

Emotion experience and frailty in a sample of Italian community-dwelling older adults

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Abstract: Frailty increases individual vulnerability to external stressors and involves high risk for adverse geriatric outcomes. To date, few studies have addressed the role of emotion perception and its association with frailty in aged populations. This cross-sectional study aimed to explore whether a significant association between frailty and emotional experience exists in a sample of Italian community-dwelling older adults. Our sample consisted of 104 older adults (age 76±8 years; 59.6% women) living in Piedmont, Italy. Frailty was measured using the Italian version of the Tilburg Frailty Indicator (TFI), and emotion perception was measured with the Positive and Negative Affect Schedule (PANAS). The Mini-Mental State Examination was used as a screening tool for cognitive functions (people with a score ≤20 points were excluded). One-way analysis of covariance (ANCOVA), adjusted for interesting variables, and post hoc tests were performed where appropriate. According to the TFI, 57.7% of participants resulted as frail. Analysis showed a significant greater severity of frailty in the low positive affect (PA) group compared to the high PA group. Similarly, those with high negative affect (NA) showed significantly higher levels of frailty than the low NA group. As expected, significant differences for frailty were also found among the groups composed of 1) people with high PA and low NA, 2) people with low PA or high NA, and 3) people with low PA and high NA. Post hoc tests showed a greater severity of frailty in the second and in the third groups compared to the first one. Lastly, robust participants aged >75 years showed higher levels of PA than the group aged between 60 and 75 years. These findings demonstrate that both PA and NA may influence frailty, giving new insights for the evaluation and prevention of frailty in older adults.

Keywords: emotion perception functional decline, frail individuals, Tilburg Frailty Indicator, analysis of covariance

Introduction

In affective and emotional experience, it is possible to recognize positive affect (PA) and negative affect (NA). The first reflects the condition in which the individual feels enthusiastic, active, excited, and determined; the second is a general dimension of subjective distress, including contempt, anger, disgust, guilt, fear, shame, and so on.¹ Tellenger² demonstrated that PA and NA correspond to extraversion personality factors and anxiety/neuroticism, respectively. The presence of positive emotions is a factor related to individual health and well-being, especially among older people. PA is strictly related to engagement in social activity, higher self-reported frequency of positive events in a person's life, higher perception of satisfaction, and good physical health.³⁻⁶ Furthermore, studies conducted in older adults found that PA was associated with lower disability in the execution of daily living activities,⁷ higher levels of mobility, good functional status, and major likelihood of survival at 2 years,⁸ as well as higher rate of recovery of functional status after a stroke.⁹ On the other hand,

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NA is correlated with stress sensations and poor coping abilities.¹⁰

Furthermore, according to the socioemotional selectivity theory (SST),¹¹ emotional experience improves with age because people come to appreciate and invest more effort in matters of life that are important to them. In other words, interpersonal relationships in older people are aimed at achieving emotional satisfaction and are carefully selected. The result of this behavior is that older people, being more selective in relationships, have more positive emotions.¹² Charles et al,¹³ when comparing groups of different ages, found that older adults have a stronger capacity to remember positive images and they were more inclined to process and remember positive information, with the resulting emotional content. This trend has been described by Carstensen and Mikels as a “positivity effect.”¹⁴

Regarding age-related problems, frailty is one of the most widely spread and disabling conditions. Frailty was present in 12.7%–44.6% of Italian older adults, depending on the index used.¹⁵ It increases individual vulnerability to external stressors and consequently increases certain negative health outcomes.^{16,17} Gobbens et al defined frailty as “a dynamic state affecting an individual who experiences losses in one or more domains of human functioning (physical, psychological, social)” on the basis of a biopsychosocial model.¹⁸ This view of frailty has recently gained more consensus as it conceives frailty as a multidimensional condition.^{19,20} Gobbens et al¹⁸ believe that frailty affects physical, psychological, and social domains of human functioning.

However, the role of affectivity in relation to frailty has not been widely investigated in the literature. To the best of our knowledge, only two studies demonstrated that PA reduced the risk for frailty in older adults who were not frail at baseline.^{21,22} However, those authors used a physical conceptualization of frailty, excluding psychological and social components of frailty, and they analyzed exclusively the role of PA in relationship with frailty, evaluating PA with four positive items of the Center of Epidemiologic Study Depression Scale. Within this picture, there is a need to learn more about the association of affectivity and frailty, considering affectivity as combination of PA and NA, and frailty as a multidimensional construct. The first hypothesis of our study is that PA and NA may affect frailty condition, with a greater severity of frailty condition in individuals with low levels of PA or high levels of NA. Our second hypothesis sustains that PA, on the basis of SST, increases with the advancement of age in robust individuals, while it remains constant, or worsens, in frail individuals. The present study aimed to investigate the existence of a significant association between

affectivity and frailty in a sample of Italian community-dwelling older adults. The following specific objectives will be pursued: 1) to evaluate differences in frailty – including physical, psychological, and social domains – among groups of individuals with different levels of PA, NA, and total emotion perception, 2) to test differences in PA between groups of differing ages and on the basis of frailty condition.

Materials and methods

Study population and procedures

This preliminary study, part of a larger research project carried out by the University of Turin, aimed to investigate the living and health conditions of older adults in Piedmont, Italy. The study was approved by the Bioethical Committee of the University of Turin. Participant recruitment was done through direct contact between the project coordinator and the available senior associations (N=5) located in Piedmont. To explain the aims and to answer any questions about the study, a preliminary meeting was organized with each association. The participants did not receive any reward or compensation for their participation. In accordance with the Italian laws and the Code of Ethics of the American Psychological Association,²³ participants read and signed the informed consent form that described the aims and the methodology of the research.

In total, 175 people were contacted, of whom 67 (38.3%) did not wish to participate and 4 (2.3%) did not meet the inclusion criteria of the study. A final sample of 104 participants (59.4%) took part in this study. Participants were recruited if they satisfied the following criteria: 1) they were aged >60 years, 2) they were able to understand and speak Italian, 3) they had a Mini-Mental State Examination (MMSE) score ≥ 21 points,²⁴ 4) they lived in their home and not in residential care facilities. Participants were excluded from the study if they had acute health problems in the previous month, such as a stroke, surgical operation, fractures, and so on.

The cognitive test and questionnaires were administered in the senior associations by two trained psychologists. First, the cognitive test was administered, followed by the self-report questionnaires that were filled out autonomously. About 15 minutes was required to complete the questionnaires. If necessary, the psychologist helped the older adults fill out the questionnaires, reading and explaining each item. Data collection was carried out between the months of March and June 2016.

Measures

Emotions were investigated using the Positive and Negative Affect Schedule (PANAS).²⁵ PANAS is a self-report

questionnaire designed to investigate positive and negative emotions during the past weeks. It is composed of 20 items, 10 of which are positive adjectives and the other 10 are negative adjectives. The positive adjectives refer to positive emotions such as determined, excited, strong, proud, and so on, while the negative adjectives refer to negative emotions such as distressed, frightened, irritable, disturbed, and so on. The individual must evaluate each emotion with a score from 1 (for nothing) to 5 (very) based on how he/she identifies in reference to that emotion in the past few weeks. The factorial structure of the test assumes two factors, which correspond to the two subscales (PA and NA); they are to be considered independent from each other. Therefore, for each subscale, the score can range between 10 and 50.¹ Reliability and validity of PANAS have been previously tested in aged people.^{26,27} Studies have found a slight correlation between the positive and negative subscales independently from age, but the two dimensions can still be considered independent.²⁷ In this study, we used the Italian version of PANAS validated by Terraciano et al.²⁸ The coefficient of consistency between the original version and the Italian one was 0.98.²⁸ In our study, the PANAS positive and negative scales showed a reliability of 0.90 and 0.88, respectively. Following the procedure described by Garcia et al.,²⁹ participants were divided, using the median value of the PA scale, into two groups of similar size, namely, high PA if they obtained a score >36 points and low PA if they had a score ≤36 points. Similarly, using the median value of the NA subscale, participants were divided into low NA if they received a score <17 and high NA if they received a score ≥17. At the end, a new categorical variable related to total emotion perception was created using the following criteria: the first group included people with high PA and low NA (called self-fulfilling), the second included those with low PA and low NA (defined as low affective) or high PA and high NA (called high affective), and the third included those with low PA and high NA (defined as self-destructive), on the basis of scientific evidence.^{29–31} In this study, low affective and high affective groups were combined in order to ensure a sufficient sample size for the analysis.

Frailty was measured using the Italian version of the Tilburg Frailty Indicator (TFI).^{32,33} The TFI is a self-report questionnaire composed of two parts: part A consists of 10 questions that investigate the determinants of frailty (gender, age, marital status, level of education, lifestyle, etc) and part B consists of 15 items that investigate frailty belonging to three domains of human functioning: physical, psychological, and social. The physical domain consists of eight questions related to physical activity, unexplained weight loss, difficulty in walking and balancing, hearing and vision problems, loss of

strength in hands, and physical tiredness. The psychological domain includes four items about cognition, depressive symptoms, anxiety, and coping. Finally, social domain consists of three questions concerning living alone, social relationships, and perceived social support. Eleven questions from part B have two categories of answer choices: “yes” and “no,” while the other includes three: “yes,” “sometimes,” and “no.” All of the items were dichotomized in 0 and 1. The total score of the TFI is between 0 and 15. Scores range from 0 to 8 for the physical domain, from 0 to 4 for the psychological domain, and from 0 to 3 for the social domain. Higher scores correspond to a more serious frailty status. The cut-off value that distinguishes frail from robust individuals is 5.³³ A Cronbach’s α of 0.72 was obtained in the present study.

Finally, cognitive functioning was evaluated using the MMSE.³⁴ The MMSE investigates six mental functioning areas: orientation, recording, attention, re-evocation, language, and constructive praxis. The minimum score for this tool is 0 up to a maximum of 30 points. High scores correspond to better cognitive functions.

Statistical analysis

Data were processed using the Statistical Package for Social Sciences (SPSS), Version 24 (IBM Corporation, Armonk, NY, USA). Statistical significance level was fixed at $\alpha < 0.05$ for all tests. Descriptive statistics were conducted for all the variable of the study. Internal consistency of the scales was carried out using Cronbach’s α . Values of $\alpha \geq 0.70$ were considered acceptable.³⁵

In order to determine whether there were statistically significant differences in frailty (total frailty, physical frailty, psychological frailty, and social frailty) between individuals with different levels of emotion perception (high and low PA, high and low NA, and the total emotion perception), an analysis of covariance (ANCOVA), controlling for age and gender of participants, was performed. In total, 12 models based on ANCOVA were analyzed. For each statistically significant effect of the variable total emotion perception, the Bonferroni post hoc test was executed.

Finally, to test whether the positive emotional experience was statistically different between “young” older adults (60–75 years) and older adults (≥76 years), an ANCOVA controlling for gender was carried out on the total sample. The same two models based on ANCOVA were tested selecting exclusively robust participants followed by frail participants.

Results

The sample is composed of 104 older adults, of which 62 (59.6%) are females, with a mean age of 76 years (SD = 8;

range 61–95 years). Most of the participants were married (49.0%), were born in the Islands or in the South of Italy (65.3%), had a level of education corresponding to primary (34.6%) or secondary school (32.7%), and performed manual labor (55.7%). A large number of participants (52.9%) reported having one or more chronic disease. The mean MMSE total score was 26.7 (SD =2.6; range 21–30) points. With respect to frailty, the TFI reported a mean value of 5.36 (SD =2.96, range 0–12) points, with 57.7% of individuals in a condition of frailty. Considering the emotion perception, the PANAS-PA scale and the PANAS-NA scale showed mean values of 35.13 (SD =7.43; range 16–50) and 17.95 points (SD =6.96; range 10–43), respectively. The characteristics of the sample are summarized in Tables 1 and 2.

The ANCOVA, controlling for gender and age, reported differences in frailty according to levels of emotion perception. Specifically, significant differences were found between the high PA and the low PA groups for multidimensional frailty ($p=0.007$, adjusted $R^2=29.6\%$), physical frailty ($p=0.008$, adjusted $R^2=24.7\%$), and psychological frailty ($p=0.041$, adjusted $R^2=9.6\%$). In all the three models, the

Table 1 Characteristics of participants (N=104)

Variables	n (%)	Mean (SD)
Age, years		76 (8)
Gender, n (%) of female	62 (59.6)	
Marital status		
Married	51 (49.0)	
Not married	9 (8.7)	
Widowed	40 (38.5)	
Divorced	4 (3.8)	
Level of education		
No schooling	14 (13.5)	
Primary school, 5 years	36 (34.6)	
Secondary school, 8 years	34 (32.7)	
High school diploma, 13 years	13 (12.5)	
University degree, 18 years	7 (6.7)	
Past job, n (%) of manual workers	58 (55.7)	
MMSE		26.7 (2.6)
Chronic disease, n (%) of yes	55 (52.9)	
Lifestyle		
Healthy	54 (52.0)	
More or less healthy	43 (41.3)	
Unhealthy	7 (6.7)	
Life events, n (%) of yes		
Lost somebody close	39 (37.5)	
Serious disease	15 (14.4)	
Serious disease in some close relation	37 (35.6)	
End of important relationship	2 (1.9)	
Traffic accident	4 (3.8)	
Crime	9 (8.7)	
Satisfaction of housing environment, n (%) of yes	91 (87.5)	

Note: Higher scores of MMSE corresponded to a better cognitive status.
Abbreviations: SD, standard deviation; MMSE, Mini-Mental State Examination.

Table 2 Characteristics of participants on components of frailty and emotion perception (N=104)

Variables	n (%)	Mean (SD)
TFI		5.36 (2.96)
Physical TFI		2.66 (1.94)
Psychological TFI		1.66 (0.99)
Social TFI		1.03 (0.95)
Level of frailty*		
Frail persons	60 (57.7)	
Robust persons	44 (42.3)	
PANAS positive		35.13 (7.43)
PANAS negative		17.95 (6.96)

Notes: *Individuals with a score ≥ 5 were classified as frail. Higher TFI scores corresponded to severe frailty condition. Higher scores of the positive and the negative subscales of PANAS indicated higher perception of positive and negative emotion perceptions, respectively.

Abbreviations: SD, standard deviation; TFI, Tilburg Frailty Indicator; PANAS, Positive and Negative Affect Schedule.

low PA group showed a significant greater severity of frailty condition in comparison with the high PA group. No differences were found between high PA and low PA groups for social frailty ($p>0.05$) (Table 3, first five columns).

Similarly, the ANCOVA, adjusted for the same previous variables, revealed significant differences between the low NA and the high NA groups in terms of multidimensional frailty ($p<0.001$, adjusted $R^2=35.6\%$), physical frailty ($p=0.001$, adjusted $R^2=27.5\%$), and psychological frailty ($p<0.001$, adjusted $R^2=19.6\%$). In all the three models, the high NA group showed higher scores of frailty compared to the low NA group. There were no statistical differences between low NA and high NA groups for social frailty ($p>0.05$) (Table 3, last four columns).

Lastly, the ANCOVA analysis, controlled for the same previous variables, demonstrated the existence of significant differences among the three groups composed of 1) people with high PA and low NA, 2) people with low PA and low NA or high PA and high NA, and 3) people with low PA and high NA, for multidimensional frailty ($p<0.001$, adjusted $R^2=38.7\%$), physical frailty ($p<0.001$, adjusted $R^2=31.5\%$), and psychological frailty ($p<0.001$, adjusted $R^2=19.9\%$). No differences were detected among the three groups for social frailty ($p>0.05$). Specifically, post hoc tests revealed significant differences in terms of multidimensional, physical, and psychological frailty between the first (high PA and low NA) and the second (low PA and low NA or high PA and high NA) groups, as well as between the first (high PA and low NA) and the third (low PA and high NA) groups, with a greater severity of frailty condition in the second and in the third groups compared to the first one. No differences were

Table 3 Frailty condition based on positive and negative affect

Variables	Positive emotions				Negative emotions			
	High PA (n=52)	Low PA (n=52)	F(1,100)	p-value*	Low NA (n=51)	High NA (n=53)	F(1,100)	p-value*
Multidimensional frailty	4.25±2.76	6.46±2.76	7.64	0.007	4.06±2.80	6.60±2.96	17.76	<0.001
Physical frailty	1.98±1.64	3.35±2.00	7.42	0.008	1.94±1.84	3.36±1.80	11.56	0.001
Psychological frailty	1.38±1.09	1.94±0.80	4.31	0.041	1.24±0.95	2.08±0.85	17.25	<0.001
Social frailty	0.88±0.92	1.17±0.96	0.12	NS	0.88±0.89	1.17±1.00	0.59	NS

Notes: *Values based on ANCOVA, using gender and age of participants as covariates. Data represent mean ± SD.

Abbreviations: ANCOVA, analysis of covariance; high PA, high positive affect (score of PANAS-Positive subscale >36 points); low PA, low positive affect (score of PANAS-Positive subscale ≤36 points); low NA, low negative affect (score of PANAS-Negative subscale <17 points); high NA, high negative affect (score of PANAS-Negative subscale ≥17 points); NS, nonsignificant.

found between the second (low PA and low NA or high PA and high NA) and the third (high PA and low NA) groups (Table 4).

Another model based on ANCOVA, adjusted for gender, was used to test the differences in positive emotion perception according to age groups. The model showed that there are no significant differences between “young” older adults (60–75 years) and older adults (>75 years) for perception of PA ($p>0.05$), when both robust and frail individuals were considered at the same time (N=104). On the contrary, when the same analysis was conducted on the group of robust participants (n=44), our results yielded significant differences ($p=0.017$), with higher levels of PA in the group of adults aged >75 years. No significant differences were found in terms of PA if the same model was tested in the group of frail participants (n=60) (Table 5).

Discussion

This cross-sectional research explored the role of emotion experience on the condition of frailty in a sample of older adults living in Italy. The purpose of this study was twofold. On the one hand, it analyzed the condition of frailty in groups with different levels of PA and NA; frailty was analyzed from a multidimensional, physical, psychological, and social point of view. On the other hand, it tested whether there

were differences in terms of PA in groups of individuals of different ages and on the basis of frailty condition.

Data on frailty prevalence obtained in this study are in line with the results of other surveys conducted on Italian aged populations,^{20,36} where pre-frail and frail older adults are larger than robust ones.

First, these findings demonstrate that both PA and NA may affect frailty condition. Specifically, individuals who experienced high PA presented a lower score of multidimensional, physical, and psychological frailty when compared to those who experienced low PA. Furthermore, people with low NA exhibited a reduced level of frailty in comparison with those with high NA. Taking into consideration the total emotion perception, results showed that the group who experienced high PA and low NA (self-fulfilling) had a significantly lower severity of multidimensional, physical, and psychological frailty condition in comparison with those who experienced low PA and/or high NA (low affective and high affective, self-destructive). Conversely, in our study, emotion perception did not affect social frailty. Consistent with these results, previous longitudinal studies demonstrated the protective role of PA on frailty.^{21,22} Those authors showed that increasing PA values at baseline, measured using four positive items of the Center of Epidemiologic Study Depression Scale, reduced the risk for physical frailty in older adults. It is possible to

Table 4 Frailty condition based on total emotion perception

Total emotion perception					
Variables	High PA and low NA (n=31)	Low PA and low NA or high PA and high NA (n=41)	Low PA and high NA (n=32)	F(2,99)	p-value*
Multidimensional frailty	3.10±2.34	5.76±2.63**	7.03±2.58**	12.38	<0.001
Physical frailty	1.35±1.40	2.88±1.81**	3.66±1.91**	9.50	<0.001
Psychological frailty	1.00±1.00	1.78±0.88**	2.16±0.77**	9.38	<0.001
Social frailty	0.74±0.86	1.10±0.94	1.22±1.01	0.282	NS

Notes: *Values based on ANCOVA, using gender and age as covariates. The values of multiple comparison were based on Bonferroni post hoc test: ** $p<0.05$ versus high PA and low NA group. Data represent mean ± SD.

Abbreviations: ANCOVA, analysis of covariance; high PA, high positive affect (score of PANAS-Positive subscale >36 points); low PA, low positive affect (score of PANAS-positive subscale ≤36 points); low NA, low negative affect (score of PANAS-Negative subscale <17 points); high NA, high negative affect (score of PANAS-Negative subscale ≥17 points); NS, nonsignificant.

Table 5 Positive affect based on different age group for all sample, robust people, and frail people

Variable	All sample (N=104)		Robust people (n=44)		Frail people (n=60)	
	Age ≤75 years (n=51)	Age >75 years (n=53)	Age ≤75 years (n=31)	Age >75 years (n=13)	Age ≤75 years (n=20)	Age >75 years (n=40)
PANAS-Positive	36.31±6.59	34.00±8.07	37.39±4.90	41.38±3.97	34.65±8.46	31.60±7.60
		1.54	NS		6.25	0.017
		F(1,101)		F(1,41)		F(1,57)
		p-value*		p-value*		p-value*

Notes: *Values based on ANCOVA, using gender as covariate. Data represent mean ± SD. Higher scores of the positive subscale of PANAS indicated higher perception of positive emotion perceptions. **Abbreviations:** ANCOVA, analysis of covariance; PANAS, Positive and Negative Affect Schedule; NS, nonsignificant.

suppose that PA and NA may act indirectly on different individual behaviors. For example, affectivity can have a key role in the adoption and/or maintenance of a physically active lifestyle,³⁷ development of creativity,³⁸ execution of cognitive tasks,³⁹ and in social experiences and interactions,⁴⁰ which are recognized as considerable risk factors for the onset of frailty. Furthermore, PA is also associated with a reduction of neuroendocrine, inflammatory (eg, lower levels of cytokine Il-6),⁴¹ and cardiovascular activity.⁴² The obtained results may have two important implications. On the one hand, they make it possible to provide empirical evidence to the multidimensional theorization and definition of frailty.^{17,43} In fact, it seems that a reduced level of PA and high level of NA may contribute to increases in the severity of frailty condition. In line with the view of frailty proposed by Gobbens et al in which psychological components are included,¹⁸ our results suggested that also emotion experience may be a useful construct to be taken into consideration in association with frailty condition. On the other hand, our findings may be a useful tool to increase the awareness of the important role of emotion experience in interventions for the prevention of frailty. For example, interventions of physical exercise or cognitive training associated with frequent experience of positive emotions may have a higher efficacy with respect to classical interventions.

Our results also demonstrated that robust individuals aged ≥76 years significantly improved their PA compared to the group aged between 60 and 75 years, supporting the SST and the “positive effect” of aged people mentioned by Carstensen et al.¹⁴ On the contrary, no age differences were found in frail participants in terms of positive emotions. Our results on robust participants are consistent with those obtained by Carstensen et al³ and Gross et al,¹² who noticed the most frequent presence of emotions such as happiness in seniors compared to young and adult people. The same tendency has also been observed in an Italian study conducted by Galati et al.⁴⁴ However, these studies involved older adults who were not characterized as frail. Therefore, it is possible to assume that frailty may seriously compromise the health status of the individual, limiting the perception of PA, and the increase of PA with advancing age.

Results of this study should be interpreted in light of several limitations. First, the sample size was small with some subgroups (eg, robust older adults aged ≥76 years, frail older adults aged ≤75 years) comprising a very limited number of participants. Furthermore, the recruitment of participants was done in a limited area of Italy and was not based on randomization or stratification strategies, making it impossible to generalize the results to the entire Italian aged population. A further

limitation concerns the cross-sectional design of this study, which did not allow for the analysis of trends of emotional experience and their impact on frailty condition. Also the use of self-report instruments with older adults could be seen as a study limitation, since self-reporting may be less accurate and more sensitive to cognitive impairment, level of education, and culture in comparison with performance-based assessment.^{45,46} Finally, the Italian version of the PANAS has been validated only on a sample of adult people. However, the original version of the instrument has been repeatedly used with older adults;^{27,47} therefore, it may be assumed that the Italian version preserves the same features as the original instrument, and consequently, it can be applied to aged people.

Conclusion

This study provides significant evidence on the association of both positive and negative emotion perception with frailty condition, giving new insights for the evaluation and prevention of frailty. Furthermore, results confirm the theory that proposes that positive emotions increases with the advancement of age in robust individuals. Due to these noteworthy limitations, our findings need to be deepened in the future with studies conducted on larger samples and longitudinally designed.

Disclosure

The authors report no conflicts of interest in this work.

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