**Title page**Title: Measuring hospital staff nurses perception on quality of the professional practice environment
Running head: Construct validity of the Essentials of Magnetism

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**Conflict of Interest**

This research was formed without any financial support and any conflict of interest. Copyright on the original Essentials of Magnetism instrument means that this instrument can not be reprinted without the expressed written permission of Health Sciences Research Associates and, therefore, permission was obtained.

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ABSTRACT

Aim. The purpose of this study was to determine construct validity of the Dutch Essentials of Magnetism II © instrument, designed to assess nursing practice environments, using hypotheses testing.

Background. Reduction of hospital length of stay and the number of inpatient beds increases care intensity. Educational levels and numbers of nursing staff in hospitals, however, do not match this increase, resulting in a strain on quality of care and patient safety. A possible answer to existing concerns about quality of care may be the creation of a productive and healthy practice environment, as this impacts the quality of care. Therefore, areas requiring improvement of the practice environment have to be defined.

Design. A cross-sectional, correlational study design.

Method. We determined construct validity with hypotheses testing by relating the Dutch Essentials of Magnetism II to the Dutch Practice Environment Scale of the Nursing Work Index. We formulated fifteen hypotheses prior to data-analysis; ten related to convergent validity and five related to discriminant validity. Data were collected from qualified nurses (N=259) on nine randomly selected hospital wards from March to April 2012.

Results. Response rate was 47% (n=121). Total scores of both instruments are strongly correlated (r=.88). In total, twelve out of fifteen hypotheses (80%) were confirmed and three were rejected.

Conclusion. The D-EOMII has satisfactory construct validity for measuring the nursing practice environment in hospitals and can be used by nurses, managers, health policy makers, hospitals and governments to assess and identify processes and relationships that are in need of improvement.

KEYWORDS

Hospital Care, Hypotheses Testing, Nursing, Practice Environment, Quality of Care, Workforce Issues.

SUMMARY STATEMENT

Why is this research needed?

* Reduction of hospital length of stay and the number of inpatient beds increase care intensity for inpatients.
* The numbers and educational levels of nursing staff in hospitals do not match this increase in care intensity, resulting in a strain on quality of care and patient safety.
* Existing concerns about quality of care may be overcome by creating optimal practice environments for nurses and therefore areas of improvement have to be defined, requiring valid and reliable measures.
* The Essentials of Magnetism II is not extensively evaluated outside its original context of USA-based hospitals. Yet such evaluations are necessary if we reliably want to assess the practice environment.

What are the key findings?

* The Dutch Essentials of Magnetism instrument has satisfactory construct validity for measuring the nursing practice environment in hospitals.
* Subscales of the Dutch Essentials of Magnetism instrument and the Practice Environment Scale of the Nursing Work Index are correlated, but not highly correlated, thus indicating that subscales do not measure the exact same constructs.

How should the findings be used to influence policy/practice/research/education?

* The Dutch Essentials of Magnetism instrument can be used to assess nursing practice environments in hospitals and to identify processes and relationships that are in need of improvement.
* A nursing practice environment that encompasses the essential elements measured by the D-EOMII, can help to attract and retain well qualified nurses.
* This study indicates that the Dutch Essentials of Magnetism and the Practice Environment Scale of the Nursing Work Index vary in measured constructs but, given the large overlap in what is captured, using both instruments is not worthwhile.
* Nursing education should include the essentials of magnetism as nurses need to know which elements enable them to deliver the best possible patient care.
* Further research is recommended to get insight in which elements of the nursing practice environment are most strongly related to the quality of patient care.

INTRODUCTION

The financial crisis in Europe resulted in constraints on health expenditure growth leading to, for instance, internal hospital restructuring and cutting costs (Karanikolos et al. 2013). Reduction of hospital length of stay and the number of inpatient beds increases care intensity for inpatients (Aiken et al. 2013, Aiken et al. 2014). At the same time, there is no matching increase in either the numbers or educational levels of nursing staff in hospitals, resulting in a strain on quality of care and patient safety (Aiken et al. 2014).

The Organisation for Economic Co-operation and Development (OECD) reported that many European countries face shortages of nurses and the nursing workforce is aging (OECD 2012). Therefore it is also not possible to simply increase the number and educational level of nursing staff. Studies indicated that better practice environments in hospitals are significantly associated with better quality and safety of patient care, and higher job satisfaction for nurses (Aiken et al. 2012, Aiken et al. 2014, Bae 2011, Cheung et al. 2008, Djukic et al. 2013, Duvall & Andrews 2010, Zangaro & Soeken 2007). Optimally designed practice environments support nurses’ delivery of care, enabling them to sustain or improve quality of patient care (Djukic et al. 2013). Furthermore, Aiken et al. (2012) noted that creating an optimal practice environment can be a relatively low cost strategy. Thus, a possible answer to the existing concerns on quality of care may be the creation of a productive and healthy practice environment for nurses.

To be able to establish an optimal practice environment, areas of improvement have to be defined (Warshawsky & Havens 2011). For this, managers in health care organizations need valid and reliable assessment tools to identify weaknesses and key strengths in their nurses’ practice environments (Lake 2007).

Organizational traits relevant for nurses’ practice environment were identified by the American Academy of Nursing in several projects on the identification of ‘excellent hospitals’ with professionally and personally rewarding nursing practice environments; so-called Magnet Hospitals (McClure 1983). An instrument was developed to measure eight attributes of the nursing practice environment defined by Magnet Hospital nurses as essential to quality care: the Essentials of Magnetism II© (EOMII) (Health Sciences Research Associates (HSRA), California). To be able to implement improvements in the work environment that lead to improved patient outcomes, measurement of processes in terms of steps and components of the nursing practice environment should be performed at nursing ward level as patients on different ward have specific characteristics and needs that require different nursing care (Kramer et al. 2014). The EOMII does measure steps and components of the nursing practice environment on ward level and focusses on contributing elements of the practice environment to quality of care. This is exactly the wanted combination for this study. In the Netherlands no process measurement of the nursing practice environment existed and therefore the EOMII was translated and tested in Dutch hospitals (De Brouwer et al. 2014). However, further validation was suggested by De Brouwer et al. 2014.

Background

The Essentials of Magnetism II© (EOMII) is a globally used instrument measuring processes and relationships of practice environment contributing to productivity and quality of patient care (Schmalenberg & Kramer 2008). The EOMII measures functional processes leading to desired patient and nurse outcomes, called Essentials of Magnetism (EOM): Collaborative Nurse-Physician Relationships, Control over Nursing Practice, Nurse Manager Support, Adequacy of Staffing, Clinically Competent Peers, Support for Education, Patient Centred Culture, Clinical Autonomy (Schmalenberg & Kramer 2008, de Brouwer et al. 2014).

De Brouwer et al. 2014 translated the EOMII into Dutch (D-EOMII) and showed acceptable reliability and validity. However, to ensure the D-EOMII is a valid and reliable measure the validation process should be amplified (de Brouwer et al. 2014). Further insight in the D-EOMII’s construct validity is necessary in this validation process.

Construct validity refers to the extent to which scores of a questionnaire relate to other measures in a manner that is consistent with theoretically derived hypotheses concerning the concepts that are being measured (Mokkink et al. 2010). Construct validity can be determined in terms of structural validity (degree to which questionnaire scores are an adequate reflection of the dimensionality of the construct), cross-cultural validity (degree to which performance of items of a translated instrument are an adequate reflection of that of the original version), and hypotheses testing (correlation between measures or expected differences in scores between “known” groups) (Mokkink et al. 2010).

Structural validity and cross-cultural validity have already been addressed for the D-EOMII (de Brouwer et al. 2014). However, hypotheses testing has not yet been done.

In hypotheses testing, formulation of hypotheses, specified in advance, is important to overcome the risk of bias in determining whether the instrument is valid (Terwee et al. 2007). A positive rating for construct validity can be determined when at least 75% of the results are in correspondence with the hypotheses in (sub)groups of at least 50 respondents. Hypotheses testing can be split into testing for convergent (degree to which measures of constructs that theoretically should be related to each other are correlated) and discriminant (degree to which measures of constructs that theoretically should not be related to each other are correlated) validity (Elbers et al. 2012).

To be able to test the convergent validity we need to have measures of construct(s) that are theoretically related to the constructs measured with the D-EOMII. Several instruments have been developed to measure nurses’ assessment of their practice environment. One example is the Practice Environment Scale of the Nurse Work Index-Revised (PES- NWI), which is a second globally used instrument measuring contributing elements of the practice environment to nursing job satisfaction (Lake 2002, Warshawsky & Havens, 2011). The PES-NWI and the D-EOMII have a common ancestor, the Nursing Work Index (NWI), but the focus of both instruments differs to some extent due to a focus on structures facilitating a good work environment (PES-NWI) versus actual processes *within* this work environment (EOMII) (Kramer et al. 2014, Lake 2002, Schmalenberg & Kramer 2008).

To date, no publication is found on validity and reliability of the Dutch PES-NWI in the Netherlands. However, there is a Dutch version available, tested in Belgian hospitals, with a structure that differs from the original PES-NWI. Cronbach’s alpha coefficients of the three subscales of that version are .80 or higher (Van Bogaert 2008). Nevertheless, in the ‘RN4Cast’ study, the original version is used in the Netherlands including 5 subscales (Sermeus et al. 2011) (see Table 1). The reliability, in terms of Cronbach’s alpha coefficients of the original (English language) PES-NWI subscales, ranges from 0.71 to 0.84 (Lake 2002). Predictive validity estimates of the subscales for personnel stability and quality of hospital care are high (Aiken et al. 2008, Bruyneel et al. 2009). The use of the instrument was reviewed by Warshawsky & Havens (2011) and they concluded that the PES-NWI can be used to assess the nursing practice environment. Lake (2007) compared the PES-NWI with other measures of the nursing practice environment and defined the PES-NWI as the most useful instrument in comparison with the Nursing Work Index (Kramer & Hafner 1989), Revised Nursing Work Index (Aiken & Patrician 2000), Work Environment Scale (Moos & Insel 1994), Job Characteristics inventory (Sims et al. 1976), Ward Organization Features Scale (Adams et al. 1995), Work Quality Index (Whitley and Putzier 1994), and the Assessment of Work Environment Schedule (Nolan et al. 1998). Thus, although validity of the Dutch version of the PES-NWI is strictly not evaluated in the Netherlands, the PES-NWI was chosen as a useful measure to determine the construct validity of the D-EOMII.

THE STUDY

Aim

The aim of this study was to determine construct validity of the D-EOMII, using hypotheses testing including a comparison of the Dutch PES-NWI and the D-EOMII.

Sample

The D-EOMII and PES-NWI were administered at nine randomly selected wards of a Dutch general hospital between March and April 2012. Nurses’ participation was voluntary. After obtaining nurses’ consent, all data were treated confidentially and anonymously.

Qualified nurses with educational levels varying from associate to bachelor degree (four years of training) employed by the hospital, independent of their contract, gender, education, years of employment and age, were included if they worked on the ward for more than six months (N=259). We excluded nurse assistants, nurse managers, nurses with a merely administrative position, and interns/students.

Instruments

D-EOMII consists of 58 items and eight constructs (see Table 1) defined as functional processes leading to desired patient and nurse outcomes, called Essentials of Magnetism (EOM): Collaborative Nurse-Physician Relationships, Control over Nursing Practice, Nurse Manager Support, Adequacy of Staffing, Clinically Competent Peers, Support for Education, Patient Centred Culture, Clinical Autonomy (Schmalenberg & Kramer 2008, de Brouwer et al. 2014). We used the Dutch version of the EOMII (D-EOMII). Before using this instrument, adjustments were made as suggested by de Brouwer et al. (2014). No items were removed. Items of subscales Collaborative Nurse-physician Relationships (5 items,), Support for Education (1 item) and Clinically Competent Peers (4 items) have been shortened and simplified. Item 52 has been adjusted from high performance and productivity to high performance and good work ethic as productivity had a different connotation in the Netherlands as referred to in the original EOMII (de Brouwer et al. 2014). Permission of HSRA was obtained to reprint the original Essentials of Magnetism Scale.

The PES-NWI consists of 32 items and five subscales: Nurse Manager Qualities, Collegial Nurse-Physician Relationships, Nurse Involvement in Hospital Affairs, Nursing Foundations for Quality of Care, Adequacy of Staffing and Resources (see Table 1) (Lake 2002).

Both instruments target the hospital staff nurses. All participants who met the inclusion criteria received an instruction letter explaining the purpose of the research, duration of participation, and a description of procedures. Participants were informed that results would be used for scientific research only, and that none of the data would be reported at the level of individuals.

The instruments were administered via a mailed survey. For both instruments respondents rate each item on a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree), to indicate whether the item is present in their current practice environment (Lake 2002, Schmalenberg & Kramer 2008).

Ethical considerations

No approval of an ethics committee was necessary as patient care was not affected or changed in any way and individuals were not subjected to invasive or laborious regimes, which is in line with Dutch law (CCMO 2011). All participants were informed verbally and via an instruction letter. Those who did not wish to take part did not return their questionnaires.

Methodology

We used a cross-sectional, correlational study design comparing results of the PES-NWI and the D-EOMII. We administered the D-EOMII in the hospital setting via a web application.

Hypotheses testing

We formulated fifteen hypotheses prior to data-analysis.

Convergent validity

Ten hypotheses were formulated with regard to convergent validity (see Table 2). The first concerned the degree to which the measures total D-EOMII score and total PES-NWI scores are correlated. It was hypothesized that the total D-EOMII score is very strongly (r>.80) correlated with the total PES-NWI score as both instruments measure perception of the practice environment (hypothesis 1). Furthermore, three subscales of both instruments measure the same construct, namely Nurse-Physician Relationship, Control over Nursing Practice, and Nurse Manager Support (see Table 1). The D-EOMII subscale measures collaborative nurse–physician relationships, whereas the PES-NWI measures collegial nurse-physician relationships. Therefore, it was hypothesized that the correlation between subscale sum scores of both instruments concerning the nurse-physician relationship is strong (r>.50) but not above r=.80 (hypothesis 2). Control over Nursing Practice, a subscale of the D-EOMII, is hypothesized to correlate strongly (r>.50) with Nurse Involvement in Hospital Affairs of the PES-NWI. Most items of the D-EOMII’s subscale are included in Nurse Involvement in Hospital Affairs. However, both subscales also differ at item level. Therefore we hypothesized that the correlation between subscale sum scores of both instruments is strong (r>.50) but not above r=.80 (hypothesis 3). The D-EOMII subscale Nurse Manager Support and the PES-NWI subscale Nurse Manager Qualities is hypothesized to correlate very strongly (r=.80) with each other as both constructs are very similar (hypothesis 4).

D-EOMII subscale sum score of Adequacy of Staffing is hypothesized to correlate strongly (r>.50) to the PES-NWI subscale sum score of Adequacy of Staffing and Resources (hypothesis 5) as three out of the four items of the PES-NWI subscale measure the same elements as the D-EOMII subscale. The PES-NWI subscale Adequacy of Staffing and Resources contains one item about teamwork which is also embedded in the D-EOMII subscale Patient Centered Culture. Therefore, the D-EOMII subscale Patient Centered Culture is hypothesized to correlate moderately (r>.30) with the PES-NWI subscale Adequacy of Staffing and Resources (hypothesis 6).

The PES-NWI subscale Nursing Foundations for Quality of Care contains elements of D-EOMII’s subscales Clinically Competent Peers, Support for Education, and Patient Centred Culture. We hypothesized that correlations between the subscale sum score of Nursing Foundations for Quality of Care correlates moderately (r>.30) with sum scores of Clinically Competent Peers, Support for Education, and Patient Centred Culture (hypotheses 7–9).

As both questionnaires aim to measure the work environment on ward level, we finally hypothesized that wards with a high score on the D-EOMII would also score high (correlation of ranking ρ>.50) on the PES-NWI (hypothesis 10).

Discriminant validity

Five hypotheses were formulated with regard to discriminant validity: The D-EOMII subscale Collaborative Nurse–Physician Relationships correlates less (r<.74) with other subscales of the PES-NWI than with Collegial Nurse-Physician Relationships (hypothesis 11); D-EOMII subscale Control over Nursing Practice correlates less (r<.44) with other subscales of the PES-NWI than with Nurse Involvement in Hospital Affairs (hypothesis 12); D-EOMII subscale Nurse Manager Support correlates less (r<.80) with other subscales of the PES-NWI than with Nurse Manager Qualities (hypothesis 13). D-EOMII subscale Adequacy of Staffing correlates less (r<.30) with other PES-NWI subscales than with PES-NWI subscale Adequacy of Staffing and Resources (hypothesis 14). PES-NWI subscale Adequacy of Staffing and Resources correlates less (r<.49) with other D-EOMII subscales than with D-EOMII subscale Patient Centered Culture, except for D-EOMII subscale Adequacy of Staffing (hypothesis 15).

Data analysis

In line with the standard methods of HSRA, the institute that developed the EOMII, only sufficiently completed questionnaires were included, meaning that respondents with more than 25 percent missing items on two or more subscales were excluded from this study.

All hypotheses, except for hypothesis 10, were tested calculating Pearson correlation coefficients, r, as we are analysing instruments that supposedly measure similar constructs. In these analyses we used individual respondent scores on both instruments. We checked for potential clustering of nurse data at the level of wards by calculating Spearman’s correlation coefficient, ρ, on ward averages. For hypothesis 10 we rank ordered wards’ mean scores, derived from individual scores, on the total D-EOMII score and the total PES-NWI score, and tested the hypothesis by calculating Spearman’s correlation coefficient, ρ. This limits the random effects due to clustering of data in wards.

Sample size for hypotheses testing was considered adequate if N>100 (Mokkink et al. 2010). In all hypotheses we used a one-tailed test with the following criteria: correlation coefficients <0.30 indicate weak correlations, 0.30–0.50 imply moderate correlations, 0.50-0.80 represent strong correlations, and >0.80 are very strong correlations (de Vet et al. 2011, Nunnally & Bernstein 1994).

Construct validity was determined to be present if at least 75% of the results were in correspondence with the predefined hypotheses, thus for 11 of the 15 hypothesis (de Vet et al. 2011). However, hypothesis 1 was considered most important. If hypothesis 1 were to be rejected it would indicate that the PES-NWI and the D-EOMII scores are not related and therefore further results on the hypothesis testing would not be as relevant.

RESULTS

Sample

Nine different nursing wards participated: internal medicine, paediatric medicine, neurology, cardiology, short stay surgery, gastroenterology and hepatology, neonatology, geriatrics, and renal dialysis. A total of 158 (61% of N=259) questionnaires were returned of which 37 were not sufficiently completed and therefore excluded. Respondents’ (n=121, 47%) age varied from 19-63 years with an average of 38.9 years. Most respondents were females (95.6%). The majority worked part time (45.6%). A third of the respondents had zero to five years of work experience (33.9%). Of the respondents 29.8% had a bachelor degree in nursing (see Table 3).

Hypotheses testing

Hypothesis 1 was confirmed (see Table 4 for all subscale correlations) as the total D-EOMII score and total PES-NWI score were strongly correlated (r=.88). Hypotheses 2 and 4 were confirmed as Collaborative Nurse–Physician Relationships and Collegial Nurse-Physician Relationships were significantly and strongly correlated (r=.74), as well as Nurse Manager Support and Nurse Manager Qualities (r=.81). However, hypothesis 3 was rejected as Control over Nursing Practice and Nurse Involvement in Hospital Affairs were significantly correlated but only moderately (r=.44).

Hypotheses 5 and 6 were confirmed as Adequacy of Staffing and Resources and Adequacy of Staffing were strongly correlated (r=.73), and Adequacy of Staffing and Resources and Patient Centered Culture were moderately correlated (r=.49). Nursing Foundations for Quality of Care was moderately correlated with Clinically Competent Peers (r=.44), Support for Education (r=.46), and Patient Centred Culture (r=.63), therefore hypotheses 7-9 were confirmed.

Hypothesis 10 was confirmed as mean total scores of the wards on both instruments correlated strongly (ρ=.83, p=.003).

Hypothesis 11 was confirmed as other subscales of the PES-NWI were only low to moderately correlated (r ranged from .29 to .46) to Collegial Nurse-Physician Relationships. Hypothesis 12 was rejected as Control over Nursing Practice was more strongly correlated to Nursing Foundations for Quality of Care and Adequacy of Staffing and Resources, although Control over Nursing Practice did correlate less with Collegial Nurse-Physician Relationships and Nurse Manager Qualities. Hypothesis 13 was confirmed as the other subscales were correlated less with Nurse Manager Support (r≤.66) than with Nurse Manager Qualities (r=.81). Hypothesis 14 was confirmed as subscale Adequacy of Staffing and Resources correlates strongly (r=.73) to Adequacy of Staffing and low to moderately with the other D-EOMII subscales (r≤.49) (hypothesis 14). Hypothesis 15 was also confirmed as all other D-EOMII subscales, except for Adequacy of Staffing, correlate less with the PES-NWI subscale Adequacy of Staffing and Resources.

In total, thirteen of the fifteen hypotheses (87%) were confirmed. The check for clustering generated the same results except for hypothesis 11. The analyses showed that the PES-NWI subscale Nurse Manager Qualities was more strongly correlated to the D-EOMII subscale Collaborative Nurse–Physician Relationships which was not the case in the analyses on individual respondent scores.

DISCUSSION

The aim of this study was to determine construct validity of the D-EOMII, using hypotheses testing. Results of our study showed that 87% of the tested hypotheses were confirmed. Therefore, we conclude that the D-EOMII has satisfactory construct validity. Total scores on both D-EOMII as PES-NWI are strongly correlated as expected, which means that an organization scoring high on one of the two instruments will also score high on the other.

Correlations between subscales of both instruments are not so high that subscales measure the exact same constructs as none of the subscale correlations approaches 1 (all subscale correlations are significant but smaller than r=.82). If we, for instance, look at the subscales Collaborative Nurse-Physician Relationships (D-EOMII) and Collegial Nurse-Physician Relationships (PES-NWI) we see that r=.74, thus indicating some variation in what is assessed. Looking at the items of both instruments it seems that the PES-NWI measures the level of satisfaction on the nurse-physician relationship whereas the D-EOMII measures the type of nurse-physician relationship that is present.

Two hypotheses were rejected. Firstly, we expected a strong correlation between the subscales Control over Nursing Practice (D-EOMII) and Nurse Involvement in Hospital Affairs (PES-NWI). The correlation was r=.44 however, which indicates a moderate correlation. Secondly, we expected that Control over Nursing Practice (D-EOMII) would correlate less with other subscales of the PES-NWI than with Nurse Involvement in Hospital Affairs. We found, however, that Nursing Foundations for Quality of Care and Adequacy of Staffing and Resources of the PES-NWI correlated more strongly. Based on the content of both subscales, this can be explained by the fact that Nurse Involvement in Hospital Affairs contains two items concerning the presence of a Chief Nursing Officer (CNO). This position does not exist in Dutch hospitals and can therefore lead to a wrongful score on this subscale. The CNO is not an aspect in the D-EOMII. Therefore, use of the D-EOMII rather than the PES-NWI could be more suitable in the Dutch situation. An earlier study on the D-EOMII also showed that Control over Nursing Practice is a reliable subscale, which showed good estimates of face and content validity (de Brouwer et al. 2014).

Confirmation of the hypotheses indicates that the D-EOMII can be used to identify areas of improvement in the nursing practice environment. Although the D-EOMII and the PES-NWI both focus on the nursing practice environment and the correlations between both instruments are largely in accordance with what we hypothesized, this study also indicates that the individual instruments do vary in constructs being measured with their subscales with subscale correlations below .82. Yet using both instruments is not recommended, because sum scores on both instruments are strongly correlated indicating a positive score on one instrument also leads to a high score on the other instrument. Depending on the learning objective of the organization or ward it is useful to see which instrument would fit best. The EOMII encompasses elements that are not present in the PES-NWI and gives a more thorough insight in areas of improvement in the nursing practice environment. Also the PES-NWI encompasses an element that is not relevant for the Dutch health care system: presence of a Chief Nursing Officer. However, the PES-NWI is a shorter questionnaire which is therefore less of a burden to administer.

Limitations

One could argue that a limitation of this study is that we included only one hospital. Yet for this type of study, in which results of two instruments are compared and not organizations or wards, a multi-centre study is not as necessary. We wanted to study the construct validity of the D-EOMII by analysing correlations between D-EOMII and another scale that presumes to measure corresponding constructs. To answer this question with hypotheses testing individual scores of nurses can be used to test the hypotheses. Ideally, more clusters should have been included in this study in order to optimally account for the effect of clustering of the data. To assess to what level this could have been problematic, we also checked all our hypotheses on the basis of rank ordering mean scores at ward level and found the same results except for one hypothesis. This indicates that conclusions would not be very different and therefore the individual scores can be used.

Hypotheses were stated as specific as possible including the magnitude of the expected correlation, which is a strength of this study (de Vet et al. 2011).

Finally, it can be questioned whether the PES-NWI is the best reference instrument for evaluation the validity of the EOMII. We chose to use the PES-NWI as a good translation of the instrument was available. Yet no studies were found on the validity or reliability of the Dutch version of the PES-NWI, for which we had to refer to international literature. According to Lake’s comparison of measures (2007) however, the PES-NWI is considered the most useful instrument for determining the construct validity of the D-EOMII.

CONCLUSION

We provided evidence that the D-EOMII has satisfactory construct validity for measuring the nursing practice environment. The EOMII is widely used to identify areas of improvement in the nursing practice environment. This study contributes to the body of knowledge on the construct validity of the D-EOMII, and outside the USA-context of its development. The D-EOMII can be used by nurses, managers, health policy makers, hospitals and even governments to assess nursing practice environments and to identify processes and relationships that are in need of improvement. A nursing practice environment that positively encompasses the essential elements measured by the D-EOMII, can help to attract and retain well qualified nurses, as indicated by several studies (Bai et al. 2015, Kramer & Schmalenberg 2002, Schmalenberg & Kramer 2008). Given the discrepancy between the increasing care intensity in hospitals and the quality and quantity of nursing staff, creating excellent nursing practice environments is of great importance. Hospital managers can use the instrument to assess their work environment for nursing staff and receive feedback on possibilities for improvement.

The essentials of magnetism are recommended to be included in the curricula of nursing education as nurses need to know which elements enable them to deliver the best possible patient care.

Research, including this study, supports the validity of the D-EOMII valid measure of the nursing practice environment. Further research is recommended to investigate which elements of the nursing practice environment are most strongly related to the quality of patient care, and which effect sizes on the instrument can be expected as a result of actions taken to improve the work environment.

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Table 1. Subscales of the EOMII and PES-NWI, number of items, Cronbach’s α

|  |  |
| --- | --- |
| EOMII subscale *(no. items, α\*)* | PES-NWI subscale *(no items\*\*)* |
| Collaborative Nurse–Physician Relationships (*6, 0.79*) | Collegial Nurse-Physician Relationships (*7, 0.88*) |
| Control over Nursing Practice (*8, 0.75*) | Nurse Involvement in Hospital Affairs (*8, 0.77*) |
| Nurse Manager Support (*10, 0.92*) | Nurse Manager Qualities (*4, 0.82*) |
| Adequacy of Staffing (*6, 0.83*) | Adequacy of Staffing and Resources (*4, 0.77*) |
| Clinically Competent Peers (*4, 0.55*) | Item: Working with nurses who are clinically competent (Nursing Foundations for Quality of Care) |
| Support for Education (*4, 0.37*) | Adequacy of Staffing and Resources (*4*)Item: Active staff development or continuing education programs for nurses (Nursing Foundations for Quality of Care) |
| Patient Centred Culture (*11, 0.85*) | Item: A clear philosophy of nursing that pervades the patient care environment (Nursing Foundations for Quality of Care) |
| Item: Inter- and intra-disciplinairy teamwork (Patient Centered Culture) | Item: Enough time and opportunity for team consultation (Adequacy of Staffing and Resources) |
| Clinical Autonomy (*9, 0.72*) |  |
|  | Nursing Foundations for Quality of Care (*9, 0.69*) |

\* De Brouwer et al. (2014)

\*\* *α* of the Dutch PES-NWI based on data from this study

Table 2. Hypotheses

|  |  |
| --- | --- |
| 1 | Very strong correlation\* between total D-EOMII score and total PES-NWI score |
| 2 | Strong correlation Collaborative Nurse–Physician Relationships and Collegial Nurse-physician Relationships |
| 3 | Strong correlation between Control over Nursing Practice and Nurse Involvement in Hospital Affairs |
| 4 | Very strong correlation between Nurse Manager Support and Nurse Manager Qualities  |
| 5 | Strong correlation between Adequacy of Staffing and Adequacy of Staffing and Resources  |
| 6 | Moderate correlation between Adequacy of Staffing and Resources and Patient Centered Culture |
| 7 | Moderate correlation between Nursing Foundations for Quality of Care and Clinically Competent Peers |
| 8 | Moderate correlation between Nursing Foundations for Quality of Care and Support for Education |
| 9 | Moderate correlation between Nursing Foundations for Quality of Care and Patient Centered Culture |
| 10 | Strong correlation between mean total ward scores on D-EOMII and PES-NWI |
| 11 | Collaborative Nurse–Physician Relationships correlates less with other subscales of the PES-NWI than with Collegial Nurse-Physician Relationships |
| 12 | Control over Nursing Practice correlates less with other subscales of the PES-NWI than with Nurse Involvement in Hospital Affairs |
| 13 | D-EOMII subscale Nurse Manager Support correlates less with other subscales of the PES-NWI than with Nurse Manager Qualities |
| 14 | D-EOMII subscale Adequacy of Staffing correlates less with other PES-NWI subscales than with Adequacy of Staffing and Resources |
| 15 | PES-NWI subscale Adequacy of Staffing and Resources correlates less with other D-EOMII subscales than with Patient Centered Culture, except from Adequacy of Staffing  |

\* Correlation: <0.30 weak, 0.30–0.50 moderate, 0.50-0.80 strong, and >0.80 very strong

Table 3. Respondents’ characteristics (*n* = 121)

|  |  |
| --- | --- |
| Demographics |  |
| Age (years) (Mean; SD) | 38.9; 12.2 |
| Sex (%; *n*) – Women | 95.8; 114 |
| Contract (%; *n*) – full time | 44.6; 54 |
| Work experience (Mean; SD) | 14.3; 11.1 |
| Work experience (%; *n*)0-5 years 6-10 years 11-15 years 16-20 years 21-25 years 26-30 years>30 years | 33.9; 4012.7; 1511.0; 1312.7; 159.3; 118.5; 1011.9; 14 |
| Bachelor’s degree in nursing (%; *n*) | 29.8; 36 |

Table 4. Correlations between EOMII subscales and PES-NWI in Pearson *r*

|  |  |  |
| --- | --- | --- |
| EOMII |  | PES-NWI |
|  |   | Staffing and Resource Adequacy | Collegial Nurse-Physician Relations | Nurse Manager Ability, Leadership, Support of Nurses | Nurse Involvement Hospital Affairs | Nursing Foundations for Quality of Care | Total score |
| Perceived Adequacy of Staffing | Correlation Coefficient *r*  | .728\*\* | .379\*\* | .496\*\* | .503\*\* | .378\*\* | .620\*\* |
| p-value (1-tailed)  | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| N | 116 | 114 | 109 | 112 | 103 | 99 |
| Clinically Competent Peers | Correlation Coefficient *r*  | .376\*\* | .287\*\* | .521\*\* | .565\*\* | .442\*\* | .557\*\* |
| p-value (1-tailed)  | <.001 | .001 | <.001 | <.001 | <.001 | <.001 |
| N | 121 | 119 | 114 | 116 | 108 | 103 |
| Nurse Manager Support | Correlation Coefficient *r*  | .455\*\* | .343\*\* | .813\*\* | .658\*\* | .612\*\* | .726\*\* |
| p-value (1-tailed)  | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| N | 117 | 115 | 111 | 114 | 106 | 102 |
| Patient Centered Culture | Correlation Coefficient *r*  | .486\*\* | .510\*\* | .624\*\* | .746\*\* | .634\*\* | .786\*\* |
| p-value (1-tailed)  | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| N | 118 | 117 | 111 | 113 | 107 | 102 |
| Control over Nursing Practice | Correlation Coefficient *r*  | .452\*\* | .277\*\* | .403\*\* | .435\*\* | .569\*\* | .546\*\* |
| p-value (1-tailed)  | <.001 | .001 | <.001 | <.001 | <.001 | <.001 |
| N | 116 | 114 | 111 | 112 | 105 | 100 |
| Clinical Autonomy | Correlation Coefficient *r*  | .404\*\* | .386\*\* | .525\*\* | .373\*\* | .489\*\* | .531\*\* |
| p-value (1-tailed)  | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| N | 113 | 111 | 108 | 108 | 103 | 98 |
| Nurse-Physician Relationships | Correlation Coefficient *r*  | .437\*\* | .743\*\* | .455\*\* | .315\*\* | .293\*\* | .563\*\* |
| p-value (1-tailed)  | <.001 | <.001 | <.001 | <.001 | .001 | <.001 |
| N | 120 | 118 | 113 | 115 | 107 | 102 |
| Support for Education | Correlation Coefficient *r*  | .232\*\* | .266\*\* | .512\*\* | .428\*\* | .461\*\* | .508\*\* |
| p-value (1-tailed)  | .005 | .002 | <.001 | <.001 | <.001 | <.001 |
| N | 120 | 118 | 113 | 115 | 107 | 102 |
| Total EOMII score | Correlation Coefficient *r*  | .661\*\* | .565\*\* | .805\*\* | .735\*\* | .710\*\* | .881\*\* |
| p-value (1-tailed)  | <.001 | <.001 | <.001 | <.001 | <.001 | <.001 |
| N | 100 | 99 | 96 | 97 | 93 | 89 |

\*\*. Correlation is significant at the 0.01 level (1-tailed).

\*. Correlation is significant at the 0.05 level (1-tailed).