Psychoneuroendocrinology 84 (2017) 83–86

Contents lists available at ScienceDirect

Psychoneuroendocrinology

journal homepage: www.elsevier.com/locate/psyneuen

Short Communication

Biological stress reactivity as an index of the two polarities of the experience model

Jaime R. Silva[a,b,*], Anastassia Vivanco-Carlevari[a], Mauricio Barrientos[c,d], Claudio Martínez[e], Luis Salazar[f], Marianne Krause[g]

[a] Centro de Apego y Regulación Emocional (CARE), Universidad del Desarrollo, Santiago, Chile
[b] Clínica Alemana de Santiago, Santiago, Chile
[c] Facultad de Medicina, Escuela de Psicología, Universidad Austral de Chile, Valdivia, Chile
[d] Center for Interdisciplinary Studies on the Nervous system (CISNe), Universidad Austral de Chile, Valdivia, Chile
[e] Facultad de Psicología, Universidad Diego Portales, Santiago, Chile
[f] Facultad de Medicina, Universidad de La Frontera, Temuco, Chile
[g] Escuela de Psicología, Pontificia Universidad Católica de Chile, Santiago, Chile

ARTICLE INFO

Keywords:
Two-polarities of experience model
Interpersonal stress
Biological stress reactivity
TSST

ABSTRACT

The two-polarities model of personality argues that experience is organized around two axes: *interpersonal relatedness* and *self-definition*. Differential emphasis on one of these poles defines adaptive and pathological experiences, generating anaclitic or introjective tendencies. The anaclitic pattern, on one hand, has been conceptually related with an exaggerated emphasis on interpersonal relatedness. On the other hand, the introjective pattern has been connected to high levels of self-criticism. The aim of this study was to investigate the psychophysiological basis for this relationship. Specifically, we hypothesized that the anaclitic individual should have a higher biological reactivity to stress (BRS), measured by the cortisol concentration in saliva, in an interpersonal stress induction protocol (Trier Social Stress Test). Contrary to what was expected, the results indicated that introjective participants presented a higher BSR than the anaclitic group. Interestingly, in contrast to their higher BSR, the introjective group reported a diminished subjective stress in relation to the average. In the anaclitic group, a tendency that goes in the opposite direction was found. Theoretical implications of these findings were discussed.

1. Introduction

In recent years, the two polarities of the personality model have developed a significant empirical and theoretical corpus (Luyten et al., 2013). This approach, originally proposed by Blatt (1974) has identified that human personality development involves the harmonious and balanced interaction of two polarities of experience (onward: POE): *interpersonal relatedness* and *self-definition* (Blatt, 1974; Blatt and Luyten, 2009). These two elemental aspects that structure experience are related to building significant and protective interpersonal relations and developing an integrated and differentiated concept of identity (Luyten and Blatt, 2013). Consequently, personality organization is conformed in relation to a dialectic interaction of these two poles, resulting in different character styles. On one side, *anaclitic* character is related with interpersonal relatedness, describing a collectively oriented style, with an emphasis on intimacy, love, and intersubjectivity. On the other hand, *introjective* character is associated with self-definition, which implies an autonomous style, giving value to agency, achievement, and initiative (Blatt, 2008).

The two-polarities model has developed substantial clinical applications, where psychopathology has been conceptualized as a maladaptive emphasis toward one of the two poles in relation to the other (Blatt and Luyten, 2009). Therefore, the unbalance on one of these polarities of experience has been considered a diathesis that may evolve in affective and cognitive disorders. In this context, an important application field has been related to studies on depression, where an anaclitic and an introjective dimension of this clinical condition has been differentiated.[1]

It has been widely accepted that a relevant element in personality configuration and its deviated pathways is stress sensitivity and

* Corresponding author at: Centro de Apego y Regulación Emocional (CARE), Universidad del Desarrollo. Av. Las Condes 12.461, Las Condes, Santiago, Chile.
E-mail address: jaimesilva@udd.cl (J.R. Silva).

[1] We thank to an anonymous reviewer, who had noticed the significance of maintaining a consistency on the manuscript, focusing in the polarities of experience as a personality tendency rather than in the depressive experience

http://dx.doi.org/10.1016/j.psyneuen.2017.06.016
Received 5 February 2017; Received in revised form 22 June 2017; Accepted 22 June 2017
0306-4530/

Table 1
Pairwise comparisons between POE groups for each index of interest: Negative Affect (NA), Positive Affect (PA), Depression (BDI), and Cortisol concentration (C2). Darkened cells denote mean and standard deviation (SD) of each index of interest. The other the cells represent mean difference and significance for each post-hoc comparison.

	N	Age	Normal				Introjective				Anaclitic				
		(*SD*)	*NA*	*PA*	*BDI*	*C2*	*NA*	*PA*	*BDI*	*C2*	*NA*	*PA*	*BDI*	*C2*	*NA*
Normal	30	20.86 (1.50)	11.75 (3.88)	30.79 (3.96)	3.58 (3.12)	7.11 (2.38)	ns	ns	5.93***	1.82*	ns	ns	ns	ns	5.03**
Introjective	21	20.67 (1.88)					14.66 (6.16)	28.33 (5.18)	9.52 (4.96)	8.93 (2.45)	ns	ns	ns	ns	ns
Anaclitic	19	20.79 (1.31)									13.05 (4.91)	30.05 (4.90)	6.57 (3.84)	7.67 (2.64)	ns
Mixed-AI	31	20.42 (1.54)													16.79 (5.26)

NA: Negative Affect.
PA: Positive Affect.
BDI: Depression scores.
C2: Cortisol increase.
n.s. $p > 0.05$.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

interpersonal stress reactivity (Bale, 2006). Congruently, according to behavioral studies, some authors have suggested that those individuals with an anaclitic character, based on its interpersonal relatedness orientation, should have a higher response to these forms of stress (Reis and Grenyer, 2002; Blatt, 2008). Although, despite the robustness of these findings, as far as we know, there are no experimental studies aimed to explore the physiological correlate of this relationship. Therefore, this study is focused on exploring the biological stress reactivity (onward: BSR) of the POE characters to interpersonal-induced stress. Specifically, our hypothesis stands that under interpersonal stress conditions, anaclitic individuals will show a greater biological stress reaction than their introjective counterparts.

2. Material and methods

2.1. Participants

The study consisted of 101 students (mean age: 20.67, *SD*: 1.55, 50 women). Each participant completed two experimental sessions and received USD $20. Informed consent and the guidelines of the Code of Ethics of the World Medical Association were completely fulfilled. The Ethics Committee of Universidad del Desarrollo approved the study. As an important exclusion criterion, we did not select participants categorized with self-reported depression. Results from the Beck Depression Inventory (BDI, Beck et al., 1961) evidenced a normal or minimal self-reported depressive state for all the participants in the study (mean BDI score: 6.97, *SD*: 4.78).[2]

2.2. Instruments and procedures

The *Depressive Experiences Questionnaire* (DEQ, Blatt et al., 1976) was administered to determine the POE categories. Although this questionnaire refers to depression, it has been frequently used in the nonclinical population to classify *character styles* based on the two-polarities model (Zuroff et al., 1990; Blatt, 1990). From the DEQ, two scores were obtained: *dependency* and *self-criticism* factors. According to the interaction between these two factors, four categories can be defined (normal, introjective, anaclitic, and mixed). To evaluate the subjective effect of the protocol, the *State-Trait Anxiety Inventory* in its state version (STAI-S, Spielberger et al., 1970) was administered. To explore the basic dimensions of emotion, participants completed the *Positive and Negative Affect Schedule* (PANAS, Watson et al., 1998).

The *Trier Social Stress Test* (TSST, Allen et al., 2014) was implemented to assess interpersonal stress sensitivity. The TSST protocol consists of a five-minute public speaking task and a subsequent five-minute mental arithmetic task in front of an expert panel. During the TSST implementation, seven cortisol measurements were taken from each participant (Fig. S1, supplementary material). The cortisol level at C2 (10 m after stress induction) was taken as indicative of participants' reactivity to stress. STAI-S was applied before the anticipation phase and again after the exposure phase. This questionnaire has been frequently used in experimental protocols relating TSST as a self-reported instrument of perceived stress (Von Dawans et al., 2011; Birkett, 2011).

3. Results

3.1. POE categorization

To determine the POE categories, the DEQ was analyzed by extracting dependency and self-criticism factors. The categorization boundaries implemented to determine the POE groups followed the standard literature criterion (Viglione et al., 1990). We considered the mean of each factor, generating four quadrants: normal, introjective, anaclitic, and mixed groups (Fig. S2A denotes this categorization). This result showed that the POE configurations were similarly distributed across groups (normal: 30, introjective: 21, anaclitic: 19, and mixed: 31 participants). In addition, the frequency observed in each group revealed significant differences among them (dependency: $F(3,99) = 52.78$, $p < 0.001$, $\eta^2 = 0.62$: anaclitic: $M = -0.36$, $SE = 0.12$; introjective: $M = -1.48$, $SE = 0.08$; normal: $M = -1.53$, $SE = 0.10$; mixed: $M = -0.21$, $SE = 0.08$; self-criticism: $F(3,99) = 81.54$, $p < 0.001$, $\eta^2 = 0.71$: anaclitic: $M = -0.95$, $SE = 0.13$; introjective: $M = 0.63$, $SE = 0.11$; normal: $M = -1.07$, $SE = 0.08$; mixed: $M = 0.40$, $SE = 0.07$, see Figs. S2B and C). Table 1 shows differences in affective parameters yielded by this classification.

3.2. Effect of TSST in cortisol response

Considering the cortisol curves induced by the protocol, it was

[2] Experimental sessions were scheduled from 10:00 a.m. to 12:00 p.m. Exclusion criteria were: a body mass index < 18 or > 30 kg/m^2; receiving medical treatment known to affect the HPA axis; a history of psychiatric or neurological disorders; abnormal vision; smoking; pregnant or lactating women, and women taking oral contraceptives. Participants were asked not to eat or brush their teeth one hour before the session, and not to drink alcohol or play sports the day before.

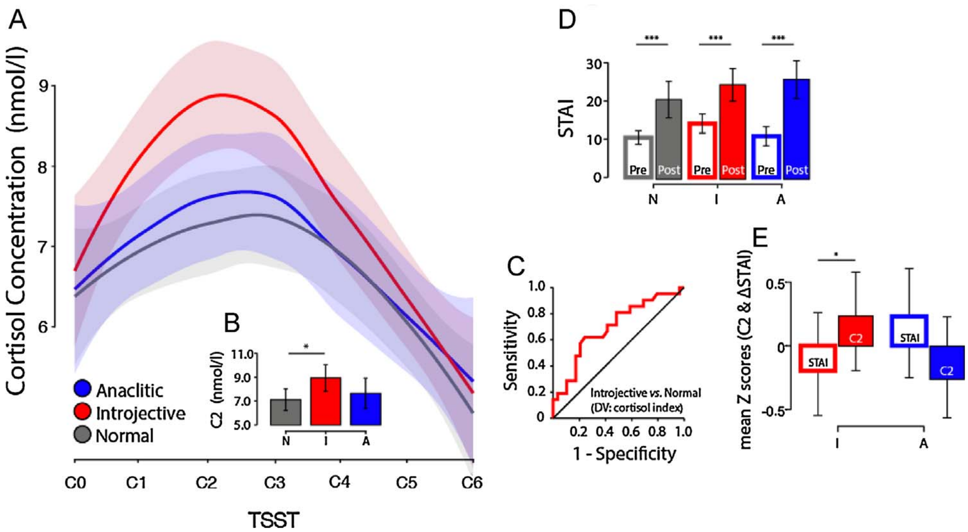

Fig. 1. A) Mean Cortisol Concentration (CC) in saliva in anaclitic (A), introjective (I), and normal (N) groups. Inside the figure (B) CC at C2 for each POE group. In all the graph's error bars denote 95% C.I. C) ROC analysis, using introjective and normal groups as the independent variable and the cortisol index as the dependent variable (DV). D) Bars denote STAI-S before and after TSST protocol for each POE group. E) mean C2 and mean STAI-S (ΔS = STAI-S Post − STAI-S Pre) for each POE group during the TSST. To compare these measures, C2 and ΔSTAI-S were independently transformed to Z-scores.

possible to observe the expected response for the entire sample. Nevertheless, when comparing these curves by the POE categories, the results were opposed to what it was hypothesized, specifically the higher cortisol response of the introjective group. To investigate this, cortisol concentration (CC) scores were analyzed using a linear mixed model (LMM, covariance structure: variance component). The analysis considered the POE classification (anaclitic, introjective, and normal), the TSST protocol (from C0 to C6), and their interaction as fixed factors. A random intercept and slope for each participant was included. Before the analysis, one participant was removed because of a high outlier cortisol score (z = 2.5). Results showed a quadratic effect of the TSST protocol (Cf., linear: $r^2 = 0.06$, $p < 0.001$; quadratic: $r^2 = 0.14$, $p < 0.001$, $F(1,596.4) = 106.5$, $p < 0.001$), a nonsignificant effect of the POE groups ($p > 0.30$), but a significant interaction between these factors ($F(4,181.4) = 58.31$, $p < 0.001$), highlighting a higher quadratic variation for the introjective group (anaclitic: $\beta = -0.06$, $SE = 0.01$, $p < 0.001$; introjective: $\beta = -0.09$, $SE = 0.01$, $p < 0.001$; normal: $\beta = -0.06$, $SE = 0.01$, $p < 0.001$, $p < 0.001$, see Fig. 1A). The mixed group has been removed for the following analysis because it is not relevant to the investigation's hypothesis. To investigate differences across the POE groups (hereafter: anaclitic, introjective, and normal), a LMM on C2 scores was run. Results showed a significant group effect ($F(2,66.0) = 3.34$, $p < 0.05$; and by considering the mixed group: $F(3,96.0) = 2.71$, $p < 0.05$). Bonferroni post-hoc analysis only evidenced a significant difference between introjective and normal individuals ($\Delta M = 1.82$, $SE = 0.69$, $p < 0.05$, see Fig. 1B).

To confirm this result, we tested the feasibility to differentiate the introjective group from the normal group through the cortisol concentration index using a more liberal technique. To this aim, we calculated the area under the ROC curve (AUC). Results indicated that cortisol is a reliable index to differentiate the normal group from the introjective group (AUC: $\alpha = 0.70$, $SE = 0.08$, $p < 0.05$, 95% C.I.: $0.54 - 0.85$, see Fig. 1C). Under the same logic, we confirmed—against our hypothesis—that anaclitic individuals did not differ from normal individuals (AUC: $p > 0.79$). Finally, we tested again whether cortisol is a capable method to distinguish introjective from anaclitic individuals. Results evidenced that cortisol in saliva is a reliable tool to distinguish these individuals (considering all cortisol points: $\alpha = 0.57$, $SE = 0.03$, $p < 0.05$, 95% C.I.: 0.50–0.64; and by considering only critical ones, i.e., from C2 to C4: $\alpha = 0.62$, $SE = 0.05$, $p < 0.05$, 95% C.I.: 0.52–0.73; same analysis run only on C2 presented a marginal significance: $p > 0.09$). In sum, we have statistical evidence to argue that the introjective group had a greater interpersonal stress sensibility when compared to their anaclitic counterpart, contrary to what the literature had described. Furthermore, the BSR in the anaclitic group did not differ from the normal group.

On the other hand, all the POE groups reported *subjective* stress generated by the TSST. To explore this, a repeated measures ANOVA was run on mean STAI-S, with Pre-Post STAI-S factor as within factor and the POE group as a between factor. Results indicated a significant within Pre-Post STAI-S effect ($F(1,63) = 109.77$, $p < 0.001$, $\eta_p^2 = 0.63$), not between the POE group effect ($p > 0.20$), neither interaction between these factors ($p > 0.41$). To verify the first main effect, multiple paired *t*-tests were conducted (Pre and Post STAI-S) on each POE group (anaclitic: $t = 7.74$, $\Delta M = 14.05$, $SE = 1.81$, $p < 0.001$; introjective: $t = 6.13$, $\Delta M = 10.66$, $SE = 1.73$, $p < 0.001$; normal: $t = 5.32$, $\Delta M = 10.77$, $SE = 2.02$, $p < 0.001$). As it may be observed in Fig. 1D, all groups presented an increase in perceived stress, with a higher (although nonsignificant) reactivity in the anaclitic group.

To deepen these observations, we explored the relationship between physiological/perceived stress reactivity, analyzing the correlation between biological stress reactivity and its subjective concomitant using Z-scores. The obtained data suggests that each group has a specific response pattern (Fig. 1E shows Z-C2 (Cortisol at C2) and Z-ΔSTAI-S (Δ = STAI-S Post − STAI-S Pre) for the introjective and anaclitic group). Paradoxically, while the introjective group presented the highest cortisol score (Z-C2), at the same time, it reported the lowest score in perceived stress (Z-ΔSTAI-S). Interestingly, the opposite pattern was evidenced for the anaclitic group: high levels of perceived stress (Z-ΔSTAI-S) with a low biological reactivity to stress (Z-C2). To test this idea, we ran an ANOVA on the mean cortisol/STAI scores (i.e., Z-C2 & Z-ΔSTAI-S), with factor of type of measure (Cortisol vs. STAI-S) and POE group (introjective vs. anaclitic). It is important to highlight that the cortisol/STAI index are the Z scores for C2 and ΔSTAI-S, independently calculated. Results revealed a significant interaction between these factors ($F(1,79) = 4.354$, $p < 0.05$, $\eta^2 = 0.15$), without main effects. To inspect this interaction, we ran two paired *t*-tests for each POE group level. T-tests indicated that the anaclitic group presented a higher index of perceived stress (mean Z-score above zero) combined with a low biological reactivity to stress (mean Z-score below zero), although this did not present a significant difference ($p > 0.09$). Notably, for the introjective group, we evidenced the opposite pattern: high biological stress reactivity (mean Z-score above zero) accompanied by low perceived stress (mean Z-score below zero). This last comparison presented statistical relevance (ZC2 *vs.* ZΔ-STAI-S: *t*-paired $(20) = -2.30$, $SD = 1.40$, $p < 0.05$; by using Z-ΔCortisol (C2-C0): *t*-paired $(20) = -1.90$, $SD = 1.41$, $p = 0.06$). The consideration of these observations opens the possibility of a different *kind* of reactivity to stress in these individuals: a physiological sensitivity for the introjective group and a subjective sensitivity for the anaclitic group.

4. Discussion

The aim of this study was to analyze if the polarities of experience, expressed in the introjective and anaclitic characters, were related to differences in the intensity of their psychophysiological responses to interpersonal stress. The results showed that interpersonal stress produced an increased physiological response (measured by cortisol concentration in saliva) in the introjective configuration. In the light of Blatt's model (1974), these observation results are contra-intuitive. Indeed, the POE model sustains that the differences in self-definition and interpersonal relatedness implies a differential sensitivity to interpersonal contexts, where the anaclitic configuration favor a greater sensibility to challenges and difficulties of this nature. Because the data had evidenced a contrary effect (higher BSR in the introjective group), it is possible to open a discussion related to the physiological reactivity associated to the POE categories, which can have important clinical implications. Specifically, the BSR could be considered in the future like a complementary index to differentiate the two polarities of human experience.

Deeper analyses of the results revealed additional differences that complement the previous observations. Although, the introjective participants could be distinguished from the anaclitic participants by their exacerbated reaction to interpersonal stress, when considering their perceived stress (self-reported stress), a relative decoupling between these analysis levels was observed. The introjective group, in contraposition to their higher cortisol levels induced by stress, showed a decreased subjective report compared to the participant's average. In the anaclitic group, interestingly, it a tendency that goes in the opposite direction was found (although marginally significant). This implies that the introjective configuration under reports their psychological responses, while the anaclitic group does the opposite. The reasons for this cannot be determined from this study design, nevertheless, some reflections are pertinent.

The relationship between the bottom-up (physiological response to stressful stimulus) and top-down (report and regulation of stress response) process could have complex interaction dynamics (Nigg, 2017). In this context, the results of our study could imply that in the introjective character might exist (1) a difficulty for recognizing the ongoing physiological states or (2) a tendency to avoid the expression of subjective consequences of the stress response. In any case, this exacerbated emotional reactivity (physiological response) would not be reflected adequately in their report. This suggestion is consistent with the general difficulty of the introjective character to expose their subjective contents within an interpersonal context (Blatt, 2008). In the anaclitic character, their tendency goes in the opposite direction, which could involve a disposition to produce the contrary effect—trying to pull the attention from the interpersonal context through the exaggeration of their subjective state. The clinical implications from these differential dynamics present an interesting investigation for future studies.

In conclusion, our results suggest that when considering the physiological reactivity in studies regarding the human response to stress, it is relevant to take into account the individual differences related to the balance between self-criticism and interpersonal relatedness. On the other hand, for Blatt's conceptual and clinical model (1974), it opens a new interesting research line to puzzle out the dynamic relationship (decoupling) between the physiologic and subjective aspects of stress response associated to the introjective and anaclitic characters. To confirm these observations in future research, the research could not only specify the theoretical POE model, but also could refine the intervention techniques and strategies for clinical cases.

Financial disclosures

This study was supported by the Fund for Innovation and Competitiveness (FIC) of the Chilean Ministry of Economy, Development and Tourism, through the Millennium Scientific Initiative, Grant No. IS130005 and National Fund for Scientific and Technological Development (FONDECYT, 1130810) to Jaime R. Silva. All authors declare that there are no conflicts of interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.psyneuen.2017.06.016.

References

Allen, A.P., Kennedy, P.J., Cryan, J.F., Dinan, T.G., Clarke, G., 2014. Biological and psychological markers of stress in humans: focus on the trier social stress test. Neurosci. Biobehav. Rev. 38, 94–124.
Bale, T.L., 2006. Stress sensitivity and the development of affective disorders. Horm. Behav. 50 (4), 529–533. http://dx.doi.org/10.1016/j.yhbeh.2006.06.033.
Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., Erbaugh, J., 1961. An inventory for measuring depression. Arch. Gen. Psychiatry 4, 561–571.
Birkett, M.A., 2011. The trier social stress test protocol for inducing psychological stress. J. Visual. Exp. 56, 1–6. http://dx.doi.org/10.3791/3238.
Blatt, S.J., Luyten, P., 2009. A structural-developmental psychodynamic approach to psychopathology: two polarities of experience across the life span. Dev. Psychopath 21, 793–814.
Blatt, S.J., D'Afflitti, J., Quinlan, D., 1976. Experiences of depression in normal young adults. J. Abnorm. Psychol. 85, 383–389.
Blatt, S.J., 1974. Levels of object representation in anaclitic and introjective depression. Psychoanal. Stud. Child 29, 107–157.
Blatt, S.J., 2008. Polarities of Experience: Relatedness and Self-definition in Personality Development, Psychopathology, and the Therapeutic Process. American Psychologic, Washington, DC.
Luyten, P., Blatt, S.J., 2013. Interpersonal relatedness and self-definition in normal and disrupted personality development: retrospect and prospect. Am. Psychol. 68, 172–183.
Nigg, J.T., 2017. Annual Research Review: on the relations among self-regulation, self-control, executive functioning, effortful control, cognitive control, impulsivity, risk-taking, and inhibition for developmental psychopathology. J. Child Psychol. Psychiatry 58, 361–383. http://dx.doi.org/10.1111/jcpp.12675.
Reis, S., Grenyer, B.F., 2002. Pathways to anaclitic and introjective depression. Psychol. Psychother. 75, 445–459.
Spielberger, C.D., Gorsuch, R.L., Lushene, R.E., 1970. The State-Trait Anxiety Inventory: Test Manual. Consulting Psychologist Press, Palo Alto, CA.
Viglione, D.J., Clemmey, P.A., Camenzuli, L., 1990. The depressive experiences questionnaire: a critical review. J. Personal. Asses. 2, 52–64.
Von Dawans, B., Kirschbaum, C., Heinrichs, M., 2011. The trier social stress fest for groups (TSST-G): a new research tool for controlled simultaneous social stress exposure in a group format. Psychoneuroendocrinology 36 (4), 514–522. http://dx.doi.org/10.1016/j.psyneuen.2010.08.004.
Watson, D., Clark, L.A., Tellegen, A., 1998. Development and validation of brief measures of positive and negative affect: the PANAS scales. J. Pers. Soc. Psychol. 54, 1063–1070.
Zuroff, D.C., Quinlan, D.M., Blatt, S.J., 1990. Psychometric properties of the depressive experiences questionnaire in a college population. J. Pers. Assess. 55 (1–2), 65–72.