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## Health and literacy in first- and second-generation Moroccan Berber women in the Netherlands: Ill literacy?

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### Abstract

**Aim:** The present study was aimed at investigating the role of literacy and generation in the self-reported general health status of Moroccan Berber speaking women in the Netherlands.

**Method:** Fifty women in our sample ( $N = 75$ ) were first generation women, from which group 25 were literates and 25 illiterates. Another group of 25 literate women belonged to the second generation. The three groups were matched for demographic characteristics. Questionnaires were administered reflecting all concepts under study. We hypothesized that, within the first generation, illiterates compared with literates would report worse health. Our second hypothesis was that literates of the first generation compared with those of the second generation would have a similar health condition.

**Results:** After controlling for age, having a job, and having an employed partner, the first generation literates compared with the illiterates of the first generation indeed reported significantly better health. Additionally, we did not find any differences in health condition between both literate groups, even after controlling for age, number of children, and marital status. Health complaints that were most frequently reported by both groups, concerned pain in shoulders, back and head.

**Conclusions:** Our results underline the importance of offering immigrants optimal access to opportunities and facilities that can improve their literacy and reading ability.

### Background

One of the most substantial sources as well as expressions of inequity among various groups participating in the same society is their differential access to written language, in other words, their degree of literacy. Although illiteracy occurs, in Western countries, more frequently among migrants than among native inhabitants, it also strikes a considerable proportion of the latter group [1].

Nevertheless, the problem of illiteracy is definitely more substantial and influential among migrants [1], and therefore migrants' illiteracy is the issue of the present paper.

Literacy affects all domains of life including one's health. In the United States, several studies have been done on the relationship between health and literacy indicating an association between bad health and illiteracy (for an

overview, see [1]). For example, respondents with lowest scores on reading ability compared with those reading better had a worse physical as well as mental health, regardless of age, income, educational level, and ethnicity. Other results [2] confirmed the association of illiteracy not only with relatively bad health, but also with a relatively bad psychosocial situation as expressed in quality of relationships with other people.

Several factors can be mentioned that explain *how* illiteracy might affect health. For example, Weiss et al. [2] argued that illiterates are not able to understand the written information about their medical conditions. Within health care, people are not only assumed to be able to read information material, but also to understand the information and to apply it in their health-related behaviour. Lack of knowledge about good healthy behaviour might therefore be an important obstacle. Simultaneously, medical mistakes can be made more easily. Medical recipes may be wrongly interpreted. Non-compliance to medical prescriptions might not be due to a lack of obedience but to a lack of understanding the instructions as well as physicians' expectations [3]. Not surprisingly, functional literacy is getting more and more attention. Involved is the application range of language abilities with filling out forms, understanding information texts, understanding medical instructions such as regarding medicine use, etcetera.

Another aspect is that illiterates have less information about the use of health facilities, which might result in over- or under-use [2]. A study among adult patients [4] who came into hospitals for first aid or ambulatory help with non-urgent medical problems, revealed a significant, negative relationship between literacy degree and use of health facilities. The authors suggest that illiterate patients receive ineffective help, because they do not understand the physicians and therefore need to consult them more frequently in order to realize their aims. Baker et al. [4] described various problems that illiterates had to face while making use of health services. Among these were, again, problems with understanding and filling out forms, difficulties with understanding advocated treatments and instructions, and unwillingness to disclose health problems to physicians due to shame for being illiterate.

Also, one's educational level is an important factor, in particular to the extent to what has been learned during the years of education. In addition, indirect effects result in an association between illiteracy and relatively bad health. In particular, illiterates (as well as people who are less skilled in the language of their new country; e.g., see [5]) have lower opportunities for successful integration including

integration into the labour market, which easily results in lower welfare and inherent health risks.

When we focus on the relationship between migrants' illiteracy and health, it will be obvious that it is extremely difficult to disentangle the health consequences of being illiterate and those of being a migrant. For example, many of the aforementioned factors that plausibly mediate or moderate the relationship between literacy and health, such as access to the labor market, welfare- and educational level, and access to information available in a certain society, definitely also influence the relationship between migration and health. Health effects of migration have been documented [6], and the studies available confirm the general picture that more health problems are found in migrant groups compared to inhabitants of the same country who lived there since they were born. Including the aforementioned factors, the higher frequency of health problems in migrants might be due to demographical and behavioral characteristics, environmental factors (housing, climate, work), and migration effects (e.g., financial worries about the family in the country of origin, living separated from the family, insecurity about moving back or not, acculturation stress; [7-9]). Furthermore, all these factors are often operative in combination with socio-economic factors such as unemployment, or being employed in poorly paid and stressful jobs (e.g., [10,11]). In particular for migrant women, the labour market opportunities are very unfavorable [12]. Moreover, within the relationship between unemployment and migrants' poorer health, (health) selection processes in the labor market seem to play an important role [12]. Mackenback [13] suggested that observed health differences might be interpreted as artifacts of differential effects of data collection in various groups. For example, the answers of various groups in health surveys will primarily reflect their health *perception* which is usually not only affected by objectively determinable health conditions but also by psychological, social and cultural factors.

In summary, health effects of both migration and illiteracy have been investigated, and they have been attributed to various, partly overlapping factors operative on different levels of explanation. Surprisingly, however, to our awareness, scant attention has until today been paid to the possible health impact of both conditions together. An exception is a study from the seventies by Brody [14] on the psychiatric consequences of Brazilian rural to urban migration. Here, the illiterate subgroup showed the broadest and most incapacitating spectrum of symptomatic or maladaptive behavior, and more disorientation and disrupted thinking processes in the absence of information. However, this study did not concern somatic health. Therefore, the present study was, first, aimed at

investigating the role of literacy and generation effects in the (somatic as well as psychological) health condition of migrants. A very interesting population for studying the role of literacy in health phenomena is that of Berber speaking Arabic immigrants in Western countries, because Berber languages (as well as Arabic dialects) are solely speaking languages. No writing variant is available, neither any standard for the style of writing in case it would be written. We were especially interested in female, Berber immigrants because they often stay at home, and – as a consequence – are not able to solve the problem of illiteracy. The second aim of our study was therefore a more specific one, namely to learn more about the health condition of the group Moroccan Berber speaking migrant women. Before describing the design of our study, we will first provide some health-related data concerning the broader group of migrants to which they belong, Moroccans in the Netherlands.

Health problem inventories by Pool and Huisman [15], and by Van der Most and Van Spijk [16] showed that relatively more Moroccan women compared to Dutch women in the Netherlands suffer from gynaecological complaints (33 % versus 15 %), digestive and respiratory problems, and physical problems in general. Other studies confirmed this picture of a higher health problem frequency in the Moroccan part of the population. Van Wersch and Uniken Venema [9] found that Moroccan compared with Dutch women reported more frequently to have headache, pelvic pain and backache, as well as several chronic health problems such as varicose veins and chronic bronchitis. In addition, a higher frequency of dizziness, gastrointestinal disorders, migraine, and high blood pressure was found in a Moroccan compared with a native Dutch group of females in a study by Costa Sr. & De Goede [17]. Plausibly, the higher number of pregnancies and, thus, a higher involvement in gynaecological consults might account for at least a part of the aforementioned excess health complaints in Moroccan women, although this cannot explain the total difference in amount and types of health problems between both groups. Furthermore, mental health problems have been inventoried that specifically occur in Moroccan girls and young women who have to cope with the demand of being a virgin in a society where sexual norms are less inhibitive toward sexuality. Among these mental health problems were suicide, depression, loneliness, anxiety, and fear for rejection by one's family or community [18]

In agreement with the aforementioned explanations for an association between migration, illiteracy, and relatively bad health, several factors have been identified to which the higher health problem frequency in Moroccan compared with native Dutch women can be attributed. Again, lack of familiarity with the health care system has been

mentioned, as well as language- and communication problems [17]. In addition, several authors emphasized the housing situation, especially the fact that Moroccan women spend a large part of the day inside their houses easily leading to overweight (also due to a tendency to eat rather fat food) and social isolation. The lack of social contacts outside the family is also reinforced by a lack of access to the labour market that has to do with a poor educational level and with traditional sex-role attitudes. The women's usual status of unemployment implies a relatively low level of financial welfare, another important factor.

In most studies so far, no distinction was made among the several subgroups *within* the Moroccan population in a Western country. Nevertheless, there seem to be good reasons for applying such differentiation or to study one specific subpopulation more thoroughly, namely Berber Moroccans. A Belgian study by De Muynck, Verrept and Schillemans [19] namely revealed that, regardless of gender, Berber compared with Arabic Moroccans had a higher medical consumption. Simultaneously, they appeared more inclined to, before consulting a general practitioner, first seek for health-related assistance within their own community. For instance, they more often went to a religious healer. As differences between the Berber and Arabic Moroccan women within this sample, the Berber women appeared to make more use of preventive health care (e.g., vaccinations, prenatal care) and secondary (e.g., cancer screening) as well as tertiary prevention health services (e.g., monitoring chronic conditions). These first two differences might be explained by, respectively, higher fertility and a general feeling of higher vulnerability to certain health risks. The higher frequency in which the Berber women came for monitoring their chronic health problems can probably be attributed to a higher prevalence of diabetes. Diabetes in this group seems to be related to overweight due to traditional attitudes toward food consumption, body weight (a corpulent body as a sign of well-being), and lack of exercise, but also to social isolation and boredom.

Because we wanted to investigate the role of literacy in the health condition of Berber females in the Netherlands, we designed our study in such a way that we had the opportunity to measure the health effects of different degrees of literacy. We varied the respondents' generation (first and second) and their being literate or not. Although we were aware that alternative variations might have been interesting as well, for example according to degree of acculturation, we chose generation because, for the specific subpopulation of Berber women in the Netherlands, the generation to which one's belongs seems to be a major index of one's degree of acculturation (for a discussion on this issue, see [20]).

Thus, a comparison was made between first-generation literate as well as illiterate Berber women (who migrated as adults), and literate Berber women of the second generation (who were born and raised in the Netherlands). Obviously, it was not possible to include illiterate Berber women belonging to the second generation, because in this group illiteracy does not substantially occur anymore. In line with what we found in the literature, we first expected that illiterate compared to literate first-generation Berber women would report a more negative health condition. Our second hypothesis was that both generation groups of literate Berber women (first generation compared with second generation) would report a similar health condition. Because of the empirical evidence that we found in the literature for the influence of factors such as educational level, age, having a job and/or an employed partner, etcetera, we tried to match the three groups for all relevant demographic variables wherever possible.

## Methods

### **Respondents and recruitment procedure**

Respondents were 75 Berber speaking women with a Moroccan background who were divided into 3 groups. The first group consisted of 25 illiterate women of the first generation (mean age 47.5 yrs, *SD* 6.9 yrs), the second of 25 literate women of the first generation (mean age 41.4 yrs, *SD* 5.6 yrs), and to the third group belonged 25 literate women of the second generation (mean age 24.4 yrs, *SD* 3.6 yrs). The groups were composed so, that they were as similar as possible with regard to the following socio-demographic variables: age (both first-generation groups), marital status, educational level, own and partner's employment status, degree in which lessons in speaking Dutch had been attended (both first-generation groups), and currently suffering from an illness. This was rather uncomplicated because both populations were already rather similar in demographics. However, whereas first generation Berber women use to have hardly any educational experiences, women from the second generation can have a high educational level. We – having to use small groups because of our intensive research method and therefore avoiding too much variation – therefore selected second-generation women who were educated at a more moderate level. Both first-generation groups were indeed highly similar with respect to the main, possibly relevant characteristics: the majority was married and had children (both 92 %); both groups were living in The Netherlands for about 18 years; one-third of the literates and none of the illiterates had a (small) job; and both groups had a low educational level (i.e., no education at all or only a few years of the lowest level) resulting in lacking any educational diploma.

The women of the first generation had migrated when they were adults. The illiterate group was illiterate with respect to classic Arabic as well as Dutch language (and any other language). If they did attend any literacy course at the time of our study, they did so for only a short period. The literate groups (first and second generation) were literate with respect to classic Arabic and/or Dutch language, and both groups had attended lessons in speaking Dutch to the same extent (on average about 2–3 years, but most respondents could not report about the number of hours a week, the intensiveness of the courses, and how much they had learned). The women belonging to the second generation had not been older than 13 years when they migrated, or they had born in the Netherlands. In other words, they could have been the children of the first generation groups. Forty percent of them were employed, 30 % was unemployed, another 30 % was attending schools; about 50 % was married, the other 50 % lived with their parents.

The literacy of all respondents was determined by means of the Rapid Estimate of Adult Literacy (REALM; [21] see Measures). The illiterates read on average 2.6 words (*SD* 5.4) on the total REALM (Dutch and Arabic REALM together); the first generation literates 57.0 words (*SD* 7.5); and the second generation literates 65.5 words (*SD* 1.7). A oneway ANOVA revealed that the differences in average number of words between the three groups were statistically significant ( $F = 4.89$ ,  $p = .01$ ); a post-hoc Scheffé-test revealed the differences being located between both literate groups with the illiterates.

All respondents were recruited from ongoing literacy projects and from Regional Educational Centers (*Regionale Opleidingscentra*; ROC) where lessons in Dutch were given; a small minority of respondents was recruited via informal contacts of one of the researchers (M.L.). One of the inclusion criteria for all groups was being a Berber speaking woman. For the first generation women, an additional inclusion criterion was having migrated as adults; for the second generation women, having been born in The Netherlands from two Berber parents who both had immigrated from Morocco. Assigning first generation women to either the literate or the illiterate group was done, first, by instructing the supervisors of the literacy projects and educational centers to select Berber migrant women who had been alphabetized in Classic-Arabic or in Dutch, and those Berber women who had not. Subsequently, (il)literacy was determined by means of these women's REALM-scores [21] (cut-off score 45; see Measures), that were also determined for the second generation group.

The respondents were asked to participate via the aforementioned supervisors, who were also asked to take the

additional matching characteristics into account. Almost all women reacted positively, after which one of the researchers (M. L.) met them in one of the centers or contacted them by means of telephone in order to make an appointment for data collection. The procedure that was followed for completing the questionnaires, is described under "Note" at the end of the Measures-paragraph.

### Measures

Measures were selected which aimed to reflect the presence (or absence) of literacy in particular literacy with relevance for participation in health care, and health in terms of actual health condition as well as health perception.

The Rapid Estimate of Adult Literacy (REALM; [21]) was used in order to measure the degree of literacy within the realm of health care. For the purpose of the present study, the REALM was adapted by removing some words (e.g., rectal, incest, testicle) and by adding terms with higher relevance for the women under study (e.g., pain, dose, ovary, blood pressure, obese, Caesarean section). Also, the original English version was translated into Dutch and in standard-Arabic by one of the researchers (M. L.) as well as a professional translator. (Notice that standard-Arabic – being the official language in Morocco – is the language in which literacy in Morocco occurs. Testing literacy in Moroccan-Arabic or Berber does not make sense because these both languages are speaking languages.) The REALM has been developed for assisting physicians in determining their patients' degree of literacy so that, if necessary, information can be given orally or by means of easily readable material. The test is composed of 3 questionnaires of which each contains 22 words. The first questionnaire consists of very simple words like "fat", "pill", "eye"; the second one more complicated ones, such as "behaviour", "miscarriage", and "hormones"; and the third questionnaire contains 'difficult', medical terms, e.g. "obese", "arthritis", "alcoholism", etc. Usually, administration of the test requires between 2 and 3 minutes. Respondents have to speak out each word separately. Their total score is the computation of all words that are formulated in the right manner and within 5 seconds; mistakes that are corrected by the respondents themselves within the time wave permitted are considered "right answers". The original scoring results in a division into 4 categories that together represent a varying degree of literacy. In the present study, the cut-off score of 45 was used for determining a dichotomous distinction between literate and illiterate. This point was originally also used for distinguishing those who "have difficulty with reading patients' information and will profit by the availability of material for people with restricted reading- and writing abilities", from people who "need materials for people

with restricted writing- and reading abilities, and are not able to read recipes".

For measuring the respondents' health condition as well as health perception, we used the Medical Outcomes Study-Short Form 36 (MOS-SF36, [22]). This 36-items questionnaire includes 8 subscales, namely "Physical functioning" (10 items), "Social functioning" (2 items), "Role limitations due to physical health problems" (4 items), "Role limitations due to emotional problems" (3 items), "Mental health" (5 items), "Vitality" (4 items), "Pain" (2 items), "General health perception" (5 items), and "Health transition" (1 item). All subscales were used in the present study, except the last one. All MOS-SF36 items have to be answered by choosing one of the available answering categories. For example, "Role limitations due to physical health problems" is measured by, among other items, the following question: "Are your activities at this moment limited by your health condition? If so, in what degree?" Then, several activities are mentioned, e.g., "Moderate effort, such as replacing a table, vacuum cleaning, walking or biking", and the respondents have to choose one of the following answering categories: "yes, seriously limited", "yes, a little limited", or "no, not at all limited". An example of an item of the subscale General health perception is "How in general do you judge your health?" with answering categories 1–5 ("excellent", "very good", "good", "poor", "bad"). The MOS-SF36 is meant for being used in patients as well as in the general population. A study by Van der Zee, Sanderma, and Heyink [23] in a native Dutch sample showed the scale having good properties for discriminating between healthy and chronically ill people as well as a good reliability. Also, the study by Aaronson et al. [24] as part of the International Quality of Life Assessment Project (IQOLA) showed a good validity as well as reliability. For the present study, a translation into Berber was provided by the Netherlands Cancer Institute where the validity and reliability of the scale in, among other languages, the Tarifit-Berber is currently being tested.

In addition to both aforementioned questionnaires, a pre-coded questionnaire was administered in order to obtain demographic information about marital status, place of birth, duration of stay in the Netherlands, living circumstances, educational level (number of years, and type of school completed), highest attained diploma, own and partner's occupational status, and actual health problems/diseases.

Note. First, demographic information was collected from all respondents in an interview. Then, the REALM was administered. Here, the respondents were requested to take a look upon *all* words and not to stop in case of rather difficult word; we namely did not want them to,

**Table 1: Internal consistency (Cronbach's alpha) of the MOS SF-36 scales**

Scale	First generation Illiterate	First generation Literate	Second generation Literate
Physical Functioning	.89	.87	.84
Role limitation due to Physical health problem	.87	.91	.90
Pain	.75	.88	.92
General health perception	.78	.63	.72
Vitality	.86	.65	.62
Social functioning	.71	.56	.62
Role limitation due to Emotional problem	.91	.90	.91
Mental health	.82	.88	.77

unnecessarily, miss subsequent words. Thereafter, the MOS SF-36 was applied. The questionnaires were administered to all respondents during separate interviews with one of the researchers (M.L.); during the interviews Berber (Tarafit) was spoken.

#### Statistical analyses

After having determined Cronbach's alpha for all MOS SF-36 subscales in the current population, we compared the three groups regarding demographic characteristics. Therefore we conducted several t-tests. Statistically significant differences appeared between both groups of first generation women (literate and illiterate) with respect to number of children, age, and own as well as partner's occupational status. Additionally, all four variables appeared to show significant correlations with most of the MOS SF-36 subscales. After having investigated between-group differences in actual health problems and diseases, we therefore decided to include the four demographic variables as covariates in a subsequent multivariate analysis of covariance (MANCOVA) in which both groups' scores on the MOS SF-36 subscales were the dependent variables.

Regarding both groups of literates (first generation and second generation), we, again, found between-group differences in number of children and age, and also in marital status. Although these variables only appeared to be correlated with the MOS SF-36 subscales "Pain" and "General health perception", we conducted a subsequent multivariate analyses of covariance (MANCOVA) on the scores of both these groups with number of children, age, and marital status as covariates.

#### Results

In this section, the results will be presented in the following sequence: reliability of the MOS SF-36 subscale scores for all groups of Berber women who participated in the present study; comparison of health conditions and – perceptions between the illiterate and the literate group of first-generation Berber women; comparison of health

conditions and – perceptions between the literate group of the first- and that of the second generation; health comparisons between all three groups together.

#### Reliability of MOS SF-36 in the current population

First, we analysed the reliability of the MOS SF-36 subscales for the current population. The Cronbach's alpha values can be found in Table 1. All values were above .70, except that – for both groups of literates – Cronbach's alpha was lower for Vitality (first generation .65, and second generation .62) and Social Functioning (.56 and .62, respectively). In addition, General health perception was lower for the literate group of the first generation too (.63). The average value of Cronbach's alpha for all MOS SF-36 subscales and for all three groups was .80.

#### Health within the first generation: Comparing the illiterates and the literates

As was described under Measures, we asked our respondents about their actual health problems or diseases. Forty percent of the illiterates (first generation) reported that they had more than one health problem or disease; 36 % reported to have one health problem or disease. With the literates, these percentages were, respectively 8 % and 28%. The percentages of first-generation women who reported to have no health problem or disease at all, were for the illiterates 24 %, and for the literates 64 %. The health problems or diseases that were most frequently mentioned, concerned pain, for example muscle pain, backache, and headache. The differences between both groups did not refer to the type of health complaints but to their number.

For both first-generation groups, means and standard deviations on the subscales of the MOS SF-36 are presented in Table 2. The scores on all these subscales were subjected to a MANCOVA in which number of children, age, and own as well as partner's occupational status were included as covariates. The E-values are also displayed in Table 2. The results were that, within first-generation Berber women, illiterates compared with literates scored sig-

**Table 2: Means (M) and standard deviations (SD) on the subscales of the MOS-SF36 for the illiterates and literates of the first generation; and F-values after controlling for number of children, age, and own and partner's employment status.**

	First generation illiterate (N = 25)		First generation literate (N = 25)		F-value
	M	SD	M	SD	
Physical functioning	79.2	19.8	93.2	13.2	5.79*
Role limitation due to Physical problem	52.0	42.0	75.0	38.9	1.23
Pain	63.8	25.9	69.6	26.4	0.58
General Health perception	42.3	22.2	60.8	15.2	7.06*
Vitality	50.0	21.4	60.2	14.9	3.25
Social functioning	77.5	19.1	83.0	16.5	0.14
Role limitation due to Emotional problem	62.7	45.5	74.7	40.0	0.46
Mental health	67.4	20.1	72.2	18.9	0.20

\* p < .05

**Table 3: Means (M) and standard deviations (SD) on the subscales of the MOS-SF36 for the literates of the first generation as well as second generation; and F-values after controlling for number of children, age, and marital status.**

	First generation literates (N = 25)		Second generation literates (N = 25)		F-value
	M	SD	M	SD	
Physical functioning	93.2	13.2	96.8	08.3	0.15
Role limitation due to Physical problem	75.0	38.9	87.0	29.9	0.45
Pain	69.6	26.4	83.5	20.6	2.84
General health Perception	60.8	15.2	72.9	16.0	0.57
Vitality	60.2	14.9	60.0	5.6	0.31
Social functioning	83.0	16.5	84.0	12.8	0.32
Role limitation due to emotional problem	74.7	40.0	76.0	34.0	0.11
Mental health	72.4	19.9	75.2	10.3	0.52

\* p < .05

nificantly lower on Physical functioning ( $F(1, 50) = 5.79$ ,  $p < .05$ ) as well as on General health perception ( $F(1, 50) = 7.06$ ,  $p < .05$ ).

**Health within the literates: Comparing the first and the second generation**

When asked about their actual health problems or diseases, the majority (80 %) of the second – as well as first generation literates (64 %) reported to have none of these at all. Twenty percent of the women belonging to the second generation reported to have at least one disease or complaint, thus, a little lower percentage than was involved in the group literates of the first generation (36 %). Here, too, pain, particularly headache was the most often mentioned health problem.

In Table 3, the mean subscale scores and standard deviations on the MOS SF-36 are presented regarding both groups of literates belonging to the first and second generation, respectively. After controlling for number of children, age, and marital status, a multivariate analysis of covariance (MANCOVA) revealed that there was not any

difference in health condition neither in health perception between literates of the first and those of the second generation.

**Comparison of the three groups under study**

In order to obtain an impression of the health differences between the three groups in one glance, we present, for all three groups under study in one figure, the percentages of women who reported to have none, one, or more than one actual health problem/disease (see Figure 1).

It is very obvious that the picture of both literate groups is very similar as well as the most favorable one. Also, the highest frequency of reporting no health problems at all was definitely found in the second-generation group of literates, and the most frequent report of more than one health problems in the first generation of illiterates.

Figure 2 shows the mean scores on all MOS SF-36 subscales for the three groups. On all subscales, the literate second-generation group had the highest, i.e., most favorable scores. Both literate groups scored highly similarly

on Vitality, Social Functioning, Role limitation due to an emotional problem, and Mental health. The illiterate first-generation group scored, on average, lower than the other two groups did. The most striking differences between literates and illiterates concerned the subscales Role limitation due to a physical problem, General health perception, and Vitality.

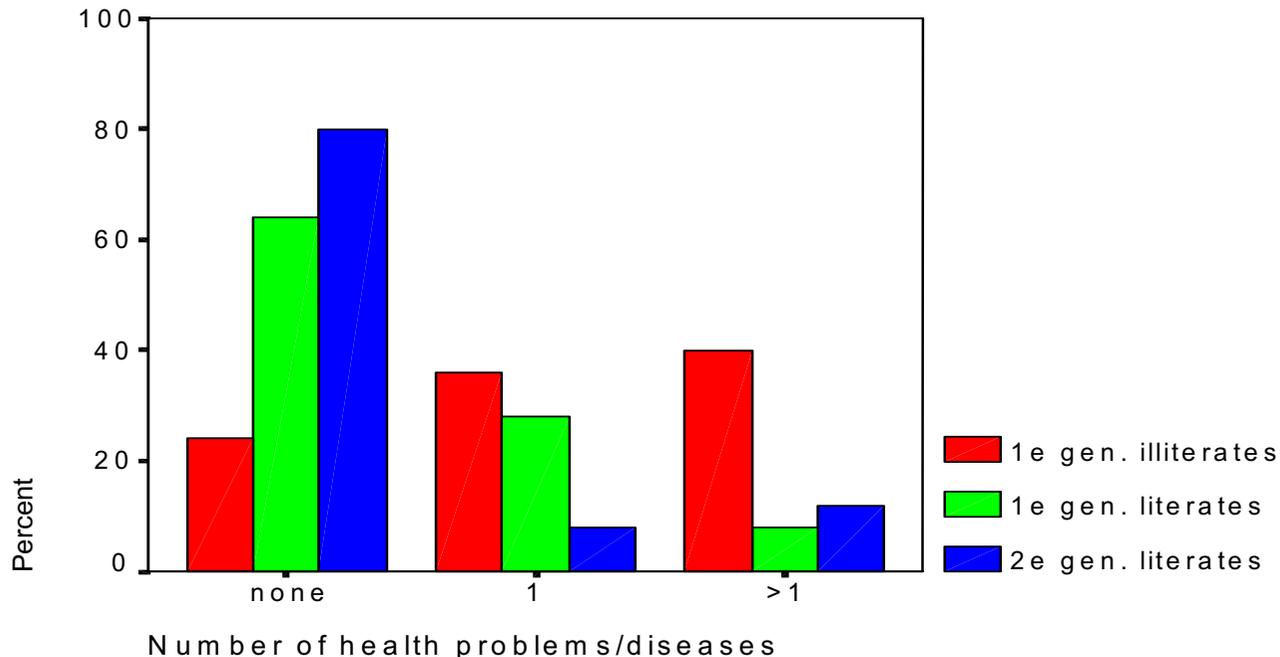
### Discussion

The present study was aimed at investigating the relationship between health and literacy in Berber speaking Moroccan women living in the Netherlands. In agreement with our first hypothesis, we found that illiterate compared to literate first-generation Berber women clearly reported a worse health condition. Seventy-six percent of the illiterates versus 36 % of the literates within the total first-generation group reported to have at least one health complaint or illness, a reduction of more than 50 %. Moreover, on all subscales of the MOS SF-36 the illiterates scored lower (i.e., less favorable) than the literates belonging to the same generation did; and after controlling for several, relevant demographic differences between both groups (number of children, age, and own as well as partner's occupational status position) these differences remained statistically significant for Physical functioning as well as General health perception. Maybe, the lower scores of the illiterates on General health perception are to be attributed to the types of health problems that they mentioned. The many physical complaints, such as pain, fatigue, rheumatism, and shortness of breath, may easily have led to a more general feeling of bad health. The picture of a relatively adverse health condition in the illiterate Berber women that arises from our results, might be due to one or more of the aforementioned explanations that were directly related to illiteracy, i.e., a bad understanding of physicians' recipes and instructions and a lack of knowledge concerning healthy behaviour. Several other, possible explanations have been ruled out in the current study, because we controlled for factors that use to be related to both illiteracy and health, such as social-economic status and educational level. Simultaneously, these analyses revealed the relatively positive effects of being employed on health, effects that have been well documented in the literature (e.g., [25]). In other words, being illiterate and unemployed together might strengthen a daily situation in which social isolation easily strikes (see also [19]), and in which one is prone to a lack of external information easily leading to a strong focus on internal, somatic stimuli and to an excess physical symptoms ([26,27]).

Our other findings are also in agreement with expectations, in particular with our second hypothesis stating that, within literates, first- and second-generation women would report similar health conditions. Although a super-

ficial comparison between both groups might suggest that the women belonging to the first generation were in a less favourable health condition (e.g., see Figure 2) with respect to Physical Functioning as well as Role limitation due to a physical problem, Pain, General health perception, and Vitality, analyses in which we controlled for important between-group variables (number of children, age, marital status) failed to show any difference in health condition between both groups. Definitely, age is a major-impact health factor in a comparison between women of a first and those of a second generation, in itself and as it is related to such factors as lifestyle and daily life. Both groups' reading abilities will have provided them with equal access to available knowledge about good health habits and – behaviours. In search for medically relevant information, they – theoretically – can equally easy get information, for example, by surfing the net or by reading folders and medical encyclopaedias.

Although the aforementioned interpretation seems very plausible and highly in agreement with the results of other studies on health effects of illiteracy (e.g., [3,4]), it is not possible to be sure about "pure" illiteracy effects. For example, our results do not allow to make a distinction between "pure" (il)literacy effects and effects of a varying vocabulary. Probably, illiteracy, due to a lack of access to an important source of vocabulary, written language, will coincide with mastering less words. Here, a strong point of the study, we think, is that both groups of first-generation women plausibly had a similar (low) degree of mastering of spoken Dutch, due to their same degree of attending lessons in (speaking) Dutch language. But, nevertheless, strictly spoken, we are not sure to what extent the relatively negative health profile that we found in the group of illiterates is due to their being illiterate, to a lack of language skills (including (Dutch and/or Arabic) vocabulary and capacity to memorize spoken information), or to both. An additional point is that we did not obtain data of a more attitudinal nature, e.g., information about one's attitudes toward staying in the Netherlands, integration into the Dutch society, etc. Reasoning from the perspective that "the mastering of a key element in the foreign culture, namely its language, shows the willingness, opportunity, ability, and/or need to actually acquire elements of that culture" [5], one might argue that the illiterates' attitudes toward integration into the (new) society could possibly be less positive than that of the literates. Because integration is generally related to better health outcomes than, for example, assimilation or isolation are (e.g., [28]), such types of attitudinal factors might have played a role as well. On the other hand, we again refer to the fact that both groups of first-generation women mastered spoken Dutch at an equal level. Furthermore, it can be questioned anyhow to what degree their lack of mastering language skills should be considered a matter of free



**Figure 1**  
Frequencies of health problems/diseases reported by each group

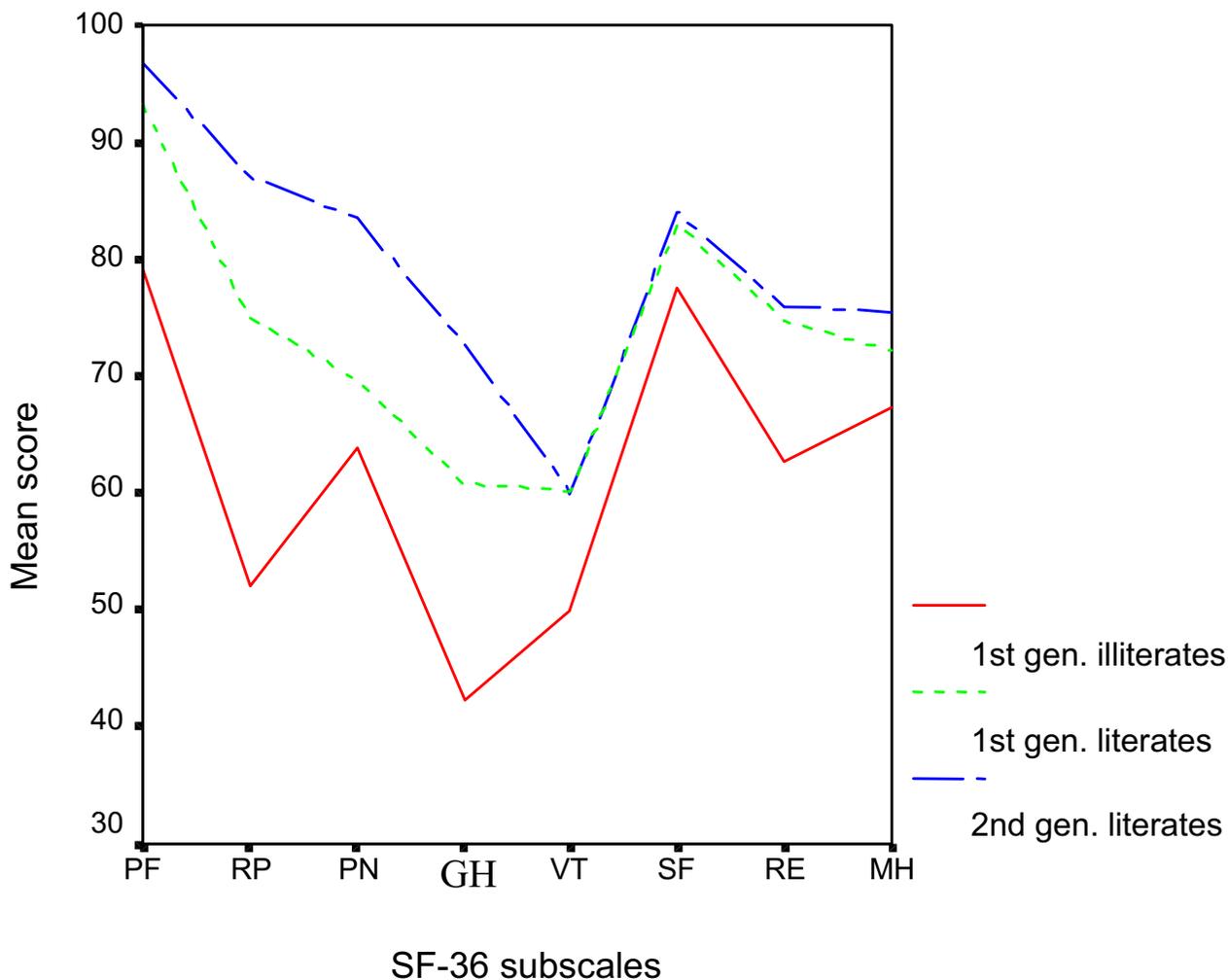
choice as implied by such terms as "willingness" and "need". We believe factors such as lack of access due to lack of "opportunity" and "ability" are more relevant in the case of our specific population.

The present study has some additional imitations as well. Although our results support the idea that illiteracy has a negative impact on health condition and – perception, they do not provide us with a definite basis for drawing causal conclusions, due to their cross-sectional character. Therefore, future longitudinal, prospective studies in which health changes are measured while illiteracy is turned into literacy, should be welcomed.

Secondly, our data were subjective in nature. We did not collect registrations by physicians or more "objective" data, e.g., in terms of number of days of admission in hospitals. Our results can therefore be biased by an inclination to over- or underreport health problems that may vary between the various certain subgroups of respondents. We are not aware of any evidence regarding such differences between the groups under study. Nevertheless, we think it is interesting and worthwhile to elaborate future studies with various types of data.

A third, possible limitation is related to the fact that the present study is a cohort study, which implies that selection effects cannot be ruled out completely. For example, one might argue that the group of first-generation, literate Berber women compared with their illiterate contemporaries had been a fitter group as reflected in better health as well as in a more enterprising attitude towards education. However, we do not deem this likely. Despite the high degree of demographic similarity between both groups, one difference between them (found only after a further, even more thorough examination of all, possibly involved characteristics) was the following. Half of the women belonging to the literate group but none of the illiterates had been born in a Moroccan city. Because the literacy of the first group had mainly been obtained in the country of origin and additional educational experience (in Morocco as well as the Netherlands) was lacking in *both* groups (except in 2 literate respondents), we think that literacy in the first-generation group was primarily an effect of having been raised in a city rather than an expression of better fitness or health.

We consider it a strong point of our study that we created an opportunity to examine illiteracy effects separated from effects of generation after migration, although we



**Figure 2**  
Mean subscale scores on the MOS SF-36 for all three groups under study

did not have the possibility to investigate the impact of illiteracy in women belonging to the second generation. Nevertheless, our results, in particular those concerning the first-generation literates compared with first-generation illiterates, point to the conclusion that illiteracy rather than generation seriously impacts health and well-being.

**Conclusions**

As an implication of our results, we advocate that literacy programs are offered to illiterate migrants in such a way that they really reach them. Especially migrant women who live in rural areas should be approached more

actively in order to provide them with equal opportunities in general and with equal health opportunities in particular. Furthermore, employment could be encouraged for the, rather isolated and relatively poor, Berber female population. In addition, health care could be more attuned to the fact of illiteracy in migrants. For example, in various countries projects have been taken place in which information officials supported the communication between general practitioners and migrants and/or migrants attended general practitioners who spoke their language (e.g., [29,30]). Such projects could be extended to other medical settings. One could think, for example, about bilingual intermediaries between physicians and

patients within home care, hospitals etcetera who also assist patients with explaining written information.

If, what we hope, illiteracy will fade away from our societies, future research should focus on the relationship between health and literacy conceptualized as a continuous variable rather than a dichotomous one as it was in our study. Furthermore, we think it is worthwhile to extend future studies on literacy and health with comparisons between the sexes as well as between natives and various groups of migrants.

### Competing interests

None declared.

### Authors contributions

MB supervised the study, participated in design and data analyses, and drafted parts of the manuscript; ML collected the data, participated in the data-analyses, and drafted parts of the manuscript. Both authors read and approved the final manuscript.

### Abbreviations

PF= physical functioning; RP = role limitation due to physical problem; PN= pain; GH= general health perception; VT= vitality; SF= social functioning; RE= role limitation due to emotional problem; MH= mental health.

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