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## Philadelphia Geriatric Morale Scale in Essential Tremor: A Population-Based Study in Three Spanish Communities

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### Abstract

**BACKGROUND**—Essential tremor (ET) is associated with both functional disability and depression. Each could contribute to a poor sense of well-being and low morale. We hypothesized that morale would be lower in ET cases than controls.

**METHODS**—Using a population-based, cross-sectional design, morale was assessed in 187 ET cases and 561 matched controls living in three communities in central Spain using the Philadelphia Geriatric Center Morale Scale (PGCMS)(range = 0 [low morale]–17), which included three dimensions of psychological well-being: agitation, lonely dissatisfaction, and attitude toward own aging.

**RESULTS**—The PGCMS score was lower in ET cases than controls ( $9.41 \pm 3.21$  vs.  $10.39 \pm 2.92$ ,  $p < 0.001$ ), as were the Agitation subscore ( $3.17 \pm 1.71$  vs.  $3.78 \pm 1.67$ ,  $p < 0.001$ ) and Lonely Dissatisfaction subscore ( $3.75 \pm 1.34$  vs.  $4.02 \pm 1.24$ ,  $p < 0.05$ ). Nearly one-half of the ET cases were classified as having low morale compared with only one-third of controls ( $p = 0.006$ ). In a linear regression analysis adjusting for demographic factors and multiple comorbid conditions, ET cases had a lower log PGCMS score than controls ( $p < 0.001$ ). Exclusion of participants on antidepressant medication did not change the results.

**CONCLUSIONS**—Our results indicate that morale is significantly lower in community-dwelling ET cases than in matched controls. This lower morale could in part be a proxy for mild, untreated depression. It therefore seems important to detect and then possibly treat this problem to improve the psychological well-being of patients with this disease.

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*Julián Benito-León:* Research project conception, organization and execution; manuscript writing (making subsequent revisions).

*Félix Bermejo-Pareja:* Research project organization and execution; manuscript writing (making subsequent revisions).

## Keywords

essential tremor; epidemiology; quality of life; morale

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## Introduction

Essential tremor (ET) is one of the most common adult-onset neurological diseases.<sup>1,2</sup> The tremor is often progressive,<sup>3</sup> resulting in difficulty performing basic daily activities.<sup>4,5</sup> Even among community-dwelling cases, who have milder tremor than clinic-derived cases, three-fourths report disability, with most experiencing this disability in multiple functional domains.<sup>5</sup> Hence, it is apparent that tremor often brings with it changes in the patients' life situation. In addition to functional difficulties, ET is associated with depression,<sup>6</sup> both could contribute to low morale and a poor sense of well-being.

Morale may be defined as the level of individual psychological well-being based on such factors as a sense of purpose and confidence in the future. It is important to assess patient morale. First, it provides a patient-centered measure of well-being. Second, it can provide insights into patient motivations for pursuing or declining a range of medical and surgical treatment options. Finally, poor psychological well-being is a problem that is worthwhile focusing on in its own right, particularly as a growing elderly population attempts to age successfully.

There are few data on morale in ET. We had the opportunity to study morale in three communities in central Spain. Comparing three samples of ET cases to matched controls, we hypothesized that morale would be lower in ET cases. Moreover, the study considered numerous confounding comorbidities to distinguish their impact on morale from that of ET.

## Methods

### Study Population

Data were derived from the Neurological Disorders in Central Spain (NEDICES) study, a longitudinal, population-based survey of major age-associated conditions of the elderly.<sup>7,8</sup> The study sample, from three communities in central Spain (Las Margaritas, Lista, and Arevalo), consisted of 6,395 individuals. A detailed account of the study population, sampling methods, and assessments has been published.<sup>7-11</sup> All procedures were approved by the University's ethical standards committee on human experimentation. Written (signed) informed consent was obtained from all participants upon enrollment.

### Baseline Evaluation (1994 to 1995)

At baseline, subjects were interviewed using a structured screening questionnaire that assessed demographic factors, medical conditions (each assessed by self-report, Table 1) and lifestyle variables.<sup>7-11</sup> The questionnaire included one screening question for ET,<sup>10,11</sup> with high negative predictive value (183 true negatives and 0 false negatives).<sup>11</sup> Persons who screened positive for ET underwent a neurological examination, which included a general neurological examination, the motor portion of the Unified Parkinson's Disease Rating Scale (UPDRS),<sup>12</sup> and three manual tasks to assess postural and kinetic tremors. For subjects who could not be examined, medical records and death certificates were reviewed.

Subjects were diagnosed with ET if they had an action tremor of the head, limbs, or voice without any other recognizable cause. Second, the tremor had to be of gradual onset (i.e., slow and progressive) and (1) present for at least 1 year or (2) accompanied by a family history of the same disorder (at least one reportedly-affected first-degree relative). Third, on an Archimedes spiral, tremor severity had to be moderate or greater (rating  $\geq 2$  according to the

Washington Heights-Inwood Genetic Study of ET Rating Scale).<sup>13</sup> Prior community-based investigations in New York demonstrated that while the majority of ET cases have tremor of this severity during spiral drawing, only 2.3% of normal elderly control subjects do, indicating that these spiral ratings are useful in distinguishing individuals with ET from those with normal (enhanced physiological) tremor.<sup>14</sup> Subjects with tremor related to alcohol withdrawal, hyperthyroidism, anxiety, Parkinson disease (PD), antidopaminergic drug intake, lithium therapy, or other known causes of tremor, were not considered to have ET. There were 256 (4.8%) prevalent ET cases.<sup>10</sup> PD and other forms of parkinsonism were diagnosed when at least two cardinal signs (resting tremor, rigidity, bradykinesia, and impaired postural reflexes) were present on UPDRS.<sup>15</sup> The diagnosis of dementia was made by consensus of two neurologists, who applied the Diagnostic and Statistical Manual of Mental Disorders (DSM)–IV criteria, and required evidence of cognitive deficit (neuropsychological test battery, clinical mental status examination) and impairment in social or occupational function.<sup>16</sup>

### Follow-Up Evaluation (1997 to 1998) and Assessment of Morale

During the second (i.e., follow-up) evaluation (1997 to 1998), the same methods (screening and examination) were used for the diagnosis of ET, PD, parkinsonism and dementia. Eighty-three incident ET cases were identified.<sup>11</sup>

For subjects who were examined, a subjective quality of life questionnaire was administered by psychologists, social workers, student nurses and general physicians, all of whom had been trained by a senior clinical investigator with expertise in health sciences research (see acknowledgements, J. R-N.). This questionnaire, the Philadelphia Geriatric Center Morale Scale (PGCMS),<sup>17</sup> was designed to provide a measure of morale or psychological well-being in social gerontological studies.<sup>17–19</sup> As such, it was selected for NEDICES, in which a broad array of neurological disorders of the elderly was assessed. The scale measures three consistently reproducible factors, which capture different dimensions of psychological well-being: agitation, lonely dissatisfaction, and attitude toward own aging. The agitation factor is comprised of 6 questions that assess anxiety and dysphoria, the lonely dissatisfaction factor is comprised of 6 questions that assess the acceptance or dissatisfaction with the social interactions the subject experiences, and the final factor is comprised of 5 questions that assess the subject's attitude towards the aging process. Each of the 17 questions is scored so that the value 0 indicates low morale and the value 1 indicates high morale; the total score ranges from 0–17. It has been suggested that scores of 13 to 17 are consistent with high morale, scores of 10 to 12 with a middle range, and scores  $\leq 9$  with lower morale.<sup>19</sup> The scale, which is short and easy to administer, has demonstrated high inter-rater reliability and internal consistency and it has been used in a variety of gerontological studies in a number of countries<sup>17–19</sup> (including Spain),<sup>20,21</sup> indicating that there is cross-cultural comparability.

### Final Sample

There were 3,816 participants evaluated at follow-up. We excluded 146 participants with PD or other forms of parkinsonism as our intention was to assess whether ET was associated with lower morale in a cohort without other competing movement disorders. Fifteen subjects were excluded due to insufficient medical information. Of the remaining 3,655 participants, there were 273 ET cases and 3,382 participants without ET (controls). We excluded an additional 1,313 participants (96 with ET and 1,217 controls) who either: (1) were not examined and therefore had no data on morale ( $N = 780$ ) or (2) had incomplete data ( $N = 533$ ). This left an eligible sample of 177 ET cases and 2,165 controls for these analyses. The 177 ET cases were frequency-matched to 531 controls (1:3 ratio) based on age and gender. We compared the final 177 ET cases to the base sample of 273 ET cases and they were similar in terms of age ( $76.6 \pm 6.2$  vs.  $77.0 \pm 6.6$  years,  $t = 0.66$ ,  $p = 0.51$ ), gender (108 [61.0%] vs. 165 [60.4%] women, chi-square [ $X^2$ ] = 0.02,  $p = 0.90$ ), and education (33 [18.6%] vs. 58 [21.2%] illiterate,  $X^2 =$

0.45,  $p = 0.50$ ). Also, the 531 matched controls were compared to the base sample of 3,382 controls and they were similar in terms of age ( $76.1 \pm 6.2$  vs.  $75.7 \pm 6.3$  years,  $t = 1.26$ ,  $p = 0.21$ ), gender (317 [59.7%] vs. 1,984 [58.7%] women,  $X^2 = 0.20$ ,  $p = 0.65$ ), and education (59 [11.1%] vs. 403 [11.9%] illiterate,  $X^2 = 0.29$ ,  $p = 0.59$ ).

### Data analyses

Statistical analyses were performed in SPSS Version 15.0 (SPSS, Inc., Chicago, IL). Demographic and clinical characteristics of ET cases and controls were compared using two-sided Student's  $t$  tests, analysis of variance (ANOVA), and  $X^2$  tests. PGCMS score and subscores were not normally distributed and, therefore, non-parametric tests (Mann Whitney and Spearman's correlation coefficients) were used to assess associations between PGCMS scores and demographic factors and comorbid conditions. A Mann Whitney test was used to compare PGCMS scores in ET cases vs. controls. PGCMS scores were stratified into low morale ( $\leq 9$ ), intermediate morale (10–12) and high morale (13–17).<sup>19</sup> We began with an unadjusted linear regression analysis in which total log-transformed PGCMS score was the dependent variable and diagnosis (ET vs. control) was the independent variable. Covariates were included in adjusted models when they were associated with either the dependent or independent variable in univariate analyses or when there was strong prior biological support for an association.

### Results

The 177 ET cases and 531 frequency-matched controls were similar in terms of age, gender, smoking, and numerous medical comorbidities (e.g., diabetes, hypertension, heart disease, Table 1). The mean duration of ET was  $10.0 \pm 11.7$  years. Forty-five (25.4%) ET cases had a family history of ET and 5 (2.8%) were taking a medication to treat ET.

In controls, lower PGCMS score was not significantly correlated with higher age (Spearman's  $r = -0.05$ ,  $p = 0.28$ ); lower PGCMS score (i.e., lower morale) was found in women, illiterate participants, non-smokers, participants with arthritis, and marginally in participants with hypertension (Table 2).

The PGCMS score was lower in ET cases than controls, as were the Agitation subscore and Lonely Dissatisfaction subscore (Table 3). The PGCMS score was lower in cases than controls in each of the three Spanish communities; this difference reached significance in two of the three communities (Table 3). PGCMS scores were stratified into categories (low morale [ $\leq 9$ ], intermediate morale [10–12] and high morale [13–17]); nearly one-half of the ET cases were classified as having low morale compared with only one-third of controls (82 [46.3%] vs. 182 [34.3%],  $X^2 = 10.10$ ,  $p = 0.006$ ).

In an unadjusted linear regression analysis, ET cases had a lower the log PGCMS score than did controls ( $\beta = -0.055$ ,  $p < 0.001$ ). In a linear regression analysis that adjusted for age, gender, education, ever cigarette smoker, hypertension, and arthritis, the results were similar ( $\beta = -0.050$ ,  $p < 0.001$ ). In a linear regression analyses that further adjusted for the above variables (age, gender, education, ever cigarette smoker, hypertension, arthritis) as well as additional comorbid medical conditions (diabetes, heart disease, chronic obstructive pulmonary disease, hip fracture, hearing difficulty, visual problems), the results were similar ( $\beta = -0.052$ ,  $p < 0.001$ ). Exclusion of 16 (9.0%) ET cases and 27 (5.1%) controls with DSM-IV-diagnosed dementia did not change the results (for fully adjusted model,  $\beta = -0.052$ ,  $p < 0.001$ ). Further exclusion of 10 (6.2%) ET cases and 19 (3.8%) controls who were taking an antidepressant medication did not change the results (for fully adjusted model,  $\beta = -0.046$ ,  $p = 0.002$ ).

The PGCMS score did not differ in ET cases who had vs. did not have a family history of ET, or in ET cases who did vs. did not take a medication to treat ET. The PGCMS score was not correlated with tremor duration (Spearman's  $r = 0.04$ ,  $p = 0.59$ ).

The PGCMS score was  $8.08 \pm 3.90$  among 13 ET cases taking antidepressant medication vs.  $9.51 \pm 3.13$  among 164 ET cases not taking these medications (Mann Whitney  $z = 1.22$ ,  $p = 0.22$ ). Among controls, these scores were  $8.74 \pm 3.18$  vs.  $10.46 \pm 2.90$ , Mann Whitney  $z = 2.30$ ,  $p = 0.02$ .

Data on tremor severity were not available; however, a number of the ET cases had not been diagnosed with ET prior to this study. We used this variable (new ET diagnosis vs. prior ET diagnosis) as a proxy for tremor severity; in an analysis in which we compared 37 ET cases with new vs. 140 ET cases with prior ET diagnoses, the PGCMS scores did not differ ( $8.81 \pm 2.97$  vs.  $9.56 \pm 3.26$ , Mann Whitney  $z = 1.36$ ,  $p = 0.17$ ).

While all ET cases had a tremor of duration of 1 or more years, in 47 (26.6%), it was  $< 3$  years. When we excluded these 47, the PGCMS score in the remaining 130 ET cases was  $9.59 \pm 3.25$ , which was lower than that of controls (Mann Whitney  $z = 2.54$ ,  $p = 0.01$ ).

## Discussion

We demonstrated that morale was lower in community-dwelling ET cases than in matched counterparts without ET. Furthermore, the lower morale was related to ET as we controlled for a variety of confounding comorbid medical conditions. Even after excluding study participants who were taking antidepressant medications, morale was lower in ET cases than controls.

This lower morale could in part be a proxy for mild, untreated depression. It would therefore seem important to detect and possibly treat this problem to improve the psychological well-being of patients with this disease. We compared ET cases who were taking antidepressants to ET cases who were not taking these medications. Interestingly, the morale was lower among the ET cases who were taking antidepressants. Patients who take antidepressants often have only partially treated depression, which may explain these results.

Our results also suggest that mood disturbance is not entirely responsible for the observed lower morale in ET. Morale scores were lower in ET cases than in controls even after stratifying by antidepressant use (i.e., morale scores trended to be lower in ET cases taking antidepressants vs. controls taking antidepressants, and morale scores also trended to be lower in ET cases who were not taking antidepressants vs. controls who were not taking antidepressants), which suggests that the lower morale may not be completely due to an underlying mood disturbance.

Morale is one aspect of quality of life, which can include physical function, pain, and general health as well as energy, social function and mental health. There are limited data on health-related quality of life in ET. These studies, however, have been for the most part in highly-selected ET patients with severe medically-refractory tremor who were undergoing tremor surgery.<sup>22, 23</sup> Apart from these surgical series, there have been two studies of quality of life in ET.<sup>24, 25</sup> In one of these studies,<sup>24</sup> clinic patients with ET were compared to a group of historical controls and quality of life was lower in the clinic patients, with both physical and mental domains seemingly affected by ET. There has been only one prior community-based study of quality of life in ET; in that study, a small sample of 34 ET cases and 34 matched controls were compared using the Rand-SF36, a different instrument than the one we used in this study.<sup>25</sup> The investigators demonstrated poorer overall quality of life in ET cases than controls, but cases had more co-morbidity (e.g., diabetes, osteoarthritis) than controls and these potential confounders were not adjusted for in the analyses.<sup>25</sup> Scores were slightly lower in

ET cases in the social function and emotional well-being domains, yet the sample size limited the power of these analyses to detect case-control differences in these domains.<sup>25</sup>

In previous studies, it has been suggested that PGCMS scores  $\leq 9$  are consistent with low morale.<sup>19</sup> In the current sample, nearly one-half of the ET cases were classified as having low morale compared with only one-third of controls, indicating that low morale is a common feature in ET cases. Moreover, the current cases were largely un-medicated, community-dwelling ET cases; one would expect even lower morale among cases ascertained from treatment centers.

Of the three PGCMS subscores, the agitation and lonely dissatisfaction subscores were the most affected by ET. Despite the fact that ET is often viewed solely as a disorder of aging, ET cases generally expressed only mild, non-significant concerns about their aging.

This study had limitations. We used a geriatric questionnaire aimed at assessing morale rather than an ET-specific quality of life questionnaire. Recently, a 30-item ET-specific quality of life questionnaire was developed;<sup>26</sup> it post-dated our study. This study also had considerable strengths. We sampled ET cases from communities, thereby avoiding the types of biases that occur when sampling medical or surgical patients and who are likely to be self-selected for lower morale or a poorer sense of well-being. The effect of ET on morale that we estimated should be viewed as a conservative estimate; presumably, clinic-based studies would find even greater effects. The study design also allowed us to assess morale in parallel in three separate Spanish communities. Finally, we were able to consider a variety of confounding comorbidities and adjust for these in our analyses in order to distinguish the impact of ET from that of other medical conditions.

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**Table 1**  
Demographic and clinical characteristics of ET cases and controls

	ET Cases (N = 177)	Controls (N = 531)
Age in years	76.6 ± 6.2	76.1 ± 6.2
Female gender	108 (61.0%)	317 (59.7%)
Education		
Illiterate	33 (18.6%)	59 (11.1%)
Can read and write	70 (39.5%)	221 (41.6%)
Primary studies	54 (30.5%)	183 (34.5%)
≥Secondary studies	20 (11.3%)	68 (12.8%)
Ever cigarette smoker	55 (31.1%)	192 (36.2%)
Diabetes	34 (19.4%)	98 (18.7%)
Hypertension	87 (49.7%)	267 (50.6%)
Heart disease	23 (13.1%)	54 (10.2%)
Chronic obstructive pulmonary disease	45 (25.4%)	120 (22.6%)
Arthritis	128 (72.3%)	372 (70.1%)
Hip fracture	12 (6.8%)	33 (6.2%)
Hearing difficulty	82 (46.3%)	211 (39.7%)
Visual problems	131 (74.0%)	416 (78.3%)

All  $p > 0.05$  comparing ET cases to controls (t tests,  $X^2$  tests, ANOVA).

In some cells, there are missing data so that the total number of participants does not add up to 177 for ET cases or 531 for controls.



**Table 2**

PGCMS score by demographic factors and comorbid conditions (in controls)

	Condition present	Condition absent
Female gender	10.03 ± 3.08 <sup>***</sup>	10.93 ± 2.59
Education = illiterate	9.36 ± 3.21 <sup>**</sup>	10.52 ± 2.86
Ever cigarette smoker	10.89 ± 2.42 <sup>**</sup>	10.11 ± 3.14
Diabetes	10.04 ± 3.07	10.47 ± 2.89
Hypertension	10.15 ± 3.10 <sup>*</sup>	10.65 ± 2.70
Heart disease	9.81 ± 3.29	10.44 ± 2.87
Chronic obstructive pulmonary disease	10.01 ± 3.19	10.51 ± 2.84
Arthritis	9.98 ± 2.97 <sup>****</sup>	11.37 ± 2.58
Hip fracture	9.91 ± 3.44	10.43 ± 2.89
Hearing difficulty	10.33 ± 2.89	10.43 ± 2.95
Visual problems	10.27 ± 3.02	10.83 ± 2.49

\* p &lt; 0.10,

\*\* p &lt; 0.05,

\*\*\* p &lt; 0.01,

\*\*\*\* p &lt; 0.001 comparing condition present to condition absent (Mann Whitney test).

**Table 3**

PGCMS scores in ET cases and controls

	ET Cases (N = 177)	Controls (N = 531)
PGCMS Score	9.41 ± 3.21 (10) ***	10.39 ± 2.92 (11)
Lista (N = 218)	9.21 ± 3.29 **	10.69 ± 2.95
Arévalo (N = 282)	9.64 ± 3.27	10.06 ± 2.83
Las Margaritas (N = 208)	9.30 ± 3.12 **	10.54 ± 3.01
Agitation Subscore	3.17 ± 1.71 (3) ***	3.78 ± 1.67 (4)
Little things bother me more this year	0.51 ± 0.50 *	0.60 ± 0.49
I sometimes worry so much that I can't sleep	0.45 ± 0.50 *	0.54 ± 0.50
I am afraid of a lot of things	0.67 ± 0.47 ***	0.81 ± 0.39
I get mad more than I used to	0.59 ± 0.49 *	0.68 ± 0.47
I take things hard	0.41 ± 0.49 **	0.53 ± 0.50
I get upset easily	0.54 ± 0.50	0.62 ± 0.49
Lonely Dissatisfaction Subscore	3.75 ± 1.34 (4) *	4.02 ± 1.24 (4)
I sometimes feel that life isn't worth living	0.75 ± 0.44 **	0.84 ± 0.37
I have a lot to be sad about	0.56 ± 0.50	0.62 ± 0.49
Life is hard for me much of the time	0.63 ± 0.49 **	0.76 ± 0.43
I am satisfied with my life today	0.70 ± 0.46 *	0.78 ± 0.42
I feel lonely	0.29 ± 0.46	0.24 ± 0.43
I see enough of my friend and relatives	0.82 ± 0.38	0.79 ± 0.41
Attitude Toward Own Aging Subscore	2.49 ± 1.18 (2)	2.60 ± 1.10 (3)
Things keep getting worse as I get older	0.27 ± 0.45	0.34 ± 0.48
I have as much pep as I had last year	0.44 ± 0.50 *	0.55 ± 0.50

	ET Cases (N = 177)	Controls (N = 531)
As I get older I am less useful	0.63 ± 0.48 **	0.51 ± 0.50
As I get older things are better than I thought they would be	0.67 ± 0.47	0.72 ± 0.45
I am as happy now as when I was younger	0.47 ± 0.50	0.48 ± 0.50

All values are mean ± SD (median).

\*  
p < 0.05,

\*\*  
p < 0.01,

\*\*\*  
p < 0.001 comparing ET cases to controls (Mann Whitney test).

Each of the 17 questions is scored so that the value 0 indicates low morale and the value 1 indicates high morale. Hence, lower scores indicate lower morale and higher scores indicate higher morale.