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Affective Neuroscience and Sex Differences in the Relationship between Anger and Fear. If FEAR Increases, SEEKING and PLAY Decrease, in the Female Sample

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Abstract: Background. The possible interactions between anger and fear have not been widely explored in the psychological literature. Fear and anger are currently beginning to be studied by looking at their interrelationships, rather than seeing them as simply opposing emotions. Furthermore, there is a tendency to think that anger is more typical of men and fear of women. Our contribution proposes a particular perspective of affective neuroscience. The objectives of the study are: 1) To assess possible differences in affective systems, states and traits of anger in relation to biological sex; 2) To assess correlations between ANGER, FEAR and PANIC, state and trait anger in both a female and male sample; 3) To assess possible differences in basic affective systems in relation to different levels of ANGER, FEAR, and PANIC, state and trait anger, in sample of female and in sample of male. Methods. A non-clinical sample of 339 females and 99 males completed the ANPS 3.1 to assess basic affective states and the STAXI 2 to assess anger states and traits. Results. No significant differences were found for ANGER and FEAR scores and for state and trait scores between the male and female samples. Clear correlations emerged ($p < .01$) between FEAR. PANIC and FEAR in both the female and male samples. Among the differences that emerged in the affective systems, we emphasise that in the female group as FEAR increases, there are significant variations in systems of SEEKING, PLAY, and CARE. Furthermore, only in the female sample as PANIC increases, PLAY progressively decreases, and CARE shows an irregular trend. Discussion. Given the importance of the SEEKING and PLAY systems for well-being and equality gender the hypoactivation of these systems to increases in FEAR and PANIC highlights the need to monitor conditions that may trigger these affective systems.

Keywords: sex differences; basic affective systems; SEEKING; FEAR; ANGER; PANIC; PLAY; CARE; gender inequality

1. Introduction

Sex differences in Anger and Fear

There is a cultural prejudice, partly also scientifically endorsed, that connotes anger as more masculine and fear as more feminine.

Anger would be more frequent in males, humans would show a particular sensitivity to threatening stimuli, and emotions of anger; women would express less intense anger than men [1–3] and men show a unique sensitivity to threatening stimuli, that is, to stimuli with angry emotions [4,5].

Brody et al. (1995), evaluating the changes in the developmental period from childhood to adulthood, found in the adult sample, women tended to report more anger than men [6] but even recent studies, with new methodologies, seem quite aligned with the most historical and cited research. In a eye-tracking study Zhang et al (2024) report that "men's total fixation duration and

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total fixation point number in angry emotions were significantly higher and greater than women's, indicating that men have a unique attention bias toward threatening stimuli" [7].

In general, various studies have shown that there are gender differences in neural networks for emotion processing [8.9]. and that men have greater right hemisphere lateralization and higher activation levels than women [10,11]

With regard to fear, several studies showed that females more fear than males do [6,10,12,13], recognise facial expressions of fear faster and more accurately than men [2,14] women also invest more attention and resources on the target of fearful emotion and can notice it earlier [7]. The most widespread interpretation is that women report more fear due to a vulnerability that would depend on physical characteristics, gender differences in neural networks for emotion processing and cultural aspects, i.e. due to their inferior status of power and socialisation pressures in which women learn to be 'the weaker gender'. According to Brody (1985) [6] therefore, fear is adaptive for women because, on an intrapersonal level, it can protect them from the consequences of male aggression by intensifying coping strategies and, on an interpersonal level, it can serve to minimise aggression or warn others, e.g. children, that they are not safe. Even twenty-five years later, the interpretation is not substantially different. Klein (2000) [15] also emphasizes the female advantages in identifying negative emotions for the survival of the self and the offspring and recognizes the role of parental investments in modulating responses to environmental threats to increase the survival of the self and the offspring. To think that being afraid is the best solution for a woman, who is in a condition of inferiority, may well be true, but it is the condition of inferiority that needs to be changed for gender equality. There are undeniable differences between women and men, but there are conditions of inferiority that are attributable to culture, not nature, and are therefore desirable to change.

Another underlying assumption, in our view questionable, is that anger is the alternative to fear and that the first is always preferable. From a relational point of view, the violent expressions of anger are precisely sustained by the intolerable perception of one's own vulnerability; anger, therefore, can be used in its transformative function, turning one who is actually a sheep into a lion, so to speak [16]; expressing anger does not therefore always mean being in condition of superiority, but sometimes being unable to tolerate not being so.

The Interactions between Anger and Fear

The possible interactions between anger and fear have not been widely explored in the psychological literature. In fact, the prevailing view is that anger and fear are alternative responses. Both fear and anger involve the processing of threat signals [17] but anger promotes action and attack [18–20] whereas fear induces flight or freeze responses. This seems to be true both in the micro-dimension of inter-individual relationships and in the macro-dimension of conflicts between nations [21].

From a brain perspective, there would be different activations: anger activates a large cortical network [22] whereas fear is more related to the amygdala and subcortical circuits [23,24]. Furthermore, anger and fear responses to stress have different biological profiles, with anger being associated with a greater associated increase in cortisol, whereas fear responses are associated with an increase in pro-inflammatory cytokines [25].

However, there are also divergent contributions from fields as diverse as philosophy [26], neurology and medicine [27–29], psychology and psychopathology [30–32]. Anger and fear have also been studied in cases of traumatic experiences: the development of fear-based psychopathological forms triggered by trauma exposure also leads to changes in anger, such as excessive trait anger, anger expression and anger control deficits [30,31]. Marshall et al. (2018) [32] found a positive association between trauma exposure, fear, anger, intimate partner aggression (IPA) and parent-child aggression (PCA), but also differences related to gender and parental role.

This Study

Our contribution fits into the theoretical framework of affective neuroscience and thus sees fear and anger as part of the basic affective systems. Electrical brain stimulation has identified seven

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affective systems located in primitive subcortical regions of the brain that are anatomically, neurochemically, and functionally homologous in all mammals. They are ancestral tools for living - evolutionary memories encoded in the genome in approximate form (as primary brain processes), which are subsequently refined by basic learning mechanisms (secondary processes) and higher-order cognitions/thoughts (tertiary processes). Anger and fear are therefore both useful emotions for our survival, even though we may feel them painfully. We cannot say that one is better than the other; both are present in males and females, and both require an adaptive response for good health.

The basic affective systems are intrinsic values that inform how we proceed in the pursuit of survival, i.e. they are 'built-in tools for survival', signalling whether we are in 'comfort zones', i.e. conditions that support survival, or in 'discomfort zones', indicating the presence of conditions that may compromise survival [33–35].

In a healthy condition, all affective systems have had an adequate response; on the contrary, in a condition of distress or psychopathology there may be hyperactivation of one system or hypoactivation of another.

In a health perspective we can then consider relevant not only to consider the differences, if any, between anger and fear, in women and men, but it seems more meaningful to us to consider the state of well-being, that is, to consider what happens to the other basic affective systems. Indeed, we believe that the activation of other affective systems can not only modulate the expression of anger and fear, but also allow us to hypothesise the implications and (clinical) consequences of certain activations.

Another element of interest in this approach is the identification of the PANIC system, which can give rise to emotions and behaviours that may be superficially coded as fear, but which it is important to differentiate. FEAR requires as an appropriate response distancing from the source of the fear, PANIC has to do with the fear of abandonment and this fear is therefore responded to by approaching, by seeking/waiting for the caregiver.

The box (Table 1) shows the salient features of the different affective systems [35].

Basic emotional systems	**Characteristics**
CARE	We need to take care of others, especially the little ones, and especially our own offspring. It controls responses associated with nurturing behaviors and feelings and with the development of interpersonal relationships.
SEEKING	We feel the need to engage in searching for something, facing the problems that the world poses: all our biological appetites (including bodily needs such as hunger and thirst) can only be satisfied in the world. This is a foraging or searching instinct. It is perceived as interest, curiosity and similar. It stimulates activities related to the exploration of the world, interest in reality, and seeking and anticipating positive experiences
LUST	We feel the need to turn to sexual partners. This is perceived as sexual desire and arousal (sensuality).
PLAY	It is the medium through which one experiences the delimitation of one's territory and its defence, through which social hierarchies are formed and where boundaries are formed and maintained within and outside the group It controls responses related to social adaptation, formation of social patterns, and prosocial attitudes.
PANIC/SADNESS	We feel the need to remain safe because of the presence of a caregiver (which is then internalised). Separation from attachment figures is initially perceived as agitation (protest) and later their loss is felt as despair. Expected state: my caregiver must be available and attentive to me.
FEAR	We feel the need to escape from (or paralyse ourselves during) threatening situations. Expected state: nothing should threaten my life and body.
ANGER/RAGE	We feel the need to attach and get rid of frustrating objects (things that stand between us and the satisfaction of our needs). Expected state: nothing should come between me and the satisfaction of my needs

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The aims of the study are:

1) To assess possible differences in affective systems, state, and trait anger in relation to biological sex.

2) To assess correlations between ANGER, FEAR and PANIC, state, and trait anger in both a female and a male sample.

3) To assess possible differences in basic affective systems in relation to different levels of state and trait anger scores, ANGER, FEAR and PANIC, in female and male sample, in non-clinical setting.

For the purposes of the research, also considering the theoretical framework of affective neuroscience, we have chosen to use the male/female division, but we are aware that this division is a dichotomous construct, based on a binary economy of mental simplification of the objects of the world. We specify that we asked the subjects in the sample to indicate sex and not gender. "Gender interacts with sex but is different from it, which refers to the different biological and physiological characteristics of females, males and intersex persons, such as chromosomes, hormones and reproductive organs. Gender and sex are related but different from gender identity." [36].

2. Materials and Methods

The study was approved by the Provincial Ethics Committee of Brescia with n°3676 and by the Director General of the Municipality of Brescia.

The questions were proposed to the employees of the municipality of Brescia, anonymously, through access to a link for compilation. The sending of the link was preceded by a letter written by the researcher introducing the project and providing an e-mail and telephone number for further clarification, as well as a signed letter from the Director General inviting the employees to participate.

Inclusion criteria: to be between 20 and 68 years of age, to have no outstanding criminal convictions for violent crimes, to be in a sufficiently good psycho-physical condition. The last two conditions were implied if the subjects were able to work. Age was also requested when filling in the questionnaires

The subjects gave their informed consent in digital form.

2.1. Instruments

ANPS 3.1

The Affective Neuroscience Personality Scale, first published by Davis, Panksepp and Normansell in 2003 [37], and revised by Davis and Panksepp in 2011 [38], is a rating scale for basic affective states. The authors of the scale aimed to access personal feelings and behaviors rather than more cognitive social judgments [28,37]. and consider the ANPS an instrument for indirectly assessing one's emotional nature in the context of personality. Davis and Panksepp [38] claimed to interpret the ANPS scales as tertiary (thought-mediated) approximations of the influence of various primary emotional systems in people's lives. ANPS 3.1 is the most recent version of Panksepp and Davis [39]. This scale was translated into Italian by two researchers, with the permission of its author (Ken Davis, the only living author); the versions were compared to arrive at a final version, which was submitted to an English-speaking expert and compared with the English version. Responses on a 5-point Likert scale indicate the degree of agreement or disagreement with the statements proposed.

The ANPS assesses six primary emotions (excluding LUST) with 14 items each; there are also 12 additional items assessing spirituality, which are not included in this study. The scale also assesses (social) dominance and social anxiety. These are not the basic affective systems, so unlike the six primary emotions, which must be written in upper case letters, they appear in lower case letters. Examples of items are: "Almost any small problem or puzzle stimulates my interest" (SEEKING); "I often worry about the future" (FEAR); "I often feel a strong need to take care of others" (CARE); "When I am frustrated, I usually get angry" (ANGER); "I am known as someone who makes work fun" (PLAY); "I tend to think a lot about losing loved ones" (PANIC). In our sample, the Cronbach's alpha values are as follows: SEEKING 0.7067; FEAR 0.8719; CARE s0.7565; ANGER 0.8197; PLAY

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0.8246; PANIC 0.784. Literature data are confirmed, both regarding previous Italian versions [40,41] and translations in other European and non-European languages [42].

STAXI-2

The STAXI-2 [43] is a self-report scale that assesses anger as an emotional state of varying intensity. It consists of 57 items divided into 6 subscales (trait anger, state anger, internal/external anger expression, external/internal anger control) and 5 subscales and an anger expression index. Specifically, state anger (15 items) measures the intensity of feelings of anger and the extent to which a person is likely to express anger at a given time; whereas trait anger (10 items) measures the frequency with which feelings of anger are experienced to an excessive degree. In the manual adapted to the Italian population [44], Cronbach's alpha is 0.84; in our sample, Cronbach's alpha is 0.865.

2.2. Sample

The sample consists of 428 adult subjects.

In the demographic data, participants were asked to indicate their biological sex; there were no people who refused to answer the question or who entered other specifications.

The male sample consisted of 99 subjects; the age range was 24-64 years, with μ = 49.10 and SD = 9.25. In terms of education, 53.5% of the sample had completed high school and 41.4% had completed university. 56.6% have children. In terms of occupation, the largest proportion (35.4%) are administrative and cultural officers, followed by 30.3% police officers and 20.2% professionals. Managers make-up 4% of the male sample.

The female sample consisted of 339 respondents; the age range was 22-65 years, with μ = 47.22 and SD = 9.74. 62.8% have children. In terms of education, 39.5% of the sample had completed secondary school and 56.6% had a university degree. With regard to their occupation, the majority (48.7%) work in administration and cultural services, one fifth (20.1%) are kindergarten or nursery schoolteachers, 12.4% are social workers, minorities work as police officers (5.3%), as professional and technical workers (5.9%) or as labourers, drivers (3.5%). 3.2% of women are in managerial positions.

2.3. Statistical analysis

Data were described as frequencies, medians, arithmetic means, and standard deviations. Given that the scales are not interval scales and that the sample size was not always large, the use of non-parametric tests was preferred. The Mann-Whitney test, and Kruskal- Wallis were used to assess the differences between the independent variables; the ANOVA test was used only on the whole sample to ensure greater robustness of the analysis; Spearman's correlation coefficient was used to measure the relationship between the variables analysed. The level of significance used in the analyses was $p< 0.05$. All statistical calculations were carried out using IBM SPSS Statistics version 26.

3. Results

3.1.1

A first starting point is to assess the differences between the affective systems in relation to sex. The distribution of scores according to biological sex differs for the following emotions: CARE [F (1-436) = 37.65, p = .000] PANIC [F (1-436) = 16.95, p = .000], (Social) Dominance [F (1-436) = 5.79, p = .017], Social Anxiety [F (1-436) = 9.24, p = .003]. No significant differences were found for ANGER and FEAR. Tables 2 and 3 show the means, standard deviations, and medians of the differentiated primary and secondary affective systems for women and men.

Table 2. Means, standard deviations, and medians of primary affective systems in the female sample, and male sample.

Sex		SEEKING	FEAR	CARE	ANGER	PLAY	PANIC
Female	N	339	339	339	339	339	339

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	Mean	45,83	37,58	45,51	29,47	38,32	37,45
	SD	6,658	9,443	7,354	8,926	8,177	7,594
	Median	46,00	37,00	46,00	30,00	37,00	37,00
Male	N	99	99	99	99	99	99
	Mean	45,10	36,39	40,42	29,51	39,27	33,75
	SD	7,534	10,505	8,692	8,899	8,936	8,777
	Median	45,00	35,00	40,00	29,00	41,00	34,00
Total	N	438	438	438	438	438	438
	Mean	45,67	37,31	44,36	29,48	38,54	36,61
	SD	6,864	9,693	7,957	8,910	8,353	8,018
	Median	46,00	37,00	45,00	29,00	38,00	36,00

Table 3. Means, standard deviations, and medians of Social Dominance, and Social Anxiety in the female sample, and male sample.

Sex:		Dominance	Social anxiety
Females	N	339	339
	Mean	15,28	6,37
	Deviation std.	4,773	1,826
	Median	15,00	6,00
Males	N	99	99
	Mean	16,61	5,72
	Deviation std.	4,946	2,005
	Median	16,00	6,00
Total	N	438	438
	Mean	15,58	6,22
	Deviation std.	4,838	1,885
	Median	16,00	6,00

For anger, both state and trait, there were no statistically significant differences between the male and female samples.

3.1.2.

Regarding the second objective, there are clear correlations ($p < .01$) between FEAR. PANIC, and ANGER, in both the female and male samples, but with differences in the magnitude of the correlations: the strongest correlation, in both women and men, is between FEAR and PANIC, but this correlation has a greater magnitude in women, while the correlations with ANGER have a greater magnitude in men than in women. On the STAXI-2, the correlations are significant, with a greater magnitude for the trait anger (Tables 4–6).

Table 4. Value of Spearman's correlation coefficient for ANGER, SADNESS, FEAR, State Anger, Trait Anger ($p < .01$).

	ANGER	**PANIC**	**FEAR**	**State Anger**
PANIC	,306**			
FEAR	,396	,629		
State Anger	,236	,164	,199	
Trait Anger	,570	.324	,334	.303

Table 5. Value of Spearman's correlation coefficient for ANGER, SADNESS, FEAR, State Anger, Trait Anger- (Female sample) ($p < .01$).

	ANGER	**PANIC**	**FEAR**	**State Anger**
PANIC	,293**			
FEAR	,360**	,652**		
State Anger	,207**	,168**	,146**	
Trait Anger	,570**	,295**	,316**	,300**

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Table 6. Value of Spearman's correlation coefficient for ANGER, SADNESS, FEAR, State Anger, Trait Anger- Male sample (p < .01).

	ANGER	PANIC	FEAR	State Anger
PANIC	,405**			
FEAR	,525**	,595**		
State Anger	,340**	,116	,346**	
Trait Anger	,576**	,387**	,378**	,290**

3.1.3

To better understand how FEAR, ANGER and PANIC may influence or be influenced by other affective systems, the female and male samples were divided into four groups according to quartiles of FEAR, ANGER and PANIC scores. The different groups were evaluated in terms of the scores for the different affective systems and, in the case of statistically significant differences, the groups that differed were identified. Tables 7 and 8 show the significant systems and pairwise comparisons in order of significance (p < .01- p < .05). Tables 9 and 10 show mean, median, and standard deviation of affective systems compared to the different quartiles of PANIC, and FEAR.

Table 7. Quartiles of ANGER and affective systems with statistically significant differences - Pairwise comparisons.

ANGER	FEAR	CARE	DOMINANCE	SOCIAL ANXIETY	PANIC
FEMALES	1-3 (p <.000) 1-4 (p <.000) 2-4 (p <.000) 2-3 (p <.012) 1-2 (p <.018)	3-1 (p <.008) 4-1 (p <.025)	1-4 (p <.000) 1-3 (p <.000) 2-4 (p <.002) 2-3 (p <.003)	1-4 (p <.004)	1-3 (p <.000) 1-4 (p <.000) 1-2 (p <.004) 2-4 (p <.011)
MALES	1-4 (p <.000) 2-4 (p <.001) 1-3 (p <.002)	4-1 (p <.008) 4-2 (p <.022)	1-4 (p <.000) 1-3 (p <.000) 2-4 (p <.005) 2-3 (p <.014)	1-4 (p <.000) 1-3 (p <.004) 1-2 (p <.045) 2-4 (p <.046)	2-4 (p <.004) 1-4 (p <.007) 2-3 (p <.007) 1-3 (p <.010)

Table 8. Quartiles of FEAR and affective systems with statistically significant differences - pairwise comparisons - Pairwise comparisons.

FEAR	PANIC	ANGER	DOMINANCE	CARE	PLAY	SOCIAL ANXIETY
FEMALES	1-3(p <.000) 1-4(p <.000) 2-4(p <.000) 3-4(p <.000) 1-2 (p <.001) 2-3(p <.001)	1-4 (p<.000) 1-2 (p <.006) 3-4 (p <.008) 1-3 (p <.011)		1-4 (p <.005) 2-4 (p <.012) 1-3 (p <.047)	4-1 (p <.009) 4-2 (p <.018)	1-4 (p <.000) 2-4 (p <.001) 1-3 (p <.002) 1-2 (p <.015)

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					3-4 (p <.017)
MALES	1-3 (p <.000) 1-4 (p <.000) 2-4 (p <.000) 1-2 (p <.007)	1-4 (p <.000) 1-3 (p <.002) 1-2 (p <.007)	1-3 (p <.000) 2-3 (p <.005) 1-4 (p <.006)		

Table 9. Quartiles of PANIC and mean, median, and standard deviation of affective systems (female sample).

PANIC QUARTILES		PANIC	SOCIAL ANXIETY	SEEKING	FEAR	CARE	ANGER	PLAY	DOMINANCE
1,00	N	21	21	21	21	21	21	21	21
	Mean	22,48	5,24	48,14	26,81	40,90	23,14	42,33	13,48
	Median	25,00	6,00	47,00	24,00	43,00	23,00	43,00	13,00
	SD	3,741	1,641	6,430	8,261	8,018	9,707	7,227	4,862
2,00	N	32	32	32	32	32	32	32	32
	Mean	31,03	5,91	44,19	34,72	38,78	29,31	38,38	15,69
	Median	31,00	6,00	44,00	32,50	39,50	29,00	39,00	16,00
	SD	1,710	1,766	6,552	5,898	5,843	7,950	7,483	4,437
3,00	N	22	22	22	22	22	22	22	22
	Mean	36,68	5,82	43,41	39,32	38,41	31,18	38,00	19,73
	Median	36,00	6,00	42,50	38,50	39,00	30,00	39,00	19,50
	SD	1,710	1,817	5,987	6,616	7,623	7,648	7,543	4,675
4,00	N	24	24	24	24	24	24	24	24
	Mean	44,54	5,79	45,21	44,33	44,04	33,79	38,96	17,71
	Median	41,50	6,00	46,00	44,50	41,00	34,00	40,50	17,00
	SD	3,259	1,786	7,473	8,075	7,586	9,167	9,981	5,195

Table 10. Quartiles of FEAR and mean, median, and standard deviation of affective systems (female sample).

FEAR QUARTILES		FEAR	SEEKING	CARE	ANGER	PLAY	SADNESS	DOMI NANCE	SOCIAL ANXIETY
1	N	74	74	74	74	74	74	74	74
	Mean	25,42	48,14	46,30	24,73	41,38	30,76	14,53	5,31
	Median	27,00	48,00	48,00	23,00	41,00	31,00	15,00	5,00
	SD	4,233	6,528	7,561	8,740	8,309	6,031	4,863	1,735
2	N	102	102	102	102	102	102	102	102
	Mean	34,07	45,50	43,75	29,34	38,71	35,60	15,66	6,18
	Median	34,00	45,00	44,00	29,00	39,00	35,00	16,00	6,00
	SD	1,976	6,133	6,481	7,838	7,321	5,175	4,513	1,662
3	N	82	82	82	82	82	82	82	82
	Mean	40,29	45,62	45,09	29,98	37,93	38,82	15,43	6,67
	Mediana	40,00	45,00	45,00	31,00	37,00	38,50	15,00	7,00
	SD.	1,746	7,116	7,273	8,819	7,601	6,112	4,659	1,641
4	N	81	81	81	81	81	81	81	81
	Mean	50,36	44,36	47,43	33,47	35,46	44,52	15,36	7,26
	Median	49,00	45,00	48,00	34,00	36,00	45,00	15,00	7,00
	SD	5,192	6,508	7,829	8,566	8,719	6,366	5,122	1,773

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Totale	N	339	339	339	339	339	339	339	339
	Mean	37,58	45,83	45,51	29,47	38,32	37,45	15,28	6,37
	Median	37,00	46,00	46,00	30,00	37,00	37,00	15,00	6,00
	SD	9,443	6,658	7,354	8,926	8,177	7,594	4,773	1,826

For both women and men, increasing levels of ANGER correspond to parallel increases in FEAR; also PANIC, Dominance, Social Anxiety have the same consonant trend with ANGER. The CARE System, on the other hand, shows the opposite trend, decreasing as anger increases. ANGER therefore seems to involve the same affective systems and in the same direction, regardless of biological sex.

Increased levels of FEAR are matched by similar changes in systems ANGER, Social Dominance, PANIC and Social Anxiety scores for both women and men. Some systems show significant differences only in the female groups: if FEAR increases, SEEKING, and PLAY decrease. CARE decreases from group 1 to 2 and then has a increase.

Looking at the groups differentiated by PANIC scores, there is a gradual increase in FEAR and ANGER in both males and females. It is interesting to note that only in the male groups is there a parallel increase in Dominance, but only up to group 3; a further increase in PANIC (group 4) corresponds to a slight decrease in Dominance scores. Regarding PANIC, it can also be observed that in the female sample there is a significant difference between the CARE and PLAY scores, which show a divergent trend between them: PLAY progressively decreases and CARE decreases from groups 1 to 3 and then has a significant increase.

For the state of anger, comparing samples with scores below or above the 50th percentile, the differences between the sexes are confirmed. Male subjects with higher scores in the state of anger also have higher scores in FEAR ($p = .011$), in ANGER ($p = .020$). In the female sample, on the other hand, the affective systems that show significant differences are ANGER ($p = .006$), SEEKING ($p = .047$), PLAY ($p = .025$), PANIC ($p = .009$), and Social Anxiety ($p = .013$).

With regard to the trait Anger, FEAR was statistically significant ($p = .000$), in the female sample but not in the male sample ($p = .060$), while the other systems that show significant differences are the same for males and females: ANGER (females $p = .000$; males $p = .000$), PANIC (females $p = .000$, males $p = .008$), Social Dominance (females $p = .010$, males $p = .003$), Social Anxiety (females $p = .019$, males $p = .034$) (Tables 11–14).

Table 11. Mean, median, and standard deviation of FEAR, ANGER, PANIC, Dominance, and social anxiety in groups with high and low Trait Anger scores (Female sample).

Trait anger groups		FEAR	ANGER	PANIC	DOMINANCE	SOCIAL ANXIETY
1	N	189	189	189	189	189
	Mean	35,94	26,16	35,97	14,62	6,16
	Median	36,00	26,00	36,00	15,00	6,00
	SD	8,975	8,238	7,356	4,088	1,792
2	N	150	150	150	150	150
	Mean	39,64	33,65	39,32	16,11	6,62
	Median	38,00	34,00	40,00	16,00	7,00
	SD	9,641	7,975	7,501	5,416	1,842
Total	N	339	339	339	339	339
	Mean	37,58	29,47	37,45	15,28	6,37
	Median	37,00	30,00	37,00	15,00	6,00
	SD	9,443	8,926	7,594	4,773	1,826

Table 12. Mean, median, and standard deviation of Social Anxiety, SEEKING, PLAY, PANIC, and ANGER in groups with high and low State Anger scores (Female sample).

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State anger groups		SOCIAL ANXIETY	SEEKING	PLAY	PANIC	ANGER
1	N	253	253	253	253	253
	Mean	6,22	46,25	38,89	36,74	28,72
	Median	6,00	47,00	39,00	36,00	29,00
	SD.	1,805	6,583	7,986	7,328	8,861
2	N	85	85	85	85	85
	Mean	6,76	44,71	36,85	39,47	31,73
	Median	7,00	45,00	36,00	39,00	31,00
	SD.	1,804	6,740	8,448	8,041	8,843
Total	N	338	338	338	338	338
	Mean	6,36	45,86	38,37	37,43	29,48
	Median	6,00	46,00	37,50	37,00	30,00
	SD	1,818	6,646	8,140	7,594	8,940

Table 13. Mean, median, and standard deviation of ANGER, PANIC, Dominance, and Social Anxiety, in groups with high and low Trait Anger scores (Male sample).

Trait anger groups		ANGER	PANIC	DOMINANCE	SOCIAL ANXIETY
1	N	58	58	58	58
	Mean	26,43	31,62	15,43	5,36
	Median	26,50	31,00	15,00	5,00
	SD	7,377	8,756	4,772	1,907
2	N	41	41	41	41
	Mean	33,85	36,76	18,27	6,22
	Median	34,00	35,00	18,00	6,00
	SD	9,131	7,977	4,759	2,056
Total	N	99	99	99	99
	Mean	29,51	33,75	16,61	5,72
	Median	29,00	34,00	16,00	6,00
	SD	8,899	8,777	4,946	2,005

Table 14. Mean, median, and standard deviation of ANGER, and FEAR in groups with high and low State Anger scores (Male sample).

Trait anger groups		ANGER	PANIC	DOMINANCE	SOCIAL ANXIETY
1	N	58	58	58	58
	Mean	26,43	31,62	15,43	5,36
	Median	26,50	31,00	15,00	5,00
	SD	7,377	8,756	4,772	1,907
2	N	41	41	41	41
	Mean	33,85	36,76	18,27	6,22
	Median	34,00	35,00	18,00	6,00
	SD	9,131	7,977	4,759	2,056
Total	N	99	99	99	99
	Mean	29,51	33,75	16,61	5,72
	Median	29,00	34,00	16,00	6,00
	SD	8,899	8,777	4,946	2,005

4. Discussion

Regarding sex differences in basic affective systems, the data from our sample only partially support what has been found in the literature. In the female sample, scores for the PANIC and CARE

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systems are higher than in the male sample, which is in line with what has been found in the literature, also considering studies on mammals, which demonstrate a genetic and hormonal basis (oxytocin and progesterone) for these differences. [39,45–51]. On the other hand, comparing the samples, there are no differences in the ANGER and FEAR systems. Regarding the ANGER system, its predominance in male humans would be supported by both anatomical and hormonal perspectives [34,45,52], but a recent review [53] surprisingly found no gender difference in 13 out of 15 countries, which led the authors to question the possible discrepancy between behaviour and self-reporting, as well as the complexity of this emotion. Our sample is therefore consistent with these new data. Furthermore, the lack of significant differences between male and female samples is also confirmed in the STAXI II data, both in terms of state and trait. Regarding the FEAR system, in the same review, in most North American and European countries, women show higher scores than men; in our sample, however, there is no statistically significant difference. We have already mentioned that there is an important genetic and hormonal component in the expression of affective systems, but there is also a cultural modulation [52]. We can observe that the CARE and PANIC systems are active in attachment relationships, which probably refer to situations in which there is still a substantial gender imbalance. In Italy, caring for children and the elderly is still characterized as a predominantly female task. It is therefore not unexpected to find higher scores in the female sample in our sample. ANGER and FEAR may perhaps be expressed in contexts in which sex differences are less marked; furthermore, the specific characteristics of the working environment must be considered. As a rule, employment in a municipality is associated with job security and non-stressful working conditions; on the other hand, the possibility of career advancement and the contestation/fight for job advancement are less strong. Furthermore, it should be added that highly competitive and eager to make their way people are more likely to choose larger private companies or more prestigious public institutions. It seems to us that the lack of differences between the female and male samples, with respect to FEAR and ANGER, can be interpreted partly as a sign of less cultural rigidity with respect to some gender differences, and partly as linked to the specific environmental and work situation.

As for the second objective, FEAR, PANIC, ANGER, state, and trait anger seem to be not so distant from each other. This is in line with the affective neuroscience literature, also considering Italian samples [39,40]. According to affective neuroscience, the affective systems FEAR, ANGER and PANIC have different anatomical localizations (RAGE: medial amygdala to bed nucleus of the stria terminalis (BNST), medial and periform, hypothalamus PAG; PANIC: anteriorcingulate BNST POA dorsomedial thalamus PAG; FEAR: central and lateral amygdala to medial hypothalamus and dorsal PAG) and different neuromodulators (RAGE: Substance P, acetylcholine, glutamate; PANIC: opioids, oxytocin, prolactin, corticotrophin releasing factor (CRF), glutamate; FEAR: glutamate, diazepan binding inhibitor (DBI), corticotrophin releasing factor (CRF), cholecystokin (CCK), alpha -MSH, neupeptide Y [54]. As can be seen, glutamate is a common chemistry in all three affective systems, but above all, all three relate to “negative affects” that, albeit in different ways, signal the organism to activate for its own protection. It is not surprising, therefore, that they are interrelated. Experience (learning) will then teach us which system should have priority in given circumstance and which behaviour to display. For example, it is not always useful to attack, even when we feel ANGER; if we are in a disadvantageous position, attacking would cause FEAR and it is, therefore, better to inhibit aggressive behaviour. PANIC system itself consists of an initial protest response, we might say anger, followed by a depressive phase of anxiety or fear of abandonment if reunion with the caregiver does not occur. We can also consider the case of paranoia, a particular type of fear that is not realistically well-founded. Paranoia could derive from anger, from a tendency to attack but that clashes with fear; paranoia can be understood as a state of anxiety that arises from the conflict between anger and fear.

The peculiarity of our sample, in which no statistically significant differences between the female and male samples can be inferred with respect to ANGER, FEAR, and state and trait anger scores, makes a comparison with the activation of other basic affective systems particularly interesting.

As far as the state of anger is concerned, males and females respond differently, and what is most striking is the number of systems in the female sample in which significant differences are

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recorded. Whereas in males the only differences concern FEAR and ANGER (two close systems), in females ANGER, PANIC, Social Anxiety, SEEKING and PLAY are involved. One question we can ask ourselves is whether the reason for the state of anger is the same for men and women: anger that arises in response to an obstacle that stands in the way of one's goal might evoke a circumscribed response, namely ANGER and/or FEAR, but if the state of anger were motivated by relational contrasts, perhaps the response would be broader and more articulated. Perhaps this could be a hypothesis for interpreting such differences between men and women. Partial support may come from comparisons with trait anger, where high or low levels lead to variations in the same systems in men and women, with the sole exception of FEAR, which does not vary in the male sample, but only in the female sample. Even when comparing groups with increasing levels of ANGER, there is no difference between the male and female samples; in both, there is a consistent increase in the same affective systems (FEAR, PANIC, Dominance) and a decrease in CARE, with no difference in biological sex.

Significant differences emerge when looking at FEAR levels.

It seems relevant to us to observe how, as FEAR increases, there are differences in the scores for ANGER, Dominance, PANIC and Social Anxiety in both women and men, but only in the female groups are there significant differences in the SEEKING, CARE and PLAY systems.

It is important to note that the SEEKING system, which is the system that is active by default and which we can consider transversal to the others, decreases with increasing levels of FEAR and that its hypoactivation is already significant in two group, as if a modest level of FEAR is sufficient to inhibit SEEKING. It should be mentioned here, to reinforce the observation, that the sample was not clinical. No less relevant in terms of quality of life is the hypoactivation of the PLAY system, which in adults finds greater expression in the management of social roles, and in the pleasant connotation of various activities.

Another interesting finding, which concerns only the female sample, concerns the CARE system. As PANIC and FEAR increase, PLAY decreases and CARE shows a non-linear trend. This could suggest that when the caregiver is in state of serene balance, the activation of CARE, which is expressed in particular towards their sons and daughters, is associated with a positive and joyful dimension; that is, we could think of those situations in which mutual pleasure is perceived in the parent-child interaction. On the contrary, when the caregiver is experiencing personal difficulties (activation of PANIC or FEAR) the taking care of others (CARE), the interaction risks losing the character of mutual pleasure, of PLAY and this is an impoverishment of the relationship. It is also interesting to note, with respect to PANIC, that the CARE system first decreases and then significantly increases only in the group with higher PANIC scores (group 4). It seems that at low levels of PANIC the subject is more focused on himself, but as the PANIC increases, he takes care of others. We could therefore advance the hypothesis that when the caregiver is experiencing personal difficulties regarding his own need for care and protection (PANIC), taking care of others (CARE) may be a way to respond to his own needs. There is probably also a share of vicarious gratification in this, an attempt to satisfy in others what we cannot satisfy directly in ourselves [55].

Again, with respect to CARE, we would like to propose some observations with respect to the interpretation that the response of fear, as opposed to that of anger, is for women an adaptive choice with respect to their own safety and that of minors. We would not like some interpretations to be taken as indications that it is better not to react with anger, but to experience fear in the interest of minors. Although our data do not support the hypothesis that anger is more masculine and fear feminine, they do confirm that CARE has an opposite trend to ANGER and that in women, at certain levels of FEAR, CARE is reactivated, but not SEEKING and not PLAY. So, we can say that a desire to protect others is probably activated in the female sex, but it is a CARE of lesser quality, because the search for more adaptive solutions (SEEKING) is lacking and as already mentioned, there is no playful dimension of caring. On the other hand, if we think of situations of violence and ill-treatment, which are likely to activate a great fear, we can see that the resources to look for new living conditions are not so immediate, but rather require support, help and time; moreover, the activation of CARE, perhaps protects the physical integrity, of the offspring, but does not guarantee the psychic one.

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Protection, we believe, comes through a cultural change in which CARE can be valued and promoted, even in the male sex. The 'tend-and-befriend' stress reactivity theory [56] (Taylor et al., 2000), in which caring and building friendships (we might say CARE) is an alternative strategy to fight-or-flight (we might say ANGER and FEAR) could also be shared among men. As well as a strategy to contain anger, it may be to support and promote CARE, which is present in both sexes and is not only feminine.

It is interesting to note that the hypoactivation of the SEEKING system is only significant with increasing FEAR scores and not with increasing PANIC scores. It would therefore seem that FEAR is more pervasive and generalized to different aspects of life, putting the subject in state of withdrawal or alertness; PANIC, on the other hand, seems to leave open the possibility of seeking, as if the subject is not resigned to not seeing his need for protection and care satisfied and continues to seek. This, it should be emphasized, can be hypothesized regarding our data, which refer to conditions of relative normality; it should be verified whether this hypothesis can also be applied in situations of greater impairment of the PANIC system. Furthermore, it should be remembered that activation does not define the success or effectiveness of the search.

Our study has limitations due to the number and characteristics of the sample and in particular the characteristics of the workplace where the subjects of the sample work, albeit with different roles and tasks. In addition, not all employees with PC workstations responded and the dropout rate (around 50%) may have resulted in more balanced sample. In addition, the instruments used are self-reporting and some data, for example on anger, may not be truthful, even if, precisely on anger, two different tools were used.

Of particular interest, however, are the differences in the activation of affective systems SEEKING and PLAY in relation to FEAR in the female sample. The data require further research and insights, but they are very significant elements in the assessment of women's well-being and gender equality. Certainly, gender inequalities have deep roots and causes, but a small contribution can also be made through the possibility of guaranteeing women safe environments. Increasing the sense of security in life and work contexts (decreasing FEAR) could increase teamwork (play of team), pleasant connotation of various activities (PLAY), investment in new goals, search for new solutions (SEEKING); these are important elements both for well-being and as significant factors in promoting a working career. Field research taking these parameters into account may or may not confirm these hypotheses and possibly provide indications of good practice.

5. Conclusions

In summary, this research does not confirm a gender difference that would see males more inclined to respond with anger while women with fear. Furthermore, FEAR, PANIC, ANGER, and anger in the assessments of traits and states, are correlated and not opposed. The increase in ANGER is accompanied by the activation of identical affective systems in men and women, while there are differences between the sexes in the case of FEAR and PANIC. The increase in FEAR scores is accompanied in women by decreases in SEEKING and PLAY. The increase in PANIC scores is accompanied in women by decreases in PLAY. The CARE system has a non-linear trend in the female sample. The fullness of life, personal, working, affective, requires the activation of SEEKING and PLAY; we therefore highlight the need to monitor the conditions that, by activating FEAR and PANIC, can lead to a hypoactivation of these affective systems. We believe that gender equity also passes through the possibility of guaranteeing women the conditions in which their potential can be expressed, through the activation of SEEKING and PLAY.

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Data Availability Statement: The data presented in this study are available at the reasonable request of the corresponding author.

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