfactory fit when sample size > 250 and observed variables number between 12 and 30. We then compared the different models using the χ^2 -difference test and the Akaike Information Criterion (AIC), where the lower value indicates a better fit (Hair et al., 2010).

The 5-factor model identified in Phase 2 generated satisfactory fit statistics (see Table 2 for fit statistics for all models). All factor loadings were statistically significant ($p < .001$) and ranged from .72 to .84 (beneficial relationship), .83 to .91 (positive reinforcement), .55 to .89 (support and expectations), .76 to .89 (focus on research), and .70 to .89 (positive role models). Correlations among the latent variables ranged from .10 to .62.

The 2nd-order model (correlations with 2nd-order factor = .43 to .87) and the bifactor model, but not the 1-factor model, also had satisfactory fit statistics. However, the best-fitting model was the bifactor model, which was statistically different from the 5-factor model, and generated the lowest AIC. Item loadings for factor 1 ranged from .28 to .62, factor 2 from .80 to .89, factor 3 from .30 to .80, factor 4 from .53 to .80, factor 5 from .32 to .55. Item loading for perceived research environment ranged from .35 to .77. The bifactor model included a general latent variable (i.e., dependent on all 25 items) and five subscale latent variables (i.e., five uncorrelated factors dependent on their respective five items). This model showed that each item is an indicator of both a total and subscale aspect, with the results for the total variable representing common sources of variance after controlling for subscale variances, and the subscale variables representing variances after controlling for the total variance (Reise et al., 2013).

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Insert Table 3 about here

As our results supported multi-dimensionality of the scale (i.e., the 5-factor, 2nd-order, and bifactor models all had acceptable fit statistics), it needed to be determined whether the scale should best be interpreted at the global or subscale level. To do this, we calculated the bifactor model-based reliability estimates and compared the variances explained for the total and subscale interpretations. Following Rodriguez et al. (2016), we used the Bifactor Indices Calculator (Dueber, 2017) to compute Omega, OmegaH, Relative Omega, and the explained common variance (ECV). Omega, the estimate of the proportion of variance accounted for when considering all items in a factor, was .96 (general factor), and .91, .94, .86, .92, and .90 (specific factors), indicating high reliability for the general factor and sound to high reliability for the specific factors, and suggesting all factors have acceptable reliability. OmegaH, the proportion of unique variance explained by a factor, was .71 (general factor), and .37, .62, and .52, .62, and .25 (specific factors). Relative Omega, the proportion of reliable variance in the multidimensional composite due to a factor, was .74 (general factor), and .41, .68, .60, .67 and .28 (specific factors), indicating the majority of reliable variance in the total scores resides within the general factor. Last, the ECV, the proportion of all common variance explained by a factor, was .40 (general factor), and .09, .21, .10, .14, and .06 (specific factors), suggesting a moderately strong global factor, with much less variance explained by the specific factors. Thus, it can be concluded that interpretation at the total level (and not the subscale level) will give the more useful measure of PRE, as the total factor will account for more meaningful levels of variance in the construct.

Phase 4: Construct Validity

This phase aimed to evaluate the initial construct validity of the scale by correlating scores from the PRE Scale with scores from the Organisational Culture/Support for Research and Research Interest Scales. Individuals who reported stronger research training

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environments were more likely to perceive their environment to be more research supportive (Kahn & Miller, 2000), and those who perceived a more research supportive work environment were more likely to report a positive attitude towards research and greater research engagement (Royalty et al., 1986). Thus, we expected the PRE Scale to be associated positively with the OCSR and RI Scales. These analyses were conducted using Sample B ($N = 292$). All correlations were statistically significant and in the expected directions, as reported in Table 4. The results demonstrated that the PRE Scale was associated with the two other constructs as expected; supporting convergent validity.

Insert Table 4 about here

Discussion

We devised and reported initial validity evidence for a psychometrically sound, 25-item scale to assess PRE for higher education academics: The Perceived Research Environment (PRE) Scale. We operationalised PRE as the organisational environment perceived by academics, which enables and supports them to learn and conduct research-related activities and yield scientific publications. The salient domains identified were beneficial social relationships, positive reinforcement, support and expectations, focus on research, and positive role models. Content validity was supported by a review of the literature, focus groups, pilot testing, and use of expert reviewers; whereas construct validity was supported by the EFAs and CFAs, which indicated that the new scale reflected the five anticipated inter-correlated domains. The measure can be applied most productively at the global level, it is internally reliable, and the positive associations with the Organisational Culture/Support for Research and the Research Interest Scales support its convergent validity.

Previous research has shown the importance of PRE in academics (e.g., Duffy et al., 2013). The present study provided a comprehensive measure of PRE, which assesses all identified aspects of the PRE construct. At 25 items, the scale will be practical and suitable to

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be used simultaneously with other scales in both research and practice. Extending PRE research using this scale has the potential to add to our knowledge and understanding of the PRE from the perspective of higher education academics, for example when designing research studies, identifying its nomological network, and examining its across-time correlates.

Practitioners can use the scale as a diagnostic tool at an early stage of individual's career stage as academics, as well as an evaluation instrument after in the next career stages. The PRE Scale also will be of use to those who work with academics at any stage of their career when they have issues with research-related interest and performance. The scale will be helpful to show to academics so that they can explore the supports and barriers that are influencing their research-related progress and achievement. This could be helpful for both early-career academics and those at mid- and late-career stages. At the organisational level, the scale can be used for human resource mapping as a foundation for formulating policies at department, research centre, and university levels, and for identifying strategies that might be helpful to foster a more researched focused academic environment.

Limitations

Our study was conducted using a sample of higher education academics from several universities in Central Java. Hence, the conclusions of this study need to be tested on other academic populations. We examined content and construct validity of the scale, and future researchers could focus on establishing predictive validity by, for example, testing the longitudinal associations between scores on the scale at one point in time and subsequent outcomes. We showed that the scale was unrelated to several demographic variables (e.g., age, gender, tenure, level of education, and institutions), suggesting no inherent bias based on these characteristics; however, we had missing demographic data, and future studies need to

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confirm this, and examine structural invariance on these and other variables to support the usefulness of the scale.

We only had a very small number of professors in the samples, and the number of associate professors, assistant professors, lecturers, and junior lecturers were not proportional. Future studies need to consider the proportion of their sample when collecting data in academics, as this will affect the response regarding perceived research environment. Finally, further developments, such as testing the relationships with other constructs, measures, and criterion variables would be useful to establish the nomological network and construct validity of scores from this measure.

Conclusion

This research demonstrated support for a scale to measure PRE in higher education academics, although future studies are needed to extend support for its validity and to test its applicability on more diverse populations. Our findings contribute to the body of literature on academic PRE, and open the way for improved career counselling for academics, research development interventions, and organisational policies.

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References

- Ægisdóttir, S., Gerstein, L. H., & Cinnarbas, C. D. (2008). Methodological issues in cross-cultural counselling research: Equivalence, bias, and translations. *The Counseling Psychologist, 36*, 188-219. doi:10.1177/0011000007305384
- Arbuckle, J. L. & Wothke, W. (1995). *Amos 4.0 user's guide*. Chicago, IL: Small Waters.
- Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes, 50*, 248-287. doi:10.1016/0749-5978(91)90022-L
- Bland, C. J., & Ruffin, M. T. (1992). Characteristics of a productive research environment: Literature review. *Academic Medicine, 67*, 385-397. doi:10.1097/00001888-199206000-000-10
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U. (1986). Recent advances in research on the ecology of human development. In *Development as Action in Context* (pp. 287-309). Berlin, DE: Springer.
- Byrne, B. (2010). *Structural equation modelling with AMOS: Basic concepts, applications, and programming*. New York, NY: Routledge.
- Chen, Y., Gupta, A., & Hoshower, L. (2006). Factors that motivate business faculty to conduct research: An expectancy theory analysis. *Journal of Education for Business, 81*, 179-189. doi:10.3200/JOEB.81.4.179-189
- Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation, 10*, 1-9. Retrieved from <http://pareonline.net/pdf/v10n7.pdf>
- DeVellis, R. F. (2016). *Scale development: Theory and applications* (Vol. 26). Los Angeles, CA: Sage.

PERCEIVED RESEARCH ENVIRONMENT SCALE

Dueber, D. M. (2017). Bifactor Indices Calculator: A Microsoft Excel-based tool to calculate various indices relevant to bifactor CFA models.

<https://dx.doi.org/10.13023/edp.tool.01> [Available at

<http://sites.education.uky.edu/apslab/resources/>]

Duffy, R. D., Torrey, C. L., Bott, E. M., Allan, B. A., & Schlosser, L. Z. (2013). Time management, passion, and collaboration: A qualitative study of highly research productive counseling psychologists. *The Counseling Psychologist, 41*, 881-917. doi: 10.1177/0011000012457994

Eam, P. (2015). Investigating relationship among research self-efficacy, research outcome expectations, and research interest of Cambodian faculty: Testing social-cognitive theory. *International Journal of Sociology of Education, 4*, 199-224. doi:10.17583/rise.2015.1752

Gelso, C. J. (1979). Research in counseling. Methodological and professional issues. *The Counseling Psychologist, 8*, 7-35.

Gelso, C. J. (1993). On the making of a scientist-practitioner: A theory of research training in professional psychology. *Professional Psychology: Research and Practice, 24*, 468-476. doi:10.1037/0735-7028.24.4.468

Gelso, C. J., Mallinckrodt, B., & Judge, A. B. (1996). Research training environment, attitude toward research, and research self-efficacy. The revised Research Training Environment Scale. *The Counseling Psychologist, 24*, 304-322. doi:10.1177/0011000096242010

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis. A global perspective*. (7th ed.). New Jersey, NJ: Prentice Hall.

PERCEIVED RESEARCH ENVIRONMENT SCALE

- Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods*, 7, 191-205. doi:10.1177/1094428104263675
- Hinkin, T. R. (1998). A brief tutorial on the development of measures for the use in survey questionnaires. *Organizational Research Methods*, 1, 104-121. doi:10.1177/109442819800100106
- Holden, L., Pager, S., Golenko, X., & Ware, R. S. (2012). Validation of the Research Capacity and Culture (RCC) tool: Measuring RCC at individual, team, and organisation levels. *Australian Journal of Primary Health*, 18, 62-67. doi:10.1071/PY10081
- Kahn, J. H., & Gelso, C. J. (1997). Factor structure of the Research Training Environment Scale – Revised: Implications for research training in applied psychology. *The Counseling Psychologist*, 25, 22-37. doi:10.1177/0011000097251004
- Kahn, J. H., & Miller, S. A. (2000). Measuring global perceptions of the Research Training Environment Using A Short Form of the RTES-R. *Measurement and Evaluation in Counseling and Development*, 33, 103-119. Retrieved from <https://search.proquest.com/docview/195607998?pq-origsite=gscholar>
- Kortlik, J. W., Bartlett II, J. E., Higgins, C. C., & Williams, H. A. (2002). Factors associated with research productivity of agricultural education faculty. *Journal of Agricultural Education*, 43, 1-10. doi:10.5032/jae.2002.03001
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45, 79-122. doi:10.1006/jvbe.1994.1027
- Lindsay, R., Breen, R., & Jenkins, A. (2002). Academic research and teaching quality. The views of undergraduate and postgraduate students. *Studies in Higher Education*, 27, 309-327. doi:10.1080/03075070220000699

PERCEIVED RESEARCH ENVIRONMENT SCALE

- Mallinckrodt, B. (1997). Discovering the research training environments that fit the students we select: The challenge of providing for diverse needs. *The Counseling Psychologist*, 25, 68-73. doi:10.1177/0011000097251006
- Marsh, G. W., & Brown, T. L. (1992). The measurement of nurses' attitudes towards nursing research and the research environment in clinical settings. *Journal of Clinical Nursing*, 1, 315-322. doi:10.1111/j.1365-2702.1992.tb00425.x
- Nguyen, Q., Klopper, C., & Smith, C. (2016). Affordances, barriers, and motivations: Engagement in research activity by academics at the research-oriented university in Vietnam. *Open Review of Educational Research*, 3, 68-84. doi:10.1080/23265507.2016.1170627
- Owen, M. (1992). Research at small Canadian universities. *The Canadian Journal of Higher Education*, 22, 1-14. Retrieved from <http://journals.sfu.ca/cjhe/index.php/cjhe/article/view/183130/183106>
- Pranulis, M. F., & Gortner, S. R. (1985). Researchmanship: Characteristics of productive research environments in nursing. *Western Journal of Nursing Research*, 7, 127-131. doi:10.1177/00920055X8500700112
- Reise, S. P., Bonifay, W. E., & Haviland, M. G. (2013). Scoring and modelling psychological measures in the presence of multidimensionality. *Journal of Personality Assessment*, 95, 129-140. doi:10180/00223891.2012.725437
- Rodriguez, A., Reise, S. P., & Haviland, M. G. (2016). Evaluating bifactor models: Calculating and interpreting statistical indices. *Psychological Methods*, 21, 137-150. doi:10.1037/met0000045
- Royalty, G. M., Gelso, C. J., Mallinckrodt, B., & Garrett, K. (1986). The environment and the student in counselling psychology: Does the research training environment influence

PERCEIVED RESEARCH ENVIRONMENT SCALE

- graduate students' attitudes toward research? *The Counseling Psychologist*, 14, 9-30.
doi:10.1177/0011000086141002
- Salazar, M. (2015). The dilemma of combining positive and negative items in scales. *Psicothema*, 27, 192-199. doi:10.7334/psicothema2014.266
- Shivy, V. A., Worthington, E. L., Wallis Jr, A. B., & Hogan Jr, C. (2003). Doctoral research training environments (RTEs): Implications for the teaching in psychology. *Teaching of Psychology*, 30, 297-302. doi:10.1207/S1528023TOP3004_03
- Vogt, D. S., King, D. W., & King, L. A. (2004). Focus groups in psychological assessment: Enhancing content validity by consulting members of the target population. *Psychological Assessment*, 16, 231-243. doi:10.1037/1040-3590.16.3.231
- Whelan, K., & Markless, S. (2012). Factors that influence research involvement among registered dietitians working as university faculty: A qualitative interview study. *The Academy of Nutrition and Dietetics*, 112, 1021-1028. doi:10.1016/j.jand.2012.03.002
- Whelan, K., Copeland, E., Oladitan, L., Murrells, T., & Gandy, J. (2013). Development and validation of a questionnaire to measure research involvement among registered dietitians. *Journal of the Academy of Nutrition and Dietetics*, 113, 563-568.
doi:10.1016/j.jand.2012.08.027
- White, C. S., James, K., Burke, L. A., & Allen, R. S. (2012). What makes a "research star"? Factors influencing research productivity of business faculty. *International Journal of Productivity and Performance Management*, 61, 584-602.
doi:10.1108/17410401211249175
- Young, K., & Rice, M. (1983). Measurement of attitude toward the nursing research environment in the university setting. Paper presented at the First Annual Scientific Meeting on Research in Nursing Education, San Francisco, California.

Table 1
Factor Loadings for the PRE Scale: Sample A (N = 306)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1. At my university, academics are willing to involve their colleagues in research projects	.86	-.10	-.04	-.07	-.01
2. At my university, academics support one another in their research projects	.83	.11	.13	-.04	.01
3. At my university, academics often informally discuss research ideas in their day-to-day discussions	.83	-.09	-.04	.03	-.01
4. There is a sense at my university that academics enjoy their research activities	.71	.06	.04	.05	.22
5. At my university, researchers actively involve students in their research projects	.70	-.09	-.01	.20	-.01
6. My university rewards successful researchers	.03	-.90	-.01	.07	.01
7. My university is well known for its research expertise	-.01	-.89	.01	-.03	.04
8. At my university, researchers who do well are highly respected by their colleagues	.04	-.85	.09	-.01	-.02
9. At my university, there are incentives for successful research activities (e.g., getting published or obtaining a research grant)	-.01	-.83	.03	.11	-.09
10. At my university, we all celebrate when a colleague is successful (e.g., gets published or obtains a research grant)	.08	-.76	.13	-.09	.11
11. My university sets clear expectations regarding research output for academics	.01	.01	.82	-.06	.01
12. My university has specific programs and funds to help new academics get their research started	.04	.01	.79	-.02	.05
13. My university assists researchers to publish by helping them with manuscript preparation (e.g., writing workshops)	-.01	-.03	.78	.02	-.03
14. My university has clear expectations that academics will engage in research	.09	-.08	.76	.07	-.05
15. Academics at my university know it is expected of them that they attend conferences and present their research	-.08	-.07	.68	.11	-.05
16. At my university, academics are encouraged to use a wide variety of research methods in their research	-.01	.05	.06	-.91	-.01
17. At my university, researchers are always on the look-out for research collaborators	.06	-.02	.04	-.86	.03
18. At my university, academics think research is important	.03	.02	.03	-.85	-.04
19. At my university, new faculty members are encouraged to publish as soon as they commence work	-.05	-.14	-.08	-.79	.09
20. At my university, the opportunity for academics to actualize themselves in research is wide	.08	.16	.08	-.78	.07
21. Academics at my university give high priority to their research	.02	.04	.14	-.03	.86
22. At my university, many academics publish their research in high quality academic journals	.01	-.03	-.06	-.01	.86
23. Academic at my university are strongly focused on research	-.13	.03	-.05	.09	.83
24. Academics at my university strive to publish their research in high quality journals	.13	.01	.10	-.01	.77
25. Many academics at my university are working on important research projects	.14	-.05	.01	.04	.70
Eigenvalues	8.57	4.21	2.06	1.69	1.55
% variance explained	32.94	15.56	6.81	5.40	4.86

Note. Factor 1 = Beneficial social relationships, Factor 2 = Positive reinforcement, Factor 3 = Support, Factor 4 = Encouragement, Factor 5 = Role model; Main loadings highlighted in bold.

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Table 2

Results of Item Analyses; Sample A (N = 306)

Item	Skewness	Kurtosis	Mean	SD	Item-total correlation
1.	-1.18	2.00	4.57	.93	.62
2.	-1.20	2.43	4.61	.97	.64
3.	-1.05	1.48	4.56	.97	.51
4.	-.73	1.17	4.61	.83	.63
5.	-.97	1.16	4.66	.97	.62
6.	-.90	.14	4.2	1.35	.63
7.	-.81	.10	4.05	1.36	.55
8.	-1.17	.63	4.28	1.32	.56
9.	-.99	.29	4.21	1.34	.52
10.	-.55	-.43	3.88	1.34	.65
11.	-.69	.93	4.96	.78	.41
12.	-.80	1.17	5.15	.73	.37
13.	-.78	.38	4.96	.92	.39
14.	-.68	.70	4.90	.83	.50
15.	-.58	.79	4.87	.76	.39
16.	-1.08	1.32	4.52	1.03	.73
17.	-.83	1.10	4.44	1.02	.72
18.	-1.08	1.38	4.67	1.08	.65
19.	-.81	.71	4.41	1.03	.69
20.	-1.08	1.14	4.53	1.08	.74
21.	-.34	.03	4.08	1.02	.41
22.	-.35	-.46	4.20	1.20	.33
23.	-.55	.15	4.35	1.06	.56
24.	-.61	.22	4.52	1.01	.58
25.	-.69	.91	4.66	.92	.51

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Table 3

Model Fit Indices of the 3-Factor, 1-Factor, 2nd-Order Factor, and Bifactor Models for Sample B (N = 292)

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	χ^2_{Diff}	AIC
5-factor	559.69***	256	2.19	.94	.94	.06	-	697.69
1-factor	2324.78***	270	8.61	.63	.59	.16	$p < .001$	2434.78
2 nd order	749.03***	269	2.78	.91	.90	.08	$p < .001$	861.03
Bifactor	513.33***	244	2.10	.95	.94	.06	$p < .001$	675.33

Note. χ^2_{Diff} statistics refer to differences with 5-factor model. *** $p < .001$

PERCEIVED RESEARCH ENVIRONMENT SCALE

Table 4

Summary Data for Sample B ($N = 292$; correlations above diagonal)

Indonesian													
	Scale	<i>M</i>	<i>SD</i>	Range	α	1	2	3	4	5	6	7	8
1.	Full scale	112.00	16.65	28-145	.93	-	.81***	.65***	.63***	.80***	.64***	.47***	.49***
2.	Subscale 1 (beneficial social relationship)	22.87	4.29	5-30	.90		-	.40***	.48***	.52***	.54***	.30***	.35***
3.	Subscale 2 (positive reinforcement)	20.36	6.22	5-30	.94			-	.12*	.49***	.10*	.14*	.24**
4.	Subscale 3 (support and expectations)	24.44	3.70	6-30	.87				-	.38***	.49***	.38***	.32***
5.	Subscale 4 (focus on research)	22.53	4.80	5-30	.91					-	.39***	.54***	.58***
6.	Subscale 5 (positive role models)	21.79	4.59	5-30	.89						-	.35***	.27**
7.	Organisational culture/ support for research	67.24	15.40	24-144	.93							-	.54***
8.	Research involvement	100.82	21.12	18-108	.97								-

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

**4. Bukti Konfirmasi Review dan
Hasil Review Kedua
(29 Des 2018)**



Dian Sawitri <dian.r.sawitri@gmail.com>

Journal of Psychoeducational Assessment - Decision on Manuscript ID JPA-18-0139.R1

Journal of Psychoeducational Assessment <onbehalf@manuscriptcentral.com>

Sat, Dec 29, 2018 at 12:51 AM

Reply-To: tobin@temple.edu

To: dian.r.sawitri@gmail.com

Cc: dsaklofs@uwo.ca

fred

28-Dec-2018

Dear Dr. SAWITRI:

Thank you for submitting a revision of the Manuscript ID JPA-18-0139.R1 entitled "Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics" to Journal of Psychoeducational Assessment (JPA). I have now received a review from one of the experts in the field who reviewed your initial submission and has examined your revised manuscript and cover letter. This review is included below for your reference. I have also carefully read the manuscript and your cover letter in response to reviewers' comments.

After reviewing these materials, the reviewer and I noted significant improvement over the last version. As you will see in the review, the reviewer identifies several minor issues. Rather than restating the reviewers' comments here, I will simply ask that you carefully read these comments and adjust the manuscript to address them. Once you do so, I would be pleased to recommend to the Editor, Don Saklofske, that the manuscript be published in JPA.

To revise your manuscript, log into <https://mc.manuscriptcentral.com/jopa> and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

You may also click the below link to start the revision process (or continue the process if you have already started your revision) for your manuscript. If you use the below link you will not be required to login to ScholarOne Manuscripts.

*** PLEASE NOTE: This is a two-step process. After clicking on the link, you will be directed to a webpage to confirm.

https://mc.manuscriptcentral.com/jopa?URL_MASK=15323715e61a4c85abc0a8695a7ea998

You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript using a word processing program and save it on your computer.

Once the revised manuscript is prepared, you can upload it and submit it through your Author Center.

When submitting your revised manuscript, you will be able to respond to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely publication of manuscripts submitted to Journal of Psychoeducational Assessment, your revised manuscript should be submitted within 30 days from receipt of this letter. If it is not possible for you to submit your revision in this amount of time, please advise the Associate Editor before the 30 day period as the link to your article will expire and you will not be able to re-submit your paper without making a specific request.

Once again, thank you for submitting your manuscript to Journal of Psychoeducational Assessment and I look forward to receiving your revision.

Sincerely,
Dr. Renée Tobin

Associate Editor, Journal of Psychoeducational Assessment
tobin@temple.edu

Don Saklofske
Editor

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author

Thank you for the opportunity to review this revised manuscript (JPA-18-0139.R1). Overall, I appreciate the authors' responsiveness to reviewer feedback and believe their edits have much improved the manuscript. I hope the authors will find the following comments helpful as they continue to revise their manuscript.

1. I greatly appreciated the authors' expansion of their theoretical rationale in the introduction. However, I would recommend removing the paragraph on the social cognitive perspective (p. 3-4). The study is already situated in the work of Bronfenbrenner (1979) and Vondracek et al. (1986), and applying too many theoretical perspectives makes it hard to distill the study's rationale. Moreover, the social cognitive perspective's emphasis on self-efficacy and other specific individual variables seems less relevant to this study, given that the PRE is intended to measure characteristics of the research environment (and not of the individual academic).
2. In their response to reviewers, the authors noted that all academics in this setting had research components to their roles. I would recommend stating this in the manuscript.
3. I appreciated your analysis of potential differences in institutional affiliation between Samples A and B. I also appreciated your reporting internal consistency values in Sample B.
4. On page 16, the authors state that practitioners can use the PRE as a diagnostic tool for individuals. I am unclear as to why and how this would be useful. Many academics have little control over their research environments. It seems to me that this scale would be much more useful for conducting systems-level needs assessments and planning for departmental/organizational change. I would emphasize these potential applications (rather than emphasizing potential applications for individual academics).
5. Minor comments
 - a. While the manuscript is generally well-written, its first two sentences are "run-on" sentences. I would recommend revising them.
 - b. On page 6 (line 43), the sentence beginning with "it is obvious that" could be revised as follows: "To the authors' knowledge, a perceived research environment scale suitable for academics has yet to be published in the peer-reviewed literature."
 - c. When referring to internal consistency values, please write "Cronbach's alpha" rather than just "alpha."
 - d. On page 4 (line 52), the phrase "or at hobbies" should read "or engaged in hobbies."
 - e. In describing the OCSR and the RI measures (p. 10), please use complete sentences (e.g., "A sample item from this measure is...")

**5. Bukti Konfirmasi Submit Revisi Kedua,
Respon kepada Reviewer,
dan Artikel yang Diresubmit
(2 Jan 2019)**



Dian Sawitri <dian.r.sawitri@gmail.com>

Journal of Psychoeducational Assessment - Manuscript ID JPA-18-0139.R2

Journal of Psychoeducational Assessment <onbehalf@manuscriptcentral.com>

Wed, Jan 2, 2019 at 3:24 PM

Reply-To: JPA@sagepub.com

To: dian.r.sawitri@gmail.com, p.creed@griffith.edu.au, harlina_nc@yahoo.com, anggun.resdasari@gmail.com

02-Jan-2019

Dear Dr. SAWITRI:

Your manuscript entitled "Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics" has been successfully submitted online and is presently being given full consideration for publication in Journal of Psychoeducational Assessment.

Your manuscript ID is JPA-18-0139.R2.

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at <https://mc.manuscriptcentral.com/jopa> and edit your user information as appropriate.

You can also view the status of your manuscript at any time by checking your Author Center after logging in to <https://mc.manuscriptcentral.com/jopa>.

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Thank you for submitting your manuscript to Journal of Psychoeducational Assessment.

Sincerely,
Journal of Psychoeducational Assessment Editorial Office

**RESPONSE TO THE REVIEWER
OF THE JOURNAL OF PSYCHOEDUCATIONAL ASSESSMENT**

MANUSCRIPT ID: JPA – 18 – 0139. R1

Reviewer: 1

Comments to the Author

Thank you for the opportunity to review this revised manuscript (JPA-18-0139.R1). Overall, I appreciate the authors' responsiveness to reviewer feedback and believe their edits have much improved the manuscript. I hope the authors will find the following comments helpful as they continue to revise their manuscript.

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Response:

We accepted your suggestion. We removed the paragraph on the social cognitive perspective (p. 3-4)

2. In their response to reviewers, the authors noted that all academics in this setting had research components to their roles. I would recommend stating this in the manuscript.

Response:

We accepted your suggestion. We stated it in the Participants section on page 9.

3. I appreciated your analysis of potential differences in institutional affiliation between Samples A and B. I also appreciated your reporting internal consistency values in Sample B.

Response:

Thank you for your previous suggestion.

4. On page 16, the authors state that practitioners can use the PRE as a diagnostic tool for individuals. I am unclear as to why and how this would be useful. Many academics have little control over their research environments. It seems to me that this scale would be much more useful for conducting systems-level needs assessments and planning for departmental/organizational change. I would emphasize these potential applications (rather than emphasizing potential applications for individual academics).

Response:

We accepted your suggestion. On page 16, we revised our statement: “Practitioners can use the scale for conducting systems-level needs assessments and planning for departmental/organisational change.”

5. Minor comments

- a. While the manuscript is generally well-written, its first two sentences are “run-on” sentences. I would recommend revising them.
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- e. In describing the OCSR and the RI measures (p. 10), please use complete sentences (e.g., “A sample item from this measure is...”)

Response:

We accepted your suggestions.

- a. *We revised the first two sentences: “Education, research, and services are the three key functions characterising the academic profession in modern-day, higher education systems (Eam, 2015). However, academic research and publications have been increasingly emphasised at most universities around the world, as involvement in research-related activities is recognised as an effective means to upgrade a university’s profile (Nguyen, Klopper, & Smith, 2016).”*
- b. *We revised the sentence on page 6 (line 43): “To the authors’ knowledge, a perceived research environment scale suitable for academics has yet to be published in the peer-reviewed literature.”*
- c. *We revised “alpha” to “Cronbach’s alpha” when referring to internal consistency values on page 10, 12, and 13.*
- d. *On page 4 (line 52), we revised “or at hobbies” to “or engaged in hobbies.”*
- e. *In describing the OCSR and the RI measures on page 10, we revised our previous sentences to complete sentences: “A sample item from this measure is...”*

Journal of Psychoeducational Assessment

Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics

Journal:	<i>Journal of Psychoeducational Assessment</i>
Manuscript ID	JPA-18-0139.R2
Manuscript Type:	Regular Article
Keywords:	perceived research environment, scale development, academics, university, higher education
Abstract:	There is a growing interest in the perceived research environment for higher education academics. As there is no existing, psychometrically sound scale that directly measures perceived research environment for higher education academics, we designed and validated the Perceived Research Environment Scale for use with this population. In Phase 1, items were developed based on a review of literature, six focus groups, and expert judgment. In Phase 2, the items were then administered to a sample of Indonesian academics (N = 306, M age = 42.29 years). Item analysis and exploratory factor analysis were used to reduce the number of items and determine the factor structure. In Phase 3, confirmatory factor analyses were used on a hold-out sample (N = 292, M age = 43.39) to confirm this structure. In Phase 4, we provided evidence for construct validity. The practical uses of this newly-developed scale are discussed.

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Development and Initial Validation of Perceived Research Environment Scale
for Higher Education Academics

Introduction

Education, research, and service are the three key functions characterising the academic profession in modern-day, higher education systems (Eam, 2015). However, academic research and publications have been increasingly emphasised at most universities around the world, as involvement in research-related activities is recognised as an effective means to upgrade a university’s profile (Nguyen, Klopper, & Smith, 2016). Previous studies have demonstrated that engagement in research potentially improves teaching quality and enhances knowledge and competence, and this contributes to high quality research supervision, which is critical for developing graduate students as independent researchers (Lindsay, Breen, & Jenkins, 2002).

Reflecting this, there has been a continuing trend for universities in developed countries to increase their focus on research, and this tendency has spread to developing countries, where research is increasingly viewed as a high priority (Nguyen et al., 2016). Consequently, research has become an important function for academics everywhere, as research productivity is now a primary consideration in several important organisational decisions, such as hiring, maintenance of tenure, promotions, and salary increases for academics (Chen, Gupta, & Hoshower, 2006). As academics are required to publish their research results nationally and internationally in high quality, peer-refereed journals (Nguyen et al., 2016), researchers and administrators have been interested in identifying the predictors of research involvement and performance in academics (e.g., Whelan & Markless, 2013).

This research has shown that, among the factors that influence research productivity, environmental factors are some of the most powerful ones (Bland & Ruffin, 1992), which has led researchers to identify the elements that characterise a good research environment

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(Holden, Pager, Golenko, & Ware, 2012). Owen (1992) identified four important components of a good research environment: research funding, research infrastructure, having active researchers, and the availability of supportive research administrators. White, James, Burke, and Allen (2012) demonstrated that a good research environment is one that provides opportunities to access key resources and support from colleagues and the wider university. More recently, Nguyen et al. (2016) conducted a qualitative study in Vietnam to examine the affordances, barriers, and motivations that drive research engagement in academics. Financial support for research activities was perceived as the main affordance, teaching load as the main hindrance, and having a collaborative research environment and supportive research policy settings and practices as key motivators for academics to engage in research.

The important role of the research environment for academics is consistent with Bronfenbrenner's (1979, 1986) ecological systems theory. This perspective emphasises that, compared to the objective environment, perceptions of the environment are of primary significance, because it is these that affect and guide behaviour. Bronfenbrenner argued that developing individuals are surrounded by interrelated systems. The inner circle, or microsystem, is where academics have direct, face-to-face contact with significant others, primarily their colleagues. Clusters of microsystems are called mesosystems (e.g., academics talking to colleagues from other departments constitutes a linkage between two systems). Beyond this are settings (i.e., exosystems) that are not experienced directly by the academics, but nonetheless influence their microsystem through links such as communications from management. Bronfenbrenner also described a macrosystem, which incorporated the wider society and culture. The influences here come via policy and reward systems in the university. Bronfenbrenner further proposed a chronosystem, which captures change over time in the characteristics of the individual (e.g., career-related transitions) and environmental change (e.g., national pressure to increase scientific publications and social conditions).

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For the individual academic in the research-focused environment, a relational viewpoint, which focuses on the developing individual in a changing context, is considered a useful perspective from which to comprehensively understand occupational and career behaviours (Vondracek, Lerner, & Schulenberg, 1986). These theorists argued that due to the continually changing nature of the individual and the context, a dynamic interactional approach, or a developmental contextual perspective, should be applied to understand occupational and career development. A developmental contextual point of view proposes that the context is not only continually changing, but also that the changes are influenced by the individuals and their characteristics. When considered from this perspective, occupation and career development reflect an interactive process where individuals both affect and are affected by the features of their environment, including social, cultural, and physical conditions.

In line with Bronfenbrenner’s (1979, 1986) ecological systems theory and Vondracek et al.’s (1986) person-context relationships proposition, individuals will function better, demonstrate adapted outcomes, and be more satisfied when their characteristics fit the demands of the environment. Individuals with a good person-environment fit are also likely to receive favourable feedback and input from the surroundings. Conversely, mismatched individuals will tend to demonstrate poorer outcomes and receive less positive feedback.

Consistent with the above, Pranulis and Gortner (1985) identified several characteristics of highly productive university departments: faculty competent in research skills, research valued as desirable outcome goal, time for faculty to engage in research activities, compatibility between faculty research activities and organisational mission and goals (i.e., reflected in research support and rewards), support and encouragement of faculty’s efforts to seek research funding, administrative support for research, and a psychosocial climate supportive of research and beginning investigators. Duffy, Torrey, Bott, Allan, and

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Schlosser (2013) interviewed 17 of the most research-productive counselling psychologists in the American Psychological Association. These scholars had received mentorship while in graduate school, chose research topics that they were passionate about, managed their time effectively, had good collaborations with others, had structured strategies for writing, worked in a supportive environment, and spent time outside of work with family or engaged in hobbies. In both these examples, the work environment was one of the main contributing factors. However, despite this, no measure has been created specifically to assess the perceived research environment of university academics.

Previous Measures of Research-Related Environments

While there is no scale suitable to measure the research environment from the perspective of academics in a university setting, Young and Rice (1983) devised The Research Environment Scale, a 24-item, six-point, Likert-type scale, specifically for nurses. This scale measures aspects of the clinical research environment, such as educational opportunities for nurses to learn about the research process (sample item: “Nurses have qualified mentors for conducting research”). Marsh and Brown (1992) modified this scale by removing six items and applying an 18-item version. Holden et al. (2012) devised the Research Capacity and Culture Tool to measure indicators of research capacity in health professionals at the individual, team, and organisation levels. Sample items are “Find relevant literature” (individual level), “Provide resources to support staff research training” (team), and “Has a plan or policy for research development” (organisational; 10-point rating scale).

Previous studies also have demonstrated that the research environment is critical for advancing graduate student productivity (Royalty, Gelso, Mallinckrodt, & Garrett, 1986). For example, the research training environment is an important factor in the training of graduate students in applied areas in psychology (Kahn & Gelso, 1997). Gelso (1979) suggested that there were 10 ingredients in the research training environment that contribute to positive

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outcomes, including modelling appropriate research behaviours and attitudes, positive reinforcement and support for research efforts, early and minimally threatening involvement in research, decoupling research and statistics, facilitating inward reflection for research ideas, emphasizing that science can be a partly social experience, teaching that all research is flawed and limited in some way, teaching varied investigative approaches to research, teaching how science and clinical practice can be wedded, and focusing on how scholarly activities can be accomplished in practice settings.

Royalty et al. (1986) devised the 45-item Research Training Environment Scale (RTES) to measure nine of the 10 ingredients that Gelso (1979) indicated were influential in promoting students’ research interest (focusing on how scholarly activities can be accomplished in practice settings was omitted, as it was considered an advanced skill). Then Gelso, Mallinckrodt, and Judge (1996) revised this measure by broadening the “decoupling research and statistics” component to “teaching relevant statistics and the logic of research design”. A sample item for this in their 54-item Research Training Environment Scale-Revised (RTES-R) is “My advisor offers much encouragement to me for my research activities and accomplishments”.

Kahn and Gelso (1997) introduced the idea of instructional and interpersonal factors within the research training environment. Interpersonal factors included early involvement, faculty modelling, positive reinforcement, and research as a social experience; and instructional factors included that all experiments are flawed, looking inward, teaching relevant statistics, varied investigative styles, and wedding of science and practice. Kahn and Miller (2000) created a short, 18-item form of the RTES-R by selecting one positively worded item and one negatively worded item from each subscale based on corrected item-total correlations.

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To the authors' knowledge, a perceived research environment scale suitable for academics has yet to be published in the peer-reviewed literature. We addressed this gap by designing a brief, multidimensional, and psychometrically sound instrument that could be applicable to universities and other research institutions regardless of specific disciplines.

Present Study

We employed a standard, classic test development approach (cf. DeVellis, 2016) to develop and provide initial validation for the Perceived Research Environment (PRE) Scale for academics. We conducted a literature review to determine the underlying domains for the construct, and held focus group discussions with higher education academics to validate these domains and ensure that the items developed would be specific to the population's experience. The independent reviewers who rated the suitability of the items consisted of 1 professor in psychology who had expertise in career development and test development and 3 doctoral-level psychology academics who had expertise in test development. They independently reviewed the discussions and determined the core ideas, and the team met to synthesise the results. The team identified five salient aspects: of beneficial social relationships, positive reinforcement, support, encouragement, and role modelling.

Next, we generated a list of approximately 70 items, had a group of experts rate them to examine their content validity, and administered the items along with supporting validity scales to a large sample of university-based academics. We then used item and exploratory factor analysis (EFA) on one half of the data to trim the number of items to 25 and determine the factor structure, and applied confirmatory factor analyses (CFA) on the second half of the data to confirm the factor structure. Reliability and initial validity were then assessed.

Phase 1 - Item Development

The aim of this phase was to create sufficient items to form the basis for the new scale, which was anticipated, for practical research purposes, to be approximately 25 items in

PERCEIVED RESEARCH ENVIRONMENT SCALE

length. We wrote approximately twice as many items as would appear in the final measure (Hinkin, 1998; Kline, 2000). Items were generated based on a review of the literature (e.g., Gelso, 1979) and a series of six focus groups, where we engaged with target participants, validated the underlying domains of the construct identified in the literature review, and enhanced content validity of the scale items (Vogt, King, & King, 2004). The 42 academics included in the focus groups consisted of 6 professors, 12 associate professors, 12 assistant professor, 6 lecturers, and 6 junior lecturers from one large state university in Central Java, Indonesia, who were requested to reflect on and discuss their own experiences and to give their opinions regarding characteristics of their university environment that might motivate or impede them in the conduct of research-related activities. We recorded the focus groups for later reference.

From the focus groups, we confirmed the five broad domains of perceived research environment, which were consistent with those identified from the literature review for being salient to academics (i.e., beneficial social relationships, positive reinforcement, support and expectations, focus on research, and having positive role models). We then created 70 positively worded items (i.e., to minimize response bias; Salazar, 2015), which were written in English to represent these five domains. Four independent reviewers rated the suitability of each item to reflect a specific dimension of the construct. We removed 10 items that were considered overlapping or irrelevant, and adjusted several others, leaving a final list of 60 items.

Following Ægisdóttir, Gerstein, and Cinnarbas (2008), the first author translated the items into Bahasa Indonesia, and two Indonesian academics examined the written expression. The items were then back-translated blindly into English by two bilingual Indonesian academics. All authors compared the back-translated versions with the originals, and adjusted

PERCEIVED RESEARCH ENVIRONMENT SCALE

the inaccuracies. The final items were then piloted with five Indonesian academics to check for readability.

Phase 2 - Item Analysis and EFA

The aim of this phase was to identify items to be retained in the scale and to determine the final factor structure. We used item analysis and EFA procedures.

Method

Participants. We obtained data from 598 academics who were recruited from four universities in Central Java, Indonesia, and divided this sample into two sub-samples using a random split procedure to allow for a cross-validation test of results and to reduce sample-specific effects that could potentially influence reliability and validity (Byrne, 2010). Sample A from the split ($N = 306$) was used for Phase 2, and Sample B ($N = 292$) was used for Phase 3 and Phase 4. All academics in this setting had research components to their roles.

Sample A consisted of 50.3% female academics (3.9% did not report gender), whose mean age was 42.29 years ($SD = 10.12$; 52.3% did not report age). A large majority (69.3%) had a masters' degree, and 21.6% a doctorate (9.2% did not report education level). Only a small proportion (1.3%) were professors, 22.5% were associate professors, 27.8% assistant professors, 16% lecturers, and 4.6% junior lecturers (27.8% did not report position). The mean tenure was 16.57 years ($SD = 10.04$; 14.5% did not report tenure).

Sample B consisted of 54.1% female academics (3.4% did not report gender). The mean age was 43.39 years ($SD = 9.74$; 49% did not report age), most (62.7%) had a masters' degree and 29.5% a doctorate (7.9% did not report education level). One percent were professors, 20.5% associate professors, 35.6% assistant professors, 15.4% lecturers, and 3.1% junior lecturers (24.3% did not report position). Mean tenure was 16.68 years ($SD = 9.67$; 13% did not report tenure).

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There were no differences between Sample A and Sample B on any of the demographic variables: age, $t(1060) = 0.46, p = .65$, gender, $\chi^2(1) = 0.82, p = .37$, tenure, $\chi^2(2) = 6.93, p = .06$, level of education $\chi^2(2) = 0.20, p = .65$, and institution $\chi^2(3) = 6.31, p = .10$. The total scores of the research involvement scale items for Sample A and Sample B did not differ significantly, $t(596) = -.33 (p = .74)$.

Materials

The 60 items generated in Phase 1, which were expected to reflect the five domains of PRE, were administered in a questionnaire along with the Organisational Culture/Support for Research Scale and the Research Involvement Scale, which were used to test for construct validity. Higher scores reflect higher levels of each construct.

Perceived Research Environment. This was assessed using the 60 items generated in Phase 1. Example items: “At my university, academics often informally discuss research ideas in their day-to-day discussions” (beneficial social relationship), “At my university, successful researchers have high status” (positive reinforcement), “My university assists researchers to publish by helping them with manuscript preparation (e.g., writing workshops)” (support and expectations), “At my university, academics think research is important” (focus on research), and “At my university, many academics publish their research in high quality academic journals” (positive role models); 6-point-scale of 1 = *strongly disagree* to 6 = *strongly agree*.

Organisational culture/support for research. We used the 20-item Organisational Culture/Support for Research Scale (OCSR; Kortlik, Bartlett, Higgins, & Williams, 2002) to assess academics’ perceptions of the organisational culture or support for conducting research. A sample item from this measure is “My peers support my efforts to publish in refereed research journals”; 6-point scale of 1 = *strongly disagree* to 6 = *strongly agree*.

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Cronbach's alpha was reported as .88, and validity was supported by finding positive correlations with scales of research confidence (Kortlik et al., 2012).

Research involvement. We used the 24-item Research Involvement Scale (RI; Whelan et al., 2003) to assess participants' level of engagement in research. A sample item from this measure is "Participating in research as part of a collaborative team"; 6-point scale from 1 = *not at all* to 6 = *a great deal*. Cronbach's alpha has been reported as .98, and construct validity has been supported by finding positive correlations with evidence of greater research output (Whelan et al., 2013).

Procedure

The survey was administered by the chief researchers and assistants during working hours. This study was conducted with approval from the authors' university ethics committee, and participants gave their permission to participate.

Results

Item analysis. We assessed: item skew to identify any item whose distribution indicated floor or ceiling effects; the inter-item correlations to identify any pairs of items that were too highly correlated ($r \geq .80$), which might indicate redundancy; the corrected item-total correlations to identify any items with a weak or negative correlation with the total scale ($r < .30$), which might indicate items that were not tapping the construct of PRE; and age, gender, position, tenure, and level of education in relation to each item to identify items that might be responded to differently depending on demographic variables (Kline, 2000). No items were identified as problematic; thus, no items were eliminated.

EFA. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (.94) and statistically significant Bartlett's test of sphericity ($p < .001$) confirmed that the 60 items were suitable for factor analysis. The common variance is of interest in determining the underlying factor structure, thus, we used common factor analysis (i.e., principal-axis factor analysis;

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Hair, Black, Babin, & Anderson, 2010). As the five anticipated factors were expected to be correlated aspects of an overall perceived environment measure, we utilised a direct oblimin rotation (Hair et al., 2010). Following Hayton, Allen, and Scarpello (2004), we used several criteria to determine the number of factors: the scree plot, Velicer’s minimum average partial test, parallel analysis (O’Connor, 2000), at least three items loading on a factor (Costello & Osborne, 2005), and factor interpretability (Hinkin, 1998).

In the first EFA, the scree plot indicated five factors with eigenvalues > 1.0. Velicer’s minimum average partial test and the parallel analysis also suggested a 5-factor solution. The first eigenvalues were: 14.93, 5.20, 2.38, 1.83, and 1.61. We accepted this solution as these five groupings were interpretable theoretically and reflected the five domains initially identified. Then, 35 items were deleted from the solution because their factor loadings were < .4 and/or less than twice as strong on the appropriate factor as on other factors, or they did not load meaningfully on any factor (Hinkin, 1998). The final 5-factor solution accounted for 65.58% of the variance: Factor 1 = 32.94%, Factor 2 = 15.56%, Factor 3 = 6.81%, Factor 4 = 5.40%, and Factor 5 = 4.86%. Table 1 displays the results of the item analysis and Table 2 displays factor loadings and eigenvalues.

Insert Table 1 and Table 2 about here

Factor 1 (5 items; “beneficial social relationship”) represents the situation where individuals perceive that their social relationships support their participation in research ($\alpha = .88, M = 23.01, SD = 3.85$). Factor 2 (5 items; “positive reinforcement”) refers to the situation where individuals perceive positive social and non-social reinforcement for achievements in research ($\alpha = .92, M = 20.62, SD = 5.90$). Factor 3 (5 items; “support and expectations”) reflects perceived support and expectations from the university for conducting research ($\alpha = .86, M = 24.85, SD = 3.21$). Factor 4 (5 items; “focus on research”) includes perceived emphasis on research-related activities ($\alpha = .92, M = 22.69, SD = 4.53$). Factor 5 (5 items;

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“positive role models”) reflects perceived availability of positive research role models ($\alpha = .89$, $M = 21.81$, $SD = 4.36$). The correlations among the five factors (range .10 to .47; all $p < .001$) were in line with the results from the EFA indicating that the subscales were somewhat independent, but with overlap among them. Cronbach’s alpha for the full scale was .92.

Phase 3: CFA

This phase aimed to validate the factor structure of the PRE Scale with Sample B. Using CFA (AMOS Version 4.0; Arbuckle & Wothke, 1995). We examined the 5-factor structure identified in Phase 2, and then compared this model with a 1-factor model, a hierarchical, 2nd-order model, and a bifactor model (Reise, Bonifay, & Haviland, 2013). In Sample B, Cronbach’s alpha for the full scale was .93 ($M = 112$, $SD = 16.65$), Factor 1 ($\alpha = .90$, $M = 22.87$, $SD = 4.29$), Factor 2 ($\alpha = .94$, $M = 20.36$, $SD = 6.22$), Factor 3 ($\alpha = .87$, $M = 24.44$, $SD = 3.70$), Factor 4 ($\alpha = .91$, $M = 22.53$, $SD = 4.80$), and Factor 5 ($\alpha = .89$, $M = 21.79$, $SD = 4.59$).

We used the χ^2 statistic, the normed χ^2 (χ^2/df), the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA) to examine model fit. A significant χ^2 , $\chi^2/df < 3.0$, CFI and TLI values $> .92$, and RMSEA $< .08$ indicate satisfactory fit when sample size > 250 and observed variables number between 12 and 30. We then compared the different models using the χ^2 -difference test and the Akaike Information Criterion (AIC), where the lower value indicates a better fit (Hair et al., 2010).

The 5-factor model identified in Phase 2 generated satisfactory fit statistics (see Table 3 for fit statistics for all models). All factor loadings were statistically significant ($p < .001$) and ranged from .72 to .84 (beneficial relationship), .83 to .91 (positive reinforcement), .55 to .89 (support and expectations), .76 to .89 (focus on research), and .70 to .89 (positive role models). Correlations among the latent variables ranged from .10 to .62.

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The 2nd-order model (correlations with 2nd-order factor = .43 to .87) and the bifactor model, but not the 1-factor model, also had satisfactory fit statistics. However, the best-fitting model was the bifactor model, which was statistically different from the 5-factor model, and generated the lowest AIC. Item loadings here for Factor 1 ranged from .28 to .62, Factor 2 from .80 to .89, Factor 3 from .30 to .80, Factor 4 from .53 to .80, and Factor 5 from .32 to .55. Item loading for the perceived research environment bifactor ranged from .35 to .77. The bifactor model included a general latent variable (i.e., dependent on all 25 items) and five subscale latent variables (i.e., five uncorrelated factors dependent on their respective five items). This model showed that each item is an indicator of both a total and subscale aspect, with the results for the total variable representing common sources of variance after controlling for subscale variances, and the subscale variables representing variances after controlling for the total variance (Reise et al., 2013).

Insert Table 3 about here

As our results supported multi-dimensionality of the scale (i.e., the 5-factor, 2nd-order, and bifactor models all had acceptable fit statistics), it needed to be determined whether the scale should best be interpreted at the global or subscale level. To do this, we calculated the bifactor model-based reliability estimates and compared the variances explained for the total and subscale interpretations. Following Rodriguez et al. (2016), we used the Bifactor Indices Calculator (Dueber, 2017) to compute Omega, OmegaH, Relative Omega, and the explained common variance (ECV). Omega, the estimate of the proportion of variance accounted for when considering all items in a factor, was .96 (general factor), and .91, .94, .86, .92, and .90 (specific factors), indicating high reliability for the general factor and sound to high reliability for the specific factors, and suggesting all factors have acceptable reliability. OmegaH, the proportion of unique variance explained by a factor, was .71 (general factor), and .37, .62, and .52, .62, and .25 (specific factors). Relative Omega, the proportion of reliable variance in

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the multidimensional composite due to a factor, was .74 (general factor), and .41, .68, .60, .67 and .28 (specific factors), indicating the majority of reliable variance in the total scores resides within the general factor. Last, the ECV, the proportion of all common variance explained by a factor, was .40 (general factor), and .09, .21, .10, .14, and .06 (specific factors), suggesting a moderately strong global factor, with much less variance explained by the specific factors. Thus, it can be concluded that interpretation at the total level (and not the subscale level) will give the more useful measure of PRE, as the total factor will account for more meaningful levels of variance in the construct.

Phase 4: Construct Validity

This phase aimed to evaluate the initial construct validity of the scale by correlating scores from the PRE Scale with scores from the Organisational Culture/Support for Research and Research Interest Scales. Individuals who reported stronger research training environments were more likely to perceive their environment to be more research supportive (Kahn & Miller, 2000), and those who perceived a more research supportive work environment were more likely to report a positive attitude towards research and greater research engagement (Royalty et al., 1986). Thus, we expected the PRE Scale to be associated positively with the OCSR and RI Scales. These analyses were conducted using Sample B ($N = 292$). All correlations were statistically significant and in the expected directions, as reported in Table 4. The results demonstrated that the PRE Scale was associated with the two other constructs as expected; supporting convergent validity.

Insert Table 4 about here

Discussion

We devised and reported initial validity evidence for a psychometrically sound, 25-item scale to assess PRE for higher education academics: The Perceived Research Environment (PRE) Scale. We operationalised PRE as the organisational environment

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perceived by academics, which enables and supports them to learn and conduct research-related activities and yield scientific publications. The salient domains identified were beneficial social relationships, positive reinforcement, support and expectations, focus on research, and positive role models. Content validity was supported by a review of the literature, focus groups, pilot testing, and use of expert reviewers; whereas construct validity was supported by the EFAs and CFAs, which indicated that the new scale reflected the five anticipated inter-correlated domains. The PRE scale is internally reliable, and the positive associations with the Organisational Culture/Support for Research and the Research Interest Scales support its convergent validity. Last, CFA model comparisons suggested that it can be applied most productively at the global, rather than subscale, level.

Previous research has shown the importance of PRE for academics and research institutions (e.g., Duffy et al., 2013). The present study provided a comprehensive measure of PRE, which assesses all identified aspects of the PRE construct. At 25 items, the scale is practical and will be suitable to be used simultaneously with other scales in both research and practice. Extending PRE research using this scale has the potential to add to our knowledge and understanding of the PRE from the perspective of higher education academics, for example when designing research studies, identifying its nomological network, and examining its across-time correlates.

Practitioners can use the scale for conducting systems-level needs assessments and planning for departmental/organisational change. The PRE Scale also will be of use to those who work with academics at any stage of their career when they have issues with research-related interest and performance. The scale will be helpful to show to academics so that they can explore the supports and barriers that are influencing their research-related progress and achievement. This could be helpful for both early-career academics and those at mid- and late-career stages. At the organisational level, the scale can be used for human resource

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mapping as a foundation for formulating policies at department, research centre, and university levels, and for identifying strategies that might be helpful to foster a more researched focused academic environment.

Limitations

Our study was conducted using a sample of higher education academics from several universities in Central Java. Hence, the conclusions of this study need to be tested on other academic populations. We examined content and construct validity of the scale, and future researchers could focus on establishing predictive validity by, for example, testing the longitudinal associations between scores on the scale at one point in time and subsequent outcomes. We showed that the scale was unrelated to several demographic variables (e.g., age, gender, tenure, level of education, and institutions), suggesting no inherent bias based on these characteristics; however, we had missing demographic data, and future studies need to confirm this, and examine structural invariance on these and other variables to support the usefulness of the scale.

We only had a very small number of professors in the samples, and the number of associate professors, assistant professors, lecturers, and junior lecturers were not proportional. Future studies need to consider the proportions in their samples when collecting data on academics, as this might affect responses regarding perceived research environment. Finally, further developments, such as testing the relationships with other constructs, measures, and criterion variables would be useful to establish the nomological network and construct validity of scores from this measure.

Conclusion

This research demonstrated support for a scale to measure PRE in higher education academics, although future studies are needed to extend support for its validity and to test its applicability on more diverse populations. Our findings contribute to the body of literature on

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academic PRE, and open the way for improved career counselling for academics, research
development interventions, and organisational policies.

For Peer Review

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References

- Ægisdóttir, S., Gerstein, L. H., & Cinnarbas, C. D. (2008). Methodological issues in cross-cultural counselling research: Equivalence, bias, and translations. *The Counseling Psychologist, 36*, 188-219. doi:10.1177/0011000007305384
- Arbuckle, J. L. & Wothke, W. (1995). *Amos 4.0 user's guide*. Chicago, IL: Small Waters.
- Bland, C. J., & Ruffin, M. T. (1992). Characteristics of a productive research environment: Literature review. *Academic Medicine, 67*, 385-397. doi:10.1097/00001888-199206000-000-10
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bronfenbrenner, U. (1986). Recent advances in research on the ecology of human development. In *Development as Action in Context* (pp. 287-309). Berlin, DE: Springer.
- Byrne, B. (2010). *Structural equation modelling with AMOS: Basic concepts, applications, and programming*. New York, NY: Routledge.
- Chen, Y., Gupta, A., & Hoshower, L. (2006). Factors that motivate business faculty to conduct research: An expectancy theory analysis. *Journal of Education for Business, 81*, 179-189. doi:10.3200/JOEB.81.4.179-189
- Costello, A. B., & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation, 10*, 1-9. Retrieved from <http://pareonline.net/pdf/v10n7.pdf>
- DeVellis, R. F. (2016). *Scale development: Theory and applications* (Vol. 26). Los Angeles, CA: Sage.
- Dueber, D. M. (2017). Bifactor Indices Calculator: A Microsoft Excel-based tool to calculate various indices relevant to bifactor CFA models.

PERCEIVED RESEARCH ENVIRONMENT SCALE

- <https://dx.doi.org/10.13023/edp.tool.01> [Available at
<http://sites.education.uky.edu/apslab/resources/>]
- Duffy, R. D., Torrey, C. L., Bott, E. M., Allan, B. A., & Schlosser, L. Z. (2013). Time management, passion, and collaboration: A qualitative study of highly research productive counseling psychologists. *The Counseling Psychologist, 41*, 881-917. doi: 10.1177/0011000012457994
- Eam, P. (2015). Investigating relationship among research self-efficacy, research outcome expectations, and research interest of Cambodian faculty: Testing social-cognitive theory. *International Journal of Sociology of Education, 4*, 199-224. doi:10.17583/rise.2015.1752
- Gelso, C. J. (1979). Research in counseling. Methodological and professional issues. *The Counseling Psychologist, 8*, 7-35.
- Gelso, C. J. (1993). On the making of a scientist-practitioner: A theory of research training in professional psychology. *Professional Psychology: Research and Practice, 24*, 468-476. doi:10.1037/0735-7028.24.4.468
- Gelso, C. J., Mallinckrodt, B., & Judge, A. B. (1996). Research training environment, attitude toward research, and research self-efficacy. The revised Research Training Environment Scale. *The Counseling Psychologist, 24*, 304-322. doi:10.1177/0011000096242010
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis. A global perspective*. (7th ed.). New Jersey, NJ: Prentice Hall.
- Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods, 7*, 191-205. doi:10.1177/1094428104263675

PERCEIVED RESEARCH ENVIRONMENT SCALE

- Hinkin, T. R. (1998). A brief tutorial on the development of measures for the use in survey questionnaires. *Organizational Research Methods, 1*, 104-121. doi:10.1177/109442819800100106
- Holden, L., Pager, S., Golenko, X., & Ware, R. S. (2012). Validation of the Research Capacity and Culture (RCC) tool: Measuring RCC at individual, team, and organisation levels. *Australian Journal of Primary Health, 18*, 62-67. doi:10.1071/PY10081
- Kahn, J. H., & Gelso, C. J. (1997). Factor structure of the Research Training Environment Scale – Revised: Implications for research training in applied psychology. *The Counseling Psychologist, 25*, 22-37. doi:10.1177/0011000097251004
- Kahn, J. H., & Miller, S. A. (2000). Measuring global perceptions of the Research Training Environment Using A Short Form of the RTES-R. *Measurement and Evaluation in Counseling and Development, 33*, 103-119. Retrieved from <https://search.proquest.com/docview/195607998?pq-origsite=gscholar>
- Kortlik, J. W., Bartlett II, J. E., Higgins, C. C., & Williams, H. A. (2002). Factors associated with research productivity of agricultural education faculty. *Journal of Agricultural Education, 43*, 1-10. doi:10.5032/jae.2002.03001
- Lindsay, R., Breen, R., & Jenkins, A. (2002). Academic research and teaching quality. The views of undergraduate and postgraduate students. *Studies in Higher Education, 27*, 309-327. doi:10.1080/03075070220000699
- Mallinckrodt, B. (1997). Discovering the research training environments that fit the students we select: The challenge of providing for diverse needs. *The Counseling Psychologist, 25*, 68-73. doi:10.1177/0011000097251006
- Marsh, G. W., & Brown, T. L. (1992). The measurement of nurses' attitudes towards nursing research and the research environment in clinical settings. *Journal of Clinical Nursing, 1*, 315-322. doi:10.1111/j.1365-2702.1992.tb00425.x

PERCEIVED RESEARCH ENVIRONMENT SCALE

- Nguyen, Q., Klopfer, C., & Smith, C. (2016). Affordances, barriers, and motivations: Engagement in research activity by academics at the research-oriented university in Vietnam. *Open Review of Educational Research*, 3, 68-84.
doi:10.1080/23265507.2016.1170627
- Owen, M. (1992). Research at small Canadian universities. *The Canadian Journal of Higher Education*, 22, 1-14. Retrieved from
<http://journals.sfu.ca/cjhe/index.php/cjhe/article/view/183130/183106>
- Pranulis, M. F., & Gortner, S. R. (1985). Researchmanship: Characteristics of productive research environments in nursing. *Western Journal of Nursing Research*, 7, 127-131.
doi:10.1177/00920055X8500700112
- Reise, S. P., Bonifay, W. E., & Haviland, M. G. (2013). Scoring and modelling psychological measures in the presence of multidimensionality. *Journal of Personality Assessment*, 95, 129-140. doi:10.180/00223891.2012.725437
- Rodriguez, A., Reise, S. P., & Haviland, M. G. (2016). Evaluating bifactor models: Calculating and interpreting statistical indices. *Psychological Methods*, 21, 137-150.
doi:10.1037/met0000045
- Royalty, G. M., Gelso, C. J., Mallinckrodt, B., & Garrett, K. (1986). The environment and the student in counselling psychology: Does the research training environment influence graduate students' attitudes toward research? *The Counseling Psychologist*, 14, 9-30.
doi:10.1177/0011000086141002
- Salazar, M. (2015). The dilemma of combining positive and negative items in scales. *Psicothema*, 27, 192-199. doi:10.7334/psicothema2014.266
- Shivy, V. A., Worthington, E. L., Wallis Jr, A. B., & Hogan Jr, C. (2003). Doctoral research training environments (RTEs): Implications for the teaching in psychology. *Teaching of Psychology*, 30, 297-302. doi:10.1207/S1528023TOP3004_03

PERCEIVED RESEARCH ENVIRONMENT SCALE

Vogt, D. S., King, D. W., & King, L. A. (2004). Focus groups in psychological assessment: Enhancing content validity by consulting members of the target population.

Psychological Assessment, 16, 231-243. doi:10.1037/1040-3590.16.3.231

Whelan, K., & Markless, S. (2012). Factors that influence research involvement among registered dietitians working as university faculty: A qualitative interview study. *The Academy of Nutrition and Dietetics*, 112, 1021-1028. doi:10.1016/j.jand.2012.03.002

Whelan, K., Copeland, E., Oladitan, L., Murrells, T., & Gandy, J. (2013). Development and validation of a questionnaire to measure research involvement among registered dietitians. *Journal of the Academy of Nutrition and Dietetics*, 113, 563-568. doi:10.1016/j.jand.2012.08.027

White, C. S., James, K., Burke, L. A., & Allen, R. S. (2012). What makes a “research star”? Factors influencing research productivity of business faculty. *International Journal of Productivity and Performance Management*, 61, 584-602. doi:10.1108/17410401211249175

Young, K., & Rice, M. (1983). Measurement of attitude toward the nursing research environment in the university setting. Paper presented at the First Annual Scientific Meeting on Research in Nursing Education, San Francisco, California.

Table 1
Factor Loadings for the PRE Scale: Sample A (N = 306)

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1. At my university, academics are willing to involve their colleagues in research projects	.86	-.10	-.04	-.07	-.01
2. At my university, academics support one another in their research projects	.83	.11	.13	-.04	.01
3. At my university, academics often informally discuss research ideas in their day-to-day discussions	.83	-.09	-.04	.03	-.01
4. There is a sense at my university that academics enjoy their research activities	.71	.06	.04	.05	.22
5. At my university, researchers actively involve students in their research projects	.70	-.09	-.01	.20	-.01
6. My university rewards successful researchers	.03	-.90	-.01	.07	.01
7. My university is well known for its research expertise	-.01	-.89	.01	-.03	.04
8. At my university, researchers who do well are highly respected by their colleagues	.04	-.85	.09	-.01	-.02
9. At my university, there are incentives for successful research activities (e.g., getting published or obtaining a research grant)	-.01	-.83	.03	.11	-.09
10. At my university, we all celebrate when a colleague is successful (e.g., gets published or obtains a research grant)	.08	-.76	.13	-.09	.11
11. My university sets clear expectations regarding research output for academics	.01	.01	.82	-.06	.01
12. My university has specific programs and funds to help new academics get their research started	.04	.01	.79	-.02	.05
13. My university assists researchers to publish by helping them with manuscript preparation (e.g., writing workshops)	-.01	-.03	.78	.02	-.03
14. My university has clear expectations that academics will engage in research	.09	-.08	.76	.07	-.05
15. Academics at my university know it is expected of them that they attend conferences and present their research	-.08	-.07	.68	.11	-.05
16. At my university, academics are encouraged to use a wide variety of research methods in their research	-.01	.05	.06	-.91	-.01
17. At my university, researchers are always on the look-out for research collaborators	.06	-.02	.04	-.86	.03
18. At my university, academics think research is important	.03	.02	.03	-.85	-.04
19. At my university, new faculty members are encouraged to publish as soon as they commence work	-.05	-.14	-.08	-.79	.09
20. At my university, the opportunity for academics to actualize themselves in research is wide	.08	.16	.08	-.78	.07
21. Academics at my university give high priority to their research	.02	.04	.14	-.03	.86
22. At my university, many academics publish their research in high quality academic journals	.01	-.03	-.06	-.01	.86
23. Academic at my university are strongly focused on research	-.13	.03	-.05	.09	.83
24. Academics at my university strive to publish their research in high quality journals	.13	.01	.10	-.01	.77
25. Many academics at my university are working on important research projects	.14	-.05	.01	.04	.70
Eigenvalues	8.57	4.21	2.06	1.69	1.55
% variance explained	32.94	15.56	6.81	5.40	4.86

Note. Factor 1 = Beneficial social relationships, Factor 2 = Positive reinforcement, Factor 3 = Support, Factor 4 = Encouragement, Factor 5 = Role model; Main loadings highlighted in bold.

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Table 2

Results of Item Analyses; Sample A (N = 306)

Item	Skewness	Kurtosis	Mean	SD	Item-total correlation
1.	-1.18	2.00	4.57	.93	.62
2.	-1.20	2.43	4.61	.97	.64
3.	-1.05	1.48	4.56	.97	.51
4.	-.73	1.17	4.61	.83	.63
5.	-.97	1.16	4.66	.97	.62
6.	-.90	.14	4.20	1.35	.63
7.	-.81	.10	4.05	1.36	.55
8.	-1.17	.63	4.28	1.32	.56
9.	-.99	.29	4.21	1.34	.52
10.	-.55	-.43	3.88	1.34	.65
11.	-.69	.93	4.96	.78	.41
12.	-.80	1.17	5.15	.73	.37
13.	-.78	.38	4.96	.92	.39
14.	-.68	.70	4.90	.83	.50
15.	-.58	.79	4.87	.76	.39
16.	-1.08	1.32	4.52	1.03	.73
17.	-.83	1.10	4.44	1.02	.72
18.	-1.08	1.38	4.67	1.08	.65
19.	-.81	.71	4.41	1.03	.69
20.	-1.08	1.14	4.53	1.08	.74
21.	-.34	.03	4.08	1.02	.41
22.	-.35	-.46	4.20	1.20	.33
23.	-.55	.15	4.35	1.06	.56
24.	-.61	.22	4.52	1.01	.58
25.	-.69	.91	4.66	.92	.51

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Table 3

Model Fit Indices of the 3-Factor, 1-Factor, 2nd-Order Factor, and Bifactor Models for Sample B (N = 292)

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	χ^2_{Diff}	AIC
5-factor	559.69***	256	2.19	.94	.94	.06	-	697.69
1-factor	2324.78***	270	8.61	.63	.59	.16	$p < .001$	2434.78
2 nd order	749.03***	269	2.78	.91	.90	.08	$p < .001$	861.03
Bifactor	513.33***	244	2.10	.95	.94	.06	$p < .001$	675.33

Note. χ^2_{Diff} statistics refer to differences with 5-factor model. *** $p < .001$

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Table 4

Summary Data for Sample B ($N = 292$; correlations above diagonal)

Indonesian													
	Scale	<i>M</i>	<i>SD</i>	Range	α	1	2	3	4	5	6	7	8
1.	Full scale	112.00	16.65	28-145	.93	-	.81***	.65***	.63***	.80***	.64***	.47***	.49***
2.	Subscale 1 (beneficial social relationship)	22.87	4.29	5-30	.90		-	.40***	.48***	.52***	.54***	.30***	.35***
3.	Subscale 2 (positive reinforcement)	20.36	6.22	5-30	.94			-	.12*	.49***	.10*	.14*	.24**
4.	Subscale 3 (support and expectations)	24.44	3.70	6-30	.87				-	.38***	.49***	.38***	.32***
5.	Subscale 4 (focus on research)	22.53	4.80	5-30	.91					-	.39***	.54***	.58***
6.	Subscale 5 (positive role models)	21.79	4.59	5-30	.89						-	.35***	.27**
7.	Organisational culture/ support for research	67.24	15.40	24-144	.93							-	.54***
8.	Research involvement	100.82	21.12	18-108	.97								-

Note. * $p < .05$; ** $p < .01$; *** $p < .001$

**6. Bukti Konfirmasi Artikel Accepted
(16 Jan 2019)**



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Journal of Psychoeducational Assessment - Decision on Manuscript ID JPA-18-0139.R2

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Wed, Jan 16, 2019 at 3:28 AM

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15-Jan-2019

Dear Dr. SAWITRI:

I have now carefully read the revised manuscript and your cover letter in response to reviewer comments. After reviewing these materials, I noted that you addressed all issues raised in the last round of reviews. Thus, it is a pleasure to accept your manuscript entitled "Development and Initial Validation of Perceived Research Environment Scale for Higher Education Academics" in its current form for publication in Journal of Psychoeducational Assessment.

Thank you for your fine contribution. On behalf of the Editors of Journal of Psychoeducational Assessment, we look forward to your continued contributions to the Journal.

Sincerely,
Dr. Renée Tobin
Associate Editor, Journal of Psychoeducational Assessment
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