

Updated norms of the MOS-SF36 in the young French population

Arthur Trognon (✉ arthur.trognon@clinicog.fr)

CNRS, ATILF, Lorraine University

Emilie Tinti

Lorraine University

Blandine Beaupain

Trousseau Hospital, AP-HP

Jean Donadieu

Trousseau Hospital, AP-HP

Michel Musiol

CNRS, ATILF, Lorraine University

Research Article

Keywords: French population, Mental health Scale, Physical health Scale, Quality of Life

Posted Date: November 3rd, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-1006967/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background

The SF-36 is a generic quality of life questionnaire, massively translated and widely used to obtain physical and mental health status. However, validation work in the French language was carried out over a generation ago. The objective of this study was to obtain the norms of the SF-36 in the French young population.

Method

The sample consisted of 1134 non-pre-screened French people aged between 18 and 39 years.

Results

The internal consistencies of the scales were high and the metrics associated with the factor structure were satisfactory. In general, women presented significantly higher scores than men.

Conclusion

Our results suggest that the SF-36 remains a reliable tool for studying quality of life in the young French population.

Introduction

Since the 1990s, health-related quality of life has gradually become a major theme in clinical research (Murdaugh, 1997). Indeed, although the health status of a population is most often expressed in quantitative terms such as life expectancy, mortality, or morbidity, a growing number of studies are now interested in measuring health status, and in particular its relationship with quality of life. These measures have placed the patient's perception at the centre of the assessment, by asking the patient about his or her subjective experience of his or her overall health status and more particularly about his or her functional status. Thus, a large number of self-reported questionnaires have been developed to measure these dimensions, notably the very broad Medical Outcomes Questionnaire 149-item from the RAND Health Insurance Experiment (Tarlov et al., 1989).

Several tools have been developed from this original questionnaire, including the derived SF-20 and SF-36 versions, which have shown more precise discriminatory abilities in their validation studies (McHorney et al., 1993). Thus, the Medical Outcomes Study Short Form (SF-36) has become one of the most widely used self-reported quality of life questionnaires for assessing health status, given its discriminatory properties of well-being at the level of clinical groups (Ware and Gandek, 1998), and has thus been used

extensively in the monitoring of clinical practice outcomes and medical treatment effects. This questionnaire measures quality of life on the basis of eight dimensions or concepts that are frequently used in health studies. These eight dimensions are estimated from eight subscales that examine general health; mental health (with respect to anxiety and depression components); physical functioning; limitation of work capacity or daily activities due to physical functioning as well as that due to emotional disorders; vitality; pain; and social functioning.

The questionnaire has already been translated several times into French, and norms have been obtained for the French (Leplège, 2001) and Swiss (Richard et al., 2000) populations, but they were established almost a generation ago. The purpose of this study was to update the norms of the SF-36 in the young French population (18-39 years) and to reassess its psychometric properties in terms of reliability and validity.

Material And Methods

Subjects

One thousand one hundred and thirty-four (n=1134) not preselected adults (mean age = 22.1 years ; SD = 3.2) from the general French population participated in this study. Participants screening was completed online, and ethical consents were obtained online in agreement with the Declaration of Helsinki. The study was approved by the "Comité de Protection des Personnes Sud-Est VI". Full measures were available for all subjects.

Questionnaire : the MOS-SF36

The SF-36 is a short 36-item behavioural questionnaire measuring eight quality of life dimensions: general health (GH - 5 items), vitality (VT - 4 items), bodily pain (BP - 2 items), limitation of physical problems (RP - 4 items), limitation of emotional problems (RE - 3 items), mental health (MH - 5 items), and physical functioning (PF - 10 items), social functioning (SF - 2 items). The SF-36 also includes an item to estimate the change in the subject's health status during the year preceding the assessment (HC).

Scoring

For each dimension, item responses were re-encoded on a scale ranging from 0 (best) to 100 (worst), following the standard SF-36 scoring algorithm (Ware Jr, 1999), adapted for a 5-point Likert scale. The algorithm used is available in Table 1.

Table 1
Scoring algorithm for the SF-36 questionnaire.

Item number	Participant's response	Scoring
1, 2, 20, 22, 34, 36	1	100
	2	75
	3	50
	4	25
	5	0
3, 4, 5, 6, 7, 8, 9, 10, 11, 12	1	0
	2	50
	3	100
13, 14, 15, 16, 17, 18, 19	1	0
	2	100
21, 23, 26, 27, 30	1	100
	2	75
	3	50
	4	25
	5	0
24, 25, 28, 29, 31	1	0
	2	25
	3	50
	4	75
	5	100
32, 33, 35	1	0
	2	25
	3	50
	4	75
	5	100

For the calculation of the composite scores, we averaged the PF, RP, BP and GH subscales for the PCS composite score and averaged the VT, SF, RE and MH subscales for the MCS composite score.

Internal consistency and reliability

Internal consistency and reliability of the remaining items was examined by Cronbach's alpha. Reasonable acceptability criterion was set to $.70 \leq \alpha \leq .90$ with exceeding lower bound meaning a low reliability, and exceeding higher bound meaning too many similar items, decreasing the scale's true reliability (Bland and Altman, 1997; DeVellis, 2003).

Factor structure

In order to test our 8-factors model for SF-36 and assess construct validity, we conducted a confirmatory factor analysis. Generalized least squares method was performed in order to test the fit capability of the factor structure. Model fit was assessed using the following fit indices : we used the χ^2 test statistic for absolute fit ; the comparative fit index (CFI) and Tucker-Lewis Index (TLI) for fit relative to a null model (Bentler, 1990; Tucker and Lewis, 1973); the Standardized Root Mean Square Residual (SRMR - Bentler, 1989) and the Root Mean Square Error of Approximation (RMSEA - Steiger, 1980) for overall fit. Accordingly to (Hu and Bentler, 1999), we assumed that our 8-factors model fit well if $CFI > .95$; $TLI > .95$; $RMSEA < .06$ and $SRMR < .08$. All statistical analyses were coded in R with Lavaan library and interpreted in RStudio v1.0.143.

Results

Descriptive statistics

Descriptive statistics of the study sample are shown in Table 2. Results showed that women reported poorer health compared to men for all variables except for BP.

Table 2
Descriptive statistics of the study sample.

Parameter	Men (n=505)	Women (n=629)
Age	22.82(±3.51)	21.60(±2.91)
Socio-cultural level	3.9(±1.17)	3.69(±1.19)
GH	29.04(±18.25)	34.89(±21.92)
VT	49.04(±18.26)	57.10(±18.55)
BP	84.58(±15.27)	78.81(±17.40)
RP	18.46(±27.76)	24.05(±33.99)
RE	32.61(±39.30)	46.74(±41.28)
MH	36.46(±21.70)	47.53(±21.82)
PF	3.76(±9.06)	6.09(±10.08)
SF	52.7(±9.03)	53.34(±9.53)
PCS	33.96(±9.37)	35.96(±11.32)
MCS	42.45(±17.21)	51.18(±17.69)

Internal consistency and reliability

Results concerning internal consistency and reliability are presented in Table 3. Data showed that the SF-36 questionnaire carries high internal consistency and reliability even when an item is dropped.

Table 3
Internal consistency and reliability for the SF-36 questionnaire.

Subscale	Cronbach's alpha	Lower confidence bound	Upper confidence bound
GH (5 items)	.78	.75	.79
VT (4 items)	.81	.79	.83
BP (2 items)	.80	.77	.82
RP (4 items)	.78	.76	.80
RE (3 items)	.80	.78	.82
MH (5 items)	.87	.86	.88
PF (10 items)	.84	.79	.82
SF (2 items)	.85	.83	.86

The Cronbach alpha was measured at .88 [CI_{95%}=.87-.89] for the full SF-36 questionnaire. When each of the SF-36 items was removed from the analysis in order to assess robustness, Cronbach's alpha remained high (varying from .87 to .89 with mean_α=.88, SD=.008). Measures for the subscales ranged from .78 to .85. All measures were above the minimum acceptable rate of .70 and was close to the maximum expected value of .9.

Confirmatory factor analysis

Confirmatory factor analysis suggested that the 8-factor model fit well with the SF-36 questionnaire, except for the CFI and TLI which remains slightly below the pre-defined cut-off [$\chi^2=2508$, $p<.001$, CFI=.893, TLI=.88, RMSEA=.057, SRMR=.052]. We assumed that, based on these indices, this sample has an acceptable fit to the 8-factor model.

Justification of the normative approach

A two-ways ANOVA (dimension*gender) on the measured score showed a significant effect of gender ($F_{(1,41202)}=84.75$, $p<0.001$), dimension ($F_{(8,41202)}=8942.02$, $p<0.001$), and a significant interaction between gender and dimension ($F_{(8,41202)}=18.59$, $p<0.001$), thus justifying the separation of the two genders in the setting of norms.

Normative values

Normative data for the SF-36 composite scores expressed in percentiles are presented in Table 4. The full percentiles for the 8 subscales, the 2 composite factors and HC item are available in Supplementary Tables 1-11. Women showed higher scores compared to men for each scale except for BP.

Table 4
Normative data for the SF-36 composite scores expressed in centiles.

SF-36 Scale percentiles	Men	Women
MCS		
25	28.44	35.94
50	38.125	50.83
75	54.69	65.42
99	79.05	84.06
PCS		
25	27.5	27.5
50	31.875	32.5
75	38.75	41.875
99	61.85	66.875

Discussion

The present study verified the reliability and the construct validity of the French version of the 36-Item Short Form Survey (SF-36) questionnaire in a young population.

Cronbach's alpha measures suggested that the SF-36 questionnaire was internally reliable, with measured alphas remaining in the $.70 \leq \alpha \leq .90$ interval recommended by (Bland and Altman, 1997; DeVellis, 2003).

Further confirmatory factor analysis supported the eight-factor structure of the SF-36 questionnaire, with items 1;33;34;35;36 grouped in the "General Health" factor, items 23;27;29;31 grouped in the "Vitality" factor, items 21;22 grouped in the "Body Pain" factor, items 13;14;15;16 grouped in the "Role limitation : Physical" factor, items 17;18;19 grouped in the "Role limitation : Emotional" factor, items 24;25;26;28;30 grouped in the "Mental Health" factor, items 3;4;5;6;7;8;9;10;11;12 grouped in the "Physical Functioning" factor, and items 20;32 grouped in the "Social Functioning" factor. Analysis suggested that this model is close to the standards defined by (Hu and Bentler, 1999), with only CFI and TLI which remains slightly below the cut-off.

We then performed a factor analysis that suggested some gender differences in self-reported responses, with women reporting lower quality of life than men for all domains studied except BP, which is coherent with previous studies in France and over the world (Demiral et al., 2006; El Osta et al., 2019; Hopman et al., 2000; Khader et al., 2011; Perneger et al., 1995; Sabbah et al., 2003). We thus established normative data expressed as percentiles for each gender.

Conclusion

We concluded that the French SF-36 is a reliable questionnaire for the assessment of physical and mental health conditions. The study provided norms of SF-36 for the young French population and for both genders.

Declarations

AUTHOR'S CONTRIBUTIONS

AT created the experimental protocol. ET collected the data. AT and ET performed the statistical processing of the data, the production of the tables, and wrote the paper. JD, BB, and MM supervised the work.

Funding

Not applicable

Ethics approval and consent to participate

The study was approved by the Comité de Protection des Personnes Sud-Est VI (protocol number : 20.02.24.42827). Consent was obtained online before the completion of the survey. The research was performed in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

Not applicable.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgements

Not applicable.

References

1. Bentler, P.M. (1989). EQS: structural equations program manual.
2. Bentler, P.M. (1990). Comparative fit indexes in structural models. *Psychol. Bull.* 107, 238–246.

3. Bland, J.M., and Altman, D.G. (1997). Cronbach's alpha. *BMJ* 314, 572.
4. Demiral, Y., Ergor, G., Unal, B., Semin, S., Akvardar, Y., Kivircik, B., and Alptekin, K. (2006). Normative data and discriminative properties of short form 36 (SF-36) in Turkish urban population. *BMC Public Health* 6, 247.
5. DeVellis, R.F. (2003). *Scale Development: Theory and Applications* (SAGE).
6. El Osta, N., Kanso, F., Saad, R., Rabbaa Khabbaz, L., Fakhouri, J., and El Osta, L. (2019). Validation du SF-36, questionnaire générique de la qualité de vie liée à la santé chez les personnes âgées au Liban. *East. Mediterr. Health J.* 25, 706–714.
7. Hopman, W.M., Towheed, T., Anastassiades, T., Tenenhouse, A., Poliquin, S., Berger, C., Joseph, L., Brown, J.P., Murray, T.M., and Adachi, J.D. (2000). Canadian normative data for the SF-36 health survey. *Cmaj* 163, 265–271.
8. Hu, L., and Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equ. Model. Multidiscip. J.* 6, 1–55.
9. Khader, S., Hourani, M.M., and Al-Akour, N. (2011). Normative data and psychometric properties of short form 36 health survey (SF-36, version 1.0) in the population of north Jordan. *East Mediterr Health J* 17, 368–374.
10. Leplège, A. (2001). *Le questionnaire MOS SF-36: Manuel de l'utilisateur et guide d'interprétation des scores* (De Boeck Secundair).
11. McHorney, C.A., Ware, J.E., and Raczek, A.E. (1993). The MOS 36-Item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med. Care* 31, 247–263.
12. Murdaugh, C. (1997). Health-Related Quality of Life as an Outcome in Organizational Research. *Med. Care* 35, NS41.
13. Perneger, T.V., Leplège, A., Etter, J.-F., and Rougemont, A. (1995). Validation of a French-language version of the MOS 36-Item Short Form Health Survey (SF-36) in young healthy adults. *J. Clin. Epidemiol.* 48, 1051–1060.
14. Richard, J.-L., Bouzourène, K., Gallant, S., Ricciardi, P., Sudre, P., Iten, A., and Burnand, B. (2000). Validation et normes du SF-36 dans la population du canton de Vaud (Lausanne: Institut universitaire de médecine sociale et préventive (IUMSP)).
15. Sabbah, I., Drouby, N., Sabbah, S., Retel-Rude, N., and Mercier, M. (2003). Quality of life in rural and urban populations in Lebanon using SF-36 health survey. *Health Qual. Life Outcomes* 1, 1–14.
16. Steiger, J.H. (1980). Statistically based tests for the number of common factors.
17. Tarlov, A.R., Ware, J.E., Greenfield, S., Nelson, E.C., Perrin, E., and Zubkoff, M. (1989). The Medical Outcomes Study. An application of methods for monitoring the results of medical care. *JAMA* 262, 925–930.
18. Tucker, L.R., and Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika* 38, 1–10.

19. Ware, J.E., and Gandek, B. (1998). Overview of the SF-36 Health Survey and the International Quality of Life Assessment (IQOLA) Project. *J. Clin. Epidemiol.* *51*, 903–912.
20. Ware Jr, J.E. (1999). SF-36 health survey.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SF36supplementaryTables.docx](#)