

## ORIGINAL RESEARCH

# Improving nursing students research knowledge through participation in a study about nutrition, its associated factors and assessment

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## Abstract

**Aims:** The aims of this study were threefold: 1) to explore nursing students perceptions of knowledge development after participating in an actual research project; 2) to explore undernutrition and its relationship to other clinical factors; 3) to explore the user-friendliness of the Minimal Eating Observation and Nutrition Form (MEONF-II) in relation to dependency in Activities of Daily Living (ADL).

**Methods:** A pilot study (Study 1, S1) was conducted in October 2010, including 281 patients. After extending the research protocol a second data collection (S2) was conducted in March 2011, including 236 patients (total n=517). First and third year nursing students (n=188) collected the data, during one day of their clinical practice courses by assessing three patients each in hospitals or nursing homes. Students answered questions about their experiences from participating in the study. Patient related assessments included: MEONF-II; ADL dependency (S1 and S2); insomnia; low-spiritedness; and subjective health (S2). In addition, questions about the user-friendliness of MEONF-II were included (S1 and S2).

**Results:** Among the nursing students, 51% experienced that their knowledge about nutrition increased and 67% that their understanding for research increased by participating in the project. Out of the patients, 57% were women, 50% were almost independent, 27% had some dependency, 23% were almost totally dependent in ADL, and 48% were at moderate/high undernutrition risk. In S2, 32% of patients had insomnia, and 46% experienced low-spiritedness. Dependency in 5-6 and 3-4 ADLs (OR, 2.439 and 2.057, respectively), compared to dependency in 0-2 ADLs, were the strongest predictors for undernutrition risk, followed by insomnia (OR 2.124). Nursing students experienced the MEONF-II as easy to understand (93%), easy to answer (94%) and relevant (94%), and the suggestions for measures to take in case of risk as relevant (95%), independent of the patients' ADL status.

**Conclusions:** By participating in an actual research project nursing students gets an understanding for research and tools for working with quality improvements in their future role as professional nurses. Undernutrition, mental and physical factors constitute coexisting problems in need for further investigation. Nursing students perceive the MEONF-II as user-friendly, independent of patient ADL dependency.

## Key words

Work integrated learning, Undernutrition, MEONF-II, Insomnia, Activities of daily living

# 1 Introduction

In Sweden, higher education has three corner stones; education, research and interaction with the surrounding society<sup>[1]</sup>. By involving nursing students in real research projects it is possible to integrate the three corner stones<sup>[2]</sup>, as was done in this study focusing on screening of nutritional risk using the Minimal Eating Observation Form (MEONF-II<sup>[3-5]</sup>). Its relationship to other clinical problems has not been explored and its user friendliness when used by nursing students also remains to be addressed.

Nursing students can learn about research in many different ways. The focus can be either on the process of deducting evidence from research or on how to conduct research. In this study the focus is on “conducting research”. By involving students in actual research projects it might be possible to increase their knowledge about research and its usefulness for quality improvement in clinical practice. It has been shown that by having students to participate in the research process their attitudes towards research gets more positive<sup>[6]</sup> and that their research skills improve<sup>[6, 7]</sup>. We have involved undergraduate nursing students in actual research projects since 2005<sup>[2, 8-10]</sup>. For example, in a small study were the students (n=42) were research collaborators in a nutrition study, 86% stated that they got improved understanding of research and 38% got increased knowledge about nutrition<sup>[11]</sup>. However, it was a small study and it would therefore be relevant to explore this further in a larger study. In addition, while the methodology for RECN-assignments (Research, Education and Collaboration integrated in Nursing education) has been improved since that study the general focus on research in nursing education has increased, which makes it worthwhile to explore whether these changes are reflected in the students’ evaluations.

MEONF-II is a recently developed tool for screening of nutritional risk. It was developed to be used by nurses. Studies have shown promising sensitivity and accuracy compared to other screening instruments<sup>[3-5]</sup>, and its user-friendliness has been shown to be excellent among registered nurses<sup>[3, 5]</sup>. However, it remains to be determined how it is experienced by undergraduate nursing students. It is also unknown how MEONF-II relates to other common clinical problems (e.g., insomnia, depressive mood and dependence in activities of daily living), and whether its user-friendliness differ depending on patients’ degrees of dependency in activities of daily living (ADL).

The relationship between depression and undernutrition is well known<sup>[12, 13]</sup>, and so is the relationship between undernutrition and ADL dependency<sup>[14, 15]</sup>. However, less is known about the potential relationship between insomnia and undernutrition.

## Aim

The aims of this study were to explore: 1) nursing students’ perceptions of knowledge development after participating in an actual research project; 2) undernutrition and its relationship to other clinical factors; 3) the user-friendliness of the Minimal Eating Observation and Nutrition Form (MEONF-II) in relation to ADL dependency.

## 2 Methods

### 2.1 Study design

The study had a cross-sectional design.

### 2.2 Context of nursing education

In Sweden the nursing education is three years (six semesters), i.e. 180 ECTS (European Credit Transfer and Accumulation System). Successful completion of the programme leads to two degrees: registered nurse (RN) and bachelor of science in nursing (BSN). The nursing programme within which this study was conducted included 46% theoretical courses, 12% pre-clinical courses and 42% clinical courses. The programme includes continuous and progressing

scientific training regarding evidence based practice, the research process, research methods, and (during the fifth semester) a 15 ECTS Bachelor's thesis.

## 2.3 The study

First (n=64) and third year nursing students (n=124) collected the data (three patients each), as an educational assignment, during one day of their clinical practice courses, in hospitals or nursing homes. The nursing students got written and oral information (one hour) about the study. The written information included study background, aim, instruments and procedures. They were also provided with an information letter to the managers as well as another one to the patients. Patients received written and oral information by the students<sup>[2]</sup>.

A pilot study (Study 1, S1) was conducted in October 2010, including 281 patients. After extending the research protocol a second data collection (Study 2, S2) was conducted in March 2011, including 236 patients. Thus, in total 517 patients were included in the study (n=385 patients in hospitals; n=132 residents in special accommodations). In 2010 it was 104 nursing students involved in data collection (n=31 year one students and 73 year three students) and in 2011 it was 84 students (n=33 year one students and 51 year three students), in total 188 students.

## 2.4 Instruments

### 2.4.1 Perceived knowledge development

The students own perception of knowledge development was captured (in S1 and S2) by using two questions<sup>[11]</sup>, i.e. by participating in this study: 1) did your understanding of research improve; 2) did your knowledge about nutrition increase?

### 2.4.2 Activities in daily living (ADL)

ADL dependence was assessed (in S1 and S2) using a modified Katz Activities in Daily Living-index (Katz ADL-index)<sup>[16]</sup> which summarizes an individual's overall performance in six functions: hygiene; dressing and undressing; ability to go to the toilet; mobility; ability to control bowels and bladder; and food intake. In the original version the ability to perform each function is graded as independent, partly dependent or independent<sup>[16]</sup>. However, in this study the grading was only independent or dependent. Patients were then classified as almost totally dependent (needed help in 5 or 6 activities), partly dependent (needed help in 3 or 4 activities), or almost totally independent (needed help in 2 activities or less). The goal was that each student should assess one patient from each group of ADL dependency.

### 2.4.3 Undernutrition risk

Minimal Eating Observation and Nutrition Form – Version II (MEONF-II) was used to screen for undernutrition risk (in S1 and S2). MEONF-II includes an assessment of eating difficulties (according to the Minimal Eating Observation Form – Version II (MEOF-II)<sup>[8]</sup>, unintentional weight loss, either low BMI (<20 for 69 years or younger, or <22 for 70 years or older) or calf circumference <31 centimetres, and an additional assessment of the presence or absence of clinical signs of undernutrition<sup>[3]</sup>. MEONF-II yields a total score ranging from 0-8. A score of 0-2 is interpreted as low risk for undernutrition, a score of 3-4 is considered a moderate risk, and a score  $\geq 5$  as high risk for undernutrition<sup>[4]</sup>. MEONF-II has shown a sensitivity of 0.61-0.73, specificity 0.79-0.88, and accuracy of 0.68-0.82 when compared with the MNA<sup>[3,5]</sup>.

### 2.4.4 Insomnia

The Minimal Insomnia Symptom Scale (MISS) was used to screen for insomnia (in S2)<sup>[17,18]</sup>. MISS is a scale focusing on three core aspects of insomnia, i.e. difficulties falling asleep, night awakenings, and not being rested by sleep. Each of the three questions are graded between 0 (none) and 4 (very severe). The sum varies between 0 and 12 points; six points or more is considered indicative of insomnia<sup>[17]</sup>.

### 2.4.5 Low-spiritedness

A single-item was used to capture low-spiritedness as a crude indicator of depressed mood (in S2): “Today/during the last days I have felt gloomy and depressed” (graded as: not at all; yes, a little; yes, quite a lot; a lot)<sup>[19, 20]</sup>.

### 2.4.6 Subjective health

A single-item was used as a crude indicator of subjective health (in S2): “In comparison with other people of the same age, how do you perceive your health status?” (graded as: not as good as others; as good as others; better than others)<sup>[21]</sup>.

### 2.4.7 User-friendliness of MEONF-II

User-friendliness of the MEONF-II was evaluated (in S1 and S2) by inquiring the assessors of their perceived ease of understanding and following instructions, ease of understanding and completing items, and whether items were perceived as relevant. This was done following each patient assessment. These questions have previously been used to assess the user-friendliness of the MEONF-II<sup>[3-5]</sup>.

## 2.5 Analysis

For comparisons between independent groups Mann-Whitney U test, Chi-Square test and ANOVA were used<sup>[22]</sup>. Logistic regression analysis was used to test the association between undernutrition (dependent variable) and other clinical factors (independent variables). The decision about what independent variables to enter into the logistic regression analysis (enter method) was based on significances found in bivariate analysis. In addition, age and gender were also included in the model to control for these variables. Age was included as a continuous variable, gender was coded as 0=woman and 1=man, insomnia as 0=no insomnia and 1=insomnia (total MISS score  $\geq 6$ ), ADL dependency in less than three ADLs was used as reference, and in low-spiritedness “no” was used as reference. Response categories “yes, a lot” and “yes, quite a lot” of the low-spiritedness item were merged for the logistic regression analyses due to a very low response frequency in the former category. Model fit was checked by the omnibus test (a  $p$ -value  $< 0.05$  indicates that the current model outperforms the null model) and the Hosmer and Lemeshow goodness-of-fit statistics (good model fit is indicated by a  $p$ -value  $> 0.05$ , indicating no differences in actual and predicted dependent values)<sup>[23]</sup>. Analyses were conducted using PASW Statistics 18.0.

## 2.6 Ethical considerations

All participants provided informed consent following written and oral study information. It was stressed that participation was on a voluntary basis, and that it would be possible to withdraw without any consequences for their care. No names and no personal identification numbers were collected. Formal approval by ethical committee was not required for this kind of study according to national and local directives<sup>[24]</sup>.

## 3 Results

Among the nursing students 67% (2nd semester, 67%; 6th semester, 66%,  $p=0.905$ ) experienced that their understanding for research improved by participating and 52% (2nd semester, 50%; 6th semester, 54%,  $p=0.655$ ) that their knowledge about nutrition increased (see Table 1).

**Table 1.** Nursing students’ perceptions of knowledge development after participating in an actual research project

	Nursing students (n=188)		
	2 <sup>nd</sup> semester (n=64)	6 <sup>th</sup> semester (n=124)	$p$ -value *
Improved understanding for research, %	67	66	0.905
Increased knowledge about nutrition, %	50	54	0.655

\* Chi-square test

Demographic patient data and descriptive data from patient assessments are reported in Table 2. The mean age of the participants was 78 years and most were female (57%) hospitals inpatients (75%). Most participants had circulatory (54%) or pulmonary diseases (27%), 50% were dependent in two or less activities of daily living and the other (50%) were dependent in three activities or more. About a quarter (26%) of the participants rated their health as being “not as good as others”, 46% experienced some degree of low-spiritedness and 32% had insomnia (see Table 2).

**Table 2.** Characteristics of respondents and their nutritional status.

Item	n=517
Age, mean (SD)	78.0 (76.8-79.2)
Gender, men/women, %	43/57
Setting, %	
Hospital	75
Special accommodations	25
<b>The five most common diagnose categories, %</b>	
Circulation	54
Pulmonary	27
Orthopaedic	19
Gastroenterology	15
Endocrinology	15
<b>Activities of daily living, %</b>	
Dependent in two activities or less	50
Dependent in three or four activities	27
Dependent in five or six activities	23
<b>Moderate/high undernutrition risk<sup>*</sup>, %</b>	48
	n=256 <sup>#</sup>
<b>Subjective health, comparison to others in about same age, %</b>	
Not as good as others	26
As good as others	51
Better than others	23
<b>Low-spiritedness, %</b>	
Not at all	54
Yes, a little	26
Yes, quite a lot	14
Yes, a lot	6
<b>Insomnia<sup>^</sup>, %</b>	32

\*According to the Minimal Eating Observation and Nutrition Form-Version II (MEONF-II). # Sub-sample (second data collection) of the total sample (n=517). ^According to the Minimal Insomnia Symptom Scale (MISS)

Among patients at moderate/high undernutrition (UN) risk it was significantly more common with ADL dependency, with insomnia, and with low-spiritedness (see Table 3). There was no association between undernutrition and perceived health (see Table 3).

Results from the logistic regression analysis are presented in Table 4. ADL dependency and insomnia showed independent significant associations with UN risk, exhibiting about a 2-2.5 fold increase in odds. Compared to dependency in 0-2 ADLs, dependency in 5-6 ADLs (OR 2.439) and dependency in 3-4 ADLs (OR 2.057) were the strongest of the significant predictors for undernutrition risk, followed by insomnia (OR 2.124). There was no significant association between low-spiritedness and UN risk (see Table 4).

**Table 3.** Comparisons between persons with no/low risk for undernutrition (UN) and those with moderate/high risk (n=256).

Item	UN-risk *		
	No/low	Moderate/high	P-value #
<b>Activities of daily living (%)</b>			<0.001
Dependent in two activities or less	62	37	
Dependent three or four activities	23	31	
Dependent in five or six activities	15	32	
<b>Subjective health, comparison to others in about same age (%)</b>			0.170
Not as good as others	23	30	
As good as others	51	51	
Better than others	26	19	
<b>Insomnia (%)</b>	24	48	<0.001
<b>Low-spiritedness (%)</b>			0.002
Not at all	59	45	
Yes, a little	27	25	
Yes, quite a lot	12	19	
Yes, a lot	2	11	

\* According to the Minimal Eating Observation and Nutrition Form-Version II (MEONF-II). # Mann Whitney U-test. † According to the Minimal Insomnia Symptom Scale (MISS)

**Table 4.** Logistic regression analysis with undernutrition risk as dependent variable (0= no/low risk, 1= moderate/high risk according to MEONF-II) (n=256) \*

	Odds Ratio	95% CI		P-value
<b>Age</b>	0.994	0.974	1.015	0.588
<b>Gender (male=1)</b>	0.741	0.405	1.356	0.331
<b>Insomnia<sup>b)</sup></b>	2.124	1.107	4.074	0.023
<b>Activities of daily living (ADL)<sup>†</sup></b>				0.032
Dependent in 3-4 ADLs	2.057	1.020	4.145	0.044
Dependent in 5-6 ADLs	2.439	1.130	5.266	0.023
<b>Low-spiritedness</b>				0.225
Yes, a little	0.920	0.446	1.896	0.821
Yes, quite a lot/a lot	1.830	0.827	4.050	0.136

\* Omnibus test of goodness-of-fit,  $P = 0.001$ ; Hosmer & Lemeshow test of goodness-of-fit,  $P = 0.781$ ; Nagelkerke R square, 0.139. # According to the Minimal Insomnia Symptom Scale (MISS).

† Reference category (coded 0) = dependence in 0-2 ADLs. CI, Confidence Interval

**Table 5.** Nursing students' (n=188) perception of the MEONF-II user-friendliness in relation to patients' ADL (Activities in Daily Living).

	Dependent in			P-value	Total (n=509) †
	≤2 activities (n=254)	3-4 activities (n=137)	5-6 activities (n=118)		
Time (minutes) to complete, mean (SD)	11.1 (8.7)	10.8 (6.1)	12.8 (9.1)	0.143 *	11.3 (8.1)
The MEONF-II manual is easy to understand, %	93	95	90	0.386 #	93
The MEONF-II questions are easy to answer, %	95	92	93	0.602 #	94
The MEONF-II questions are relevant, %	93	94	95	0.792 #	94
Relevant suggestions for measures to take in case of risk, %	95	95	95	0.999 #	95

\* ANOVA. # Chi-square test. † Missing ratings of user-friendliness in eight cases (original sample n=517). Minimal Eating Observation and Nutrition Form-Version II (MEONF-II)

It took a mean of 11 minutes to perform the screening with MEONF-II; which did not differ according to patients' levels of ADL dependency (see Table 5). The nursing students (n=188) experienced the MEONF-II manual as easy to understand (93%), questions as easy to answer (94%), the questions as relevant (94%) and the suggestions for measures to take in case of risk as relevant (95%). User-friendliness was independent of the patients' level of dependency in ADL (see Table 5).

## 4 Discussion

This study supports that participating in an actual research project improves nursing students understanding for research as well as for the area under study. As suggested in a previous study<sup>[2]</sup>, this should facilitate students' ability to work with quality improvements in their future role as professional nurses. We also obtained evidence that undernutrition is associated with ADL dependency and with insomnia, and that the MEONF-II is perceived as user-friendly regardless of patients' levels of ADL dependency.

Involving a relatively large number of nursing students in data collection may be seen as a weakness challenging data quality. However, involving many different assessors also reflects clinical practice, i.e. the study can be viewed as a naturalistic study. Furthermore, the rates of moderate/high risk of undernutrition in this study is very similar to that reported in other studies using a restricted number of registered nurses for data collection<sup>[3, 4]</sup> with good inter-rater reliability (kappa, 0.81)<sup>[25]</sup> in this type of patient populations. Also other aspects of our observations support accuracy of data as they replicate previous findings (see below). Students were asked to assess three patients with different levels of dependency. As can be seen in the results, 50% of patients were dependent to a limited extent (in two or less activities). This might reflect that it was difficult to get informed consent from patients with more dependency, or that there were actually more patients with low level of dependency in the specific settings.

Involvement of nursing students in actual research projects as an educational assignment enhances their understanding for research, and increase their knowledge within the area of the study. About two thirds of the students experienced that their understanding for research improved, and about half that their knowledge about nutrition increased. A similar pattern was seen in an earlier study, reporting that 38% experienced increased knowledge about nutrition and 86% stated an improved understanding of research<sup>[11]</sup>. The differences in figures are likely due to several reasons. For example, there are uncertainties associated with the figures from the earlier study due to its limited sample size (n=42). Furthermore, since then there have been changes in the nursing education, with an increased emphasis on research related areas and less nutrition specific education. However, the important finding is that learning is enhanced by participating in an actual research project, as also shown in a recent qualitative study<sup>[2]</sup>. Adding to this, others have found that participating in research leads to more positive attitudes towards research<sup>[6]</sup> and improved research skills<sup>[6, 7]</sup>.

Previous studies are pointing towards an association between undernutrition and depressed mood<sup>[12, 13, 26, 27]</sup>, something that was not confirmed in this study, when taking ADL and insomnia into account. However, in this as well as in other studies<sup>[14, 15]</sup> an association between undernutrition and ADL dependency was shown. A finding that might be seen as somewhat unexpected was the relationship between impaired nutritional status and insomnia. As far as we know, this has not been shown before. However, an association between insomnia and low consumption of specific nutrients was recently shown in a study from India among 87 adults (age 21-45 years)<sup>[28]</sup>. In addition, in a recent study from Malaysia, an association has been shown between insomnia and high wastage of vegetables, among 71 elderly (mean 69.5 years) people in a government-funded institution<sup>[29]</sup>. Although these two studies<sup>[28, 29]</sup> did not focus on the relationship between insomnia and undernutrition per se, the findings are suggestive of such a relationship. Thus, sleep status and nutritional status seems to be interdependent. However, it remains to be determined whether poor sleep may cause undernutrition, or whether undernutrition contributes to deteriorated sleep. In addition, it is known since long that insomnia is associated with a high rate of co-morbidity<sup>[30]</sup>, which might increase the risk for compromised nutritional status. It is therefore possible that factors not considered in the current study may underpin the observed associations. Taken together, our observations could be viewed as suggestive of a complex triad of coexisting problems, i.e. between undernutrition –

mental – and physical factors. However, it remains unclear what constitutes the causes and consequences and the current cross-sectional study design does not allow any firm conclusions in this regard. These associations are clearly an area in need of further studies.

The user-friendliness of the MEONF-II was excellent, regardless of patients' levels of ADL dependence. This is in accordance with previous observations among registered nurses<sup>[3,5]</sup>. However, this is the first evidence that this is the case regardless of patients' levels of ADL dependency. This is important since problems in using a screening tool among subsets of people (eg, those with high levels of ADL dependence) severely limit its usefulness in clinical practice. To the best of our knowledge, this is the first study to document this critical aspect of a nutrition screening tool.

## 5 Conclusions

Participating in actual research projects enhance students learning about research as well as within the area of the study. Undernutrition, physical (ADL dependency) and mental problems (insomnia) constitute coexisting problems in need for further investigation. The MEONF-II is perceived as a user-friendly and relevant nutritional screening tool.

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