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Affect Intensity and Subjective Ratings of Emotional Pictures and Sounds

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Abstract: Affect intensity refers to the intensity with which people experience their emotional response. Individual differences in affect intensity are supposed to be related to the strength of the response to emotional stimuli. Previous studies showed that participants with high affect intensity responded to emotional stimuli with stronger or more intense affective reactions than participants scoring low in affect intensity However, previous studies are mainly limited to the impact of affect intensity on consumer responses to advertising appeals or are limited to the use of life events descriptions as emotional stimuli. No previous studies used behavioural measures of the emotional response to standardized stimuli, varying in terms of arousal. In the present study the predictive value of affect intensity, measured by a self-report questionnaire, the Affect Intensity Measure (AIM), on the emotional response to standardized pictures and sounds has been investigated. In particular, the predictive value of affective intensity measured by the AIM, using both the total AIM total score and the four subscales scores, on subjective arousal ratings of different categories of standardized emotional pictures and sounds was assessed on a nonclinical sample. The total AIM score has been found to be predictive for subjective arousal scores for low unpleasant pictures while, using the AIM subscales scores, results showed that the Negative Reactivity subscale was predictive for arousal scores to high negative pictures and sounds. These findings seem to show that the use of the total AIM score can obscure the relationships between specific features of affect intensity and other variables. Moreover, the present results didn't show a general effect of affect intensity on behavioural responses to emotional standardized stimuli but an emotion specific effect for high negative stimuli.

Keywords: Affect Intensity, Arousal Ratings, Emotional Pictures, Emotional Sounds

1. Introduction

Affect intensity refers to individual differences in the intensity with which people experience their emotional responses [1]. According to this definition intensity applies to all emotions regardless of their specific hedonic tone, such that, for example, people who experience their positive emotions more strongly will generally experience their negative emotions more strongly as well [2]. Individual differences in affect intensity seem also to be stable over time and consistent across situations [1].

Most research on affect intensity has relied on the Affect Intensity Measure [AIM; 3], a 40-item self-report measure that asks respondents to rate how often they react to situations with strong emotions. In their original description of the AIM, authors reported five highly correlated factors but concluded that the scale was functionally unidimensional [3].

Previous studies using the AIM total score showed that people with high affect intensity display more frequent changes in mood and show greater variability in their emotional states across time and situations than people with low affect intensity [1, 4]. They also express their emotions more frequently [5, 6] and intentionally regulate their

emotions less often [7]. Individual differences in affect intensity seem also to be associated with cognitive operations. When exposed to emotional stimuli, individuals with high affect intensity tended to engage in more personalizing cognitions than low intensity individuals [1]. By doing this, subjects with high affect intensity increase the perceived importance of events, which can intensify the emotional response [8]. This emotional response has been thought to be a source of stimulation that could play a role in arousal regulation [2]. Indeed, high AI persons are supposed to have chronically lower levels of baseline arousal, leading them to experience emotions with more intensity in order to compensate for lower reactivity. Previous studies showed that participants with high affect intensity responded to naturally occurring life events with stronger or more intense affective reactions than participants scoring low in affect intensity [3]. Furthermore, this finding held regardless of whether the events elicited positive or negative affect and regardless of whether the emotional stimulation was judged to be slightly, moderately, or very strong.

Consumer studies, investigating the role of affect intensity in predicting the strength of the emotional response to advertising appeals, found a stronger emotional response and a more positive attitude toward the ad for high AI participants compared to low AI participants when they were exposed to an emotional advertising appeal. This difference was no longer observed when participants were exposed to a non-emotional appeal [9-11].

However, previous studies on the differences in the strength of the emotional response related to affect intensity are mainly limited to the impact of affect intensity on consumer response to advertising appeals or are limited to the use of life events descriptions as emotional stimuli. No previous studies used behavioural measures of the emotional response to standardized stimuli, varying in terms of arousal.

Moreover, all previous studies used as measure of emotional intensity the AIM total score.

Indeed, from the beginning, questions have been raised regarding whether the affect intensity construct is more fruitfully regarded as unidimensional or multidimensional. Indeed, further studies consistently showed that the AIM is composed of four factors [12-16], and confirmatory factor analysis verified the superiority of this four-factor structure over a model that assumed a higher-order latent variable. The findings also demonstrated that the subscales derived from these four factors relate differently to an array of emotional, cognitive, and personality variables [13]. In particular, the results of Rubin and co-workers [13] showed that use of the total AIM score can obscure relationships between specific features of affect intensity and other variables and suggest that researchers should examine the individual AIM subscales.

In the present study we tried to investigate the predictive value of affective intensity measured by the AIM, using both the total AIM score and the four subscales scores, on subjective arousal ratings of different categories of standardized emotional pictures and sounds.

In particular, aims of the study are to test if high affect intensity is associated with higher arousal ratings, if this association is shared to all stimuli regardless of their valence, arousal and stimulation mode, and, finally, whether the results may vary according to the use of the total AIM score or to the use of the four-factor AIM structure.

2. Method

2.1. Participants

Participants were 50 students (17 male) at the University of Bologna. The mean age for the total sample was 24.3 years (age range = 20 to 27 years; SD = 1.8) with a mean age of 24.3 years (SD = 1.9) for women and of 24.3 years (SD = 1.7) for men. All participants presented a negative history of psychiatric disorders. Specific phobias and blood phobia were evaluated and excluded in all participants using the Fear Survey Schedule III [17] and the Mutilation Questionnaire [18].

Ethical approval for the study was obtained by the Ethical Committee of the University of Bologna. All participants gave written informed consent before taking part in the experiments and were debriefed at the end of the experimental session.

2.2. Materials and Design

Affect Intensity Measure

The AIM comprises 40 items and defines affect intensity by responses to a given level of emotion-provoking stimulation. Each item is rated on a six-point scale from 1 to 6 (never to always) or, for the 11 reversed items from 6 to 1 (never to always). The total score is the mean of items scores. The AIM has good internal consistency, test-retest reliability, and criterion-related validity [3].

Further studies suggested the use of four subscales scores instead of the total AIM score. The subscales are: Positive Affectivity (Items 1, 2, 3, 5, 7, 8, 9, 10, 14, 18, 20, 22, 23, 27, 32, 35, 38); Negative Reactivity (Items 4, 11, 13, 17, 21, 25, 36); Negative Intensity (Items 6, 15, 19, 26, 28, 30, 31, 34, 39); and Positive Intensity (12, 16, 24, 29, 33, 37, 40). The internal consistency of the item sets was generally good [13].

Emotional Stimuli

Fifty coloured pictures representing emotional and neutral natural scenes were selected from the International Affective Picture System [IAPS; 19]. Pictures were chosen to comprise 10 different picture contents (5 pictures for each content), including 2 contents that are typically rated high pleasant, 2 contents that are typically rated low pleasant, 2 contents that are typically rated neutral, 2 contents typically rated high unpleasant and 2 contents typically rated low unpleasant. Each of the 10 contents included 5 different picture exemplars.

Fifty sounds were selected from the Affective Digitized Sounds [IADS; 20] according to their valence and arousal scores. Sounds were chosen to comprise 10 different

semantic categories (5 sounds for each category), including 2 that are typically rated high pleasant, 2 that are typically rated low pleasant, 2 that are typically rated neutral, 2 typically rated high unpleasant and 2 typically rated low unpleasant. Each of the 10 categories included 5 different sounds.

Stimuli were presented on a 19-in. CRT monitor, at 800 × 600 resolution and a refresh rate of 155 Hz, controlled by an IBM computer and E-Prime software. Each picture and each sound was presented for a 6-s followed by a 3 seconds interval. After each picture and each sound, participants were required to rate their emotional reactions to the picture in terms of pleasure and arousal using a computerized version of the Self-Assessment Manikin [SAM; 21]. Each scale of the SAM was displayed on the computer screen for 5 s. A 10 s interval lapsed between pictures and sounds.

Self-report measures

Three seconds after picture or sound offset, participants were asked to rate their emotional reactions in terms of pleasure and arousal to the picture or sound they had just viewed or heard. Valence and arousal ratings were obtained using a computerized version of the Self-Assessment Manikin [21], which depicts a graphic figure that varies along two dimensions of pleasure and arousal, on a 9-point scale. SAM ranges from a smiling, happy figure to a frowning, unhappy figure when representing the pleasure dimension; for the arousal dimension, it ranges from an excited, wide-eyed figure to a relaxed, sleepy one. Each scale of the SAM was displayed on the computer screen for 5 s. and participants answered by pressing the corresponding number on a keyboard.

2.3. Procedure

Upon arrival, subjects were given general information about the experiment, and their written consent was obtained. Prior to the experimental session the Fear Survey Schedule III [17] and the Mutilation Questionnaire [18] were administered. Participants were then led to a small, sound-attenuated room, equipped with a comfortable arm chair, positioned approximately 1.8 m in front of a 19-in. monitor. The experimental procedure was explained. Before starting the presentation of pictures and sounds, three practice pictures were projected and three sounds were presented in order to acquaint subjects with the experimental procedure. Next, subjects were directed to rest quietly and then pictures and sounds were presented. Each picture and each sound was presented for 6 seconds followed by a 3 seconds interval. After each picture, participants were required to rate their emotional responses using SAM [21].

3. Analysis and Results

The data are analyzed by means of SPSS statistical package version 25.

Two different Multiple and Multivariate Regression Analysis have been conducted by means of General Linear Model (GLM) procedure. A first Regression analysis has been conducted to evaluate if total score of Affect Intensity Measure questionnaire [3] would have been predictive of the responses in terms of arousal (measured by SAM) given by the subjects after viewing the different categories of IASP pictures and sounds. In this analysis the subject's AIM total scores have been used as factors and the pleasant pictures and sounds with low and high arousal activation, unpleasant pictures and sounds with low and high arousal activation and neutral pictures and sounds have been used as dependent variables.

A second Regression analysis has been conducted to evaluate if Affect Intensity Measure questionnaire subscales would have been predictive of the responses in terms of arousal (measured by SAM) given by the subjects after viewing the different categories of IASP pictures and sounds. The considered subscales are: Positive Affectivity score (AIM_PA), Negative Reactivity score (AIM_NR), Negative Intensity score (AIM_NI) and Positive Intensity score (AIM_PI). In this analysis the subject's AIM subscales scores have been used as factors and the High Pleasant, Low pleasant, High unpleasant, Low unpleasant and neutral valence scores for Pictures and Sounds have been used as dependent variables.

Results

Multiple and Multivariate Regression Analysis

In the first Regression analysis the relation between AIM total score and the Arousal activation related with different kinds of Pictures and sounds (measured by means SAM scale) has been studied.

The results show that the AIM total score is not significantly predictive of the dimensions measured by SAM scale as a general effect ($F_{10,39}$ = 0.80, p = ns, Partial Eta Squared =.17). However, looking at the univariate analysis, there is a significant and positive relation between Aim total score and the arousal activation related to the vision of low unpleasant pictures (see table 1, and figure 1).

Table 1. *Regression parameters related to the regression analysis between AIM total score and Arousal scores related to specific pictures and sounds.*

SAM	AIM total score		
	b	SE	t
PpHA	,610	,667	,915
PpLA	,332	,637	,521
UpHA	,887	,675	1,315
UpLA	1,277	,613	2,083*
Np	,338	,518	,652
PsHA	,827	,613	1,350
PsLA	,383	,539	,712
UsHA	1,182	,637	1,854
UsLA	,876	,524	1,672
Ns	,581	,537	1,081

Note: *p <.05 **p <.01; *PpHA* pleasant picture high arousa,; *PpLA* pleasant pictures low arousal; *UpHA* unpleasant pictures high arousal; *UpLA* unpleasant pictures low arousal; *Np* neutral pictures; *PsHA* pleasant sound high arousal; *PsLA* pleasant sounds low arousal; *UsHA* unpleasant sounds high arousal; *UsLA* unpleasant sounds low arousal; *Ns* neutral sounds.

This result suggest as the AIM total score is related and predictive of the arousal activation measured after the vision

of low unpleasant pictures. Higher is the AIM total score, higher is the activation arousal related to the UpLA.

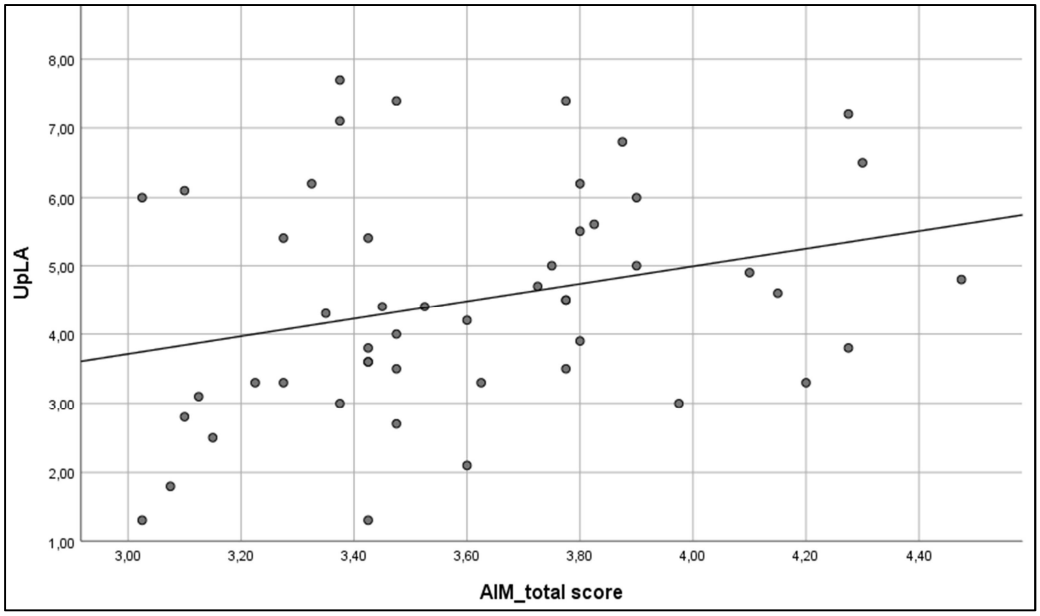

Figure 1. *Regression Plot representing the positive relation between AIM total score and UpLA.*

As described in table 1, no other significant relations has been found between AIM total scores and the different measures of SAM scale both for pictures and sounds.

In the second Regression analysis the relation between the different subscales of AIM self-report scale and the Arousal activation related with different kinds of Pictures and sounds (measured by means SAM scale) has been studied. In particular the predictability of Positive Affectivity score (AIM_PA), Negative Reactivity score (AIM_NR), Negative Intensity score (AIM_NI) and Positive Intensity score (AIM_PI) on the answers related to the arousal activation after specific picture vision and specific sound heard (measured by means SAM) has been studied.

The results show that the different Aim's subscales are not significantly predictive as general effect of the Arousal activation related with Pictures vision and Sounds listening (AIM_PA: Wilks' Lambda=0.71, $F_{10,36}$=1,45, p=ns; Partial Eta Square=0.29; AIM_NR: Wilks' Lambda=0.85, $F_{10,36}$=0.66, p=ns; Partial Eta Square=0.15; AIM_NI: Wilks' Lambda=0.63, $F_{10,36}$=2.09, p=ns; Partial Eta Square=0.37; AIM_PI: Wilks' Lambda=0.90, $F_{10,36}$=0.41, p=ns; Partial Eta Square=0.10).

Looking at the univariate analysis, it is possible to observe as only the Negative Reactivity score is predictive of specific Arousal activation both for pictures and sounds. In particular AIM_NR is a significant and positive predictor of the Arousal activation related to the vision of High Unpleasant Pictures and to the listening of High Unpleasant Sounds (see table 2 and figure 2).

Table 2. *Regression parameters related to the regression analysis between AIM subscales score and Arousal activation related to specific pictures and sounds measured by means SAM scale.*

SAM	Positive Affectivity			Negative Reactivity			Negative Intensity			Positive Intensity		
	b	SE	t	b	SE	t	b	SE	t	b	SE	t
PpHA	-,112	,499	-,225	,269	,366	,735	,620	,583	1,064	-,137	,307	-,448
PpLA	,299	,480	,623	,210	,352	,598	-,425	,561	-,758	,086	,295	,292
UpHA	-,267	,487	-,549	,772	,357	2,161*	,444	,569	,779	-,206	,300	-,688
UpLA	,386	,463	,833	,351	,340	1,032	,462	,541	,853	,042	,285	,149
Np	,647	,381	1,698	-,046	,280	-,163	-,428	,445	-,961	-,015	,235	-,064
PsHA	-,018	,453	-,039	,286	,333	,859	,756	,530	1,428	-,169	,279	-,607
PsLA	-,121	,404	-,300	,235	,297	,792	,360	,473	,762	-,090	,249	-,361
UsHA	-,133	,461	-,289	,733	,338	2,170*	,632	,538	1,174	-,142	,284	-,500
UsLA	,046	,387	,120	,411	,284	1,447	,502	,452	1,110	-,141	,238	-,591
Ns	,467	,402	1,160	,189	,295	,642	-,197	,470	-,419	-,061	,247	-,245

Note: *p <.05 **p <.01; *PpHA* pleasant picture high arousa,; *PpLA* pleasant pictures low arousal; *UpHA* unpleasant pictures high arousal; *UpLA* unpleasant pictures low arousal; *Np* neutral pictures; *PsHA* pleasant sound high arousal; *PsLA* pleasant sounds low arousal; *UsHA* unpleasant sounds high arousal; *UsLA* unpleasant sounds low arousal; *Ns* neutral sounds.

This result suggest that the AIM_NR is related and significantly predictive of the arousal activation linked to the vision and the listening of High unpleasant pictures and sounds. The higher is the negative reactivity of the subject and the higher is the arousal activation measured.

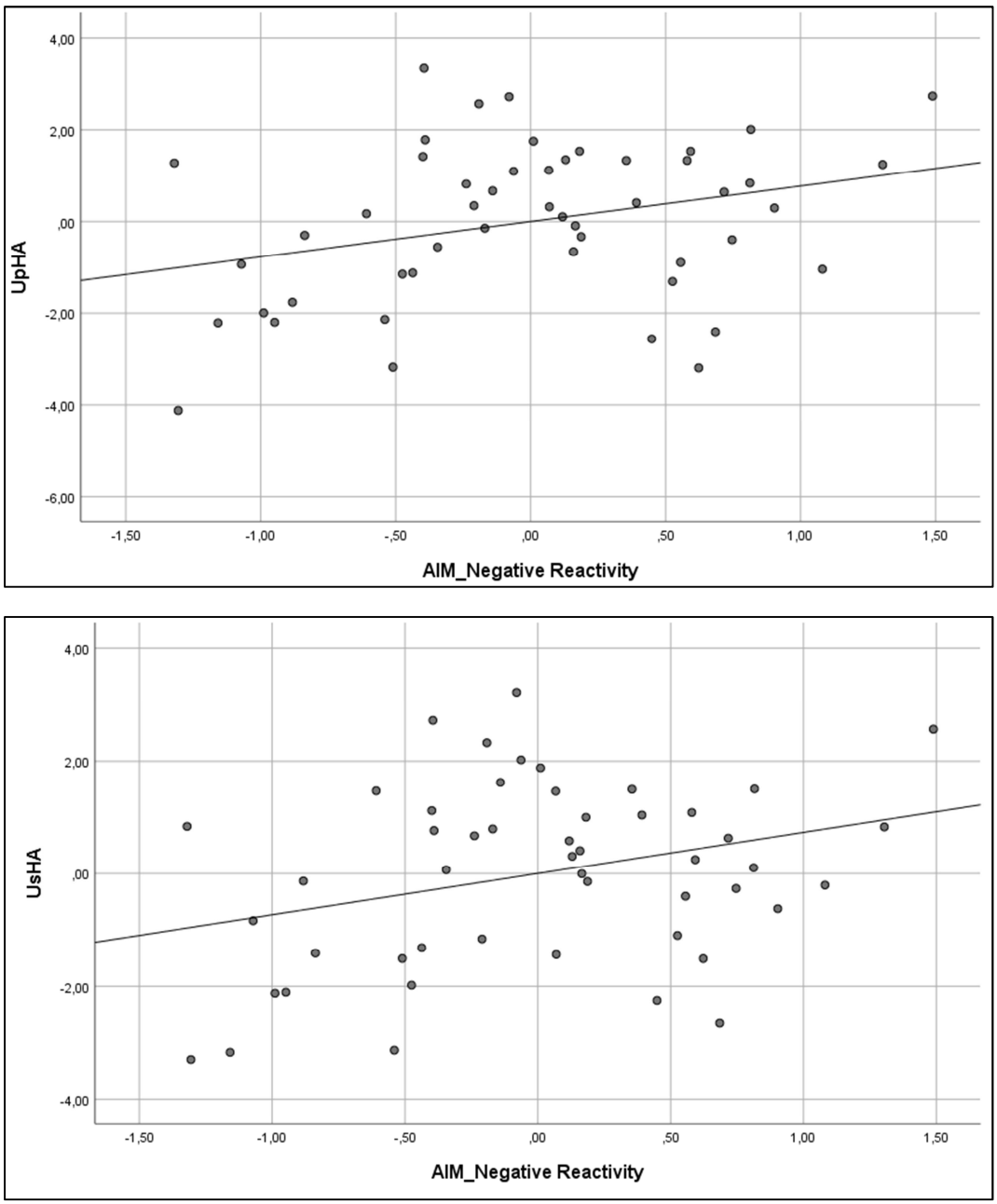

Figure 2. *Partial regression plot of the positive relation between AIM_Negative Reactivity and UpHA (a) and UsHA (b).*

As is possible to note in table 2 no other significant predictive effect has been found between AIM subscales and the Arousal activation related with pictures vision and sounds listening.

4. Discussion

In the present study, we examined the role of affect intensity measured by the AIM, a self-report questionnaire, in predicting behavioral responses in terms of levels of perceived arousal to different emotional visual and auditory stimuli.

Findings of the first multivariate regression analysis showed a significant effect of the total AIM score for low arousal unpleasant pictures. These results suggest that the AIM total score is related and predictive of the arousal activation measured after the vision of low unpleasant pictures. More precisely, self-reported affect intensity is related to the emotional reactivity in terms of arousal only for low unpleasant stimuli represented by pictures while no effects was found for the pleasant ones. No significant association was found for both pleasant and unpleasant sounds. Indeed, no other significant relation has been found between AIM total score and arousal scores both for pictures and sounds.

The results of the second multivariate regression analysis showed that the different AIM subscales were not significantly predictive as a general effect of the arousal activation related to pictures vision and sounds listening. However, results of the univariate analysis showed that the

Negative reactivity score was predictive of specific arousal activation both for pictures and sounds. In particular, the AIM subscale Negative reactivity was a significant and positive predictor of the arousal activation related to the vision of high unpleasant pictures and to the listening of high unpleasant sounds. Therefore, self-reported Negative reactivity was predictive of the behavioral response in terms of perceived arousal to high intensity negative stimuli, regardless of the stimulation mode. In summary, the tendency to negatively react more strongly seems to be reflected by the reported arousal to high arousing negative stimuli. No other significant association was found.

Overall, present findings show that self-reported affect intensity is associated with the intensity of the emotional response in terms of arousal only for negative stimuli.

However, the findings from the two regression analysis are different. When the total AIM score was used, it was found a correlation only with low arousal negative pictures while the use of AIM subscales scores showed an effect of Negative reactivity for high arousal unpleasant stimuli both for pictures and sounds. These findings seem to show that the use of the total AIM score can obscure the relationships between specific features of affect intensity and other variables and seem to be consistent with the suggestion reported by Rubin and co-workers [13].

On the other hand, the present results seem not consistent with the definition of the construct of affect intensity, according to which people with high affect intensity should respond more strongly to emotional stimuli regardless of their specific hedonic tone [1, 2]. However, there are no previous studies to be cited which used affective response in terms of subjective perceived arousal to emotional standardized stimuli as a behavioral measure of affect intensity. Instead, previous studies used mainly standard description of live events [3] or advertising appeals as emotional stimuli [9-11]. Indeed, prior studies on consumer behaviors have shown than when consumers are exposed to either a positive or negative emotional advertising appeal, the emotions expressed by high affect intensity consumers were significantly stronger than the emotions expressed by low affect intensity consumers [9, 10]. However it should be underlined that in a more recent study, replicating previous findings, Moore and co-workers [11] used as emotional stimuli only a high negative advertising appeal.

Present findings could also suggest that the predictive value of affect intensity on the strength of the emotional response should be related to specific features of the stimuli used as experimental materials. Description of life events or emotional adverting appeals are more self-engaging compared to stimuli used in the present study which are represented by static pictures or short sounds presented for a very limited time (6 seconds). Indeed, differences in AI are also associated with cognitive operations. In particular, when exposed to emotional stimuli, high AI individuals tend to engage in more personalizing cognitions than low intensity individuals [1]. The intensity of the emotional response could be enhanced by the increasing importance given by high AI subjects to the events, which intensifies the emotional response [8].

Moreover, another relevant aspect to consider is that previous studies used only the total AIM score while in the present study both total and AIM four subscales scores have been used. In particular, present results showed a significant effect of the Negative reactivity component of affect intensity on subjective arousal scores for high unpleasant pictures and sounds. This result show a consistent relationship between self-reported negative reactivity and a behavioural measure of the strength of the emotional response to negative stimuli. The other self-reported components of affect intensity resulted not predictive of the strength of the response to emotional pictures and sounds.

However, present results must be interpreted in the light of several limitations. First, the sample size was limited. Second, we mainly examined women and there is evidence that women are generally more accurate in recognizing emotions than men [22] and that females score higher than males on self-reports of the intensity of positive and negative emotions [23]. Furthermore, women typically report greater emotional reactivity to negative stimuli than do men [24] and are more emotionally reactive to negative stimuli than to positive ones. These gender differences could at least in part explain our results regarding the association between self-reported negative reactivity and the behavioral response to negative stimuli.

In future studies, it would be recommended to use a larger and more gender balanced sample.

5. Conclusion

In conclusion, the present study has also several strengths.. First, the intensity of affect was assessed by analysing data collected with the AIM at both the level of the total score and of the four subscales scores. The use of this approach avoided both drawing misleading conclusions but also allowed a more fine-grained analysis of the features of affect intensity. Second, to the best of our knowledge, this is the first study examining the association between affect intensity and its components, assessed by means of self-report measures, as well as affect intensity derived with behavioral ratings of experimental visual and auditory complex stimuli in one single study.

Nevertheless, future research is needed to better understand the real predictive value of affect intensity measured by a self-report measure as the AIM and the strength of the emotional response to standardized sets of emotional stimuli.

Declaration

We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere. We have no conflicts of interest to disclose.

We state that (a) American Psychological Association and

Institutional Review Board guidelines were followed in the treatment of participants, and (b) informed consent was granted by the participants and that they were debriefed.

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