EMOTIONAL SENSITIVITY: A NEW MEASURE OF EMOTIONAL LABILITY AND ITS MODERATING ROLE IN THE STRESS-ILLNESS RELATIONSHIP

Leticia R. Guarino

Thesis submitted for the degree of Doctor of Philosophy

University of York

Department of Psychology

July 2003

ABSTRACT

Neuroticism (N) has been described as an expression of emotional lability, but its confounding effects on stress and health studies have been consistently reported (e.g. Schroeder & Costa, 1984), as well as the shortcomings of the most widely used scales for its measurement (EPI and EPQ – Eysenck & Eysenck, 1964; 1975; NEO-PI – Costa & McCrae, 1992). N has been traditionally defined in negative or pejorative terms, which in turn has precluded consideration of the effects of positive sensitivity on behaviour. The aim of this thesis was to revise the construct of N, which led to the construction and validation of a new instrument to assess emotional sensitivity. The thesis was also aimed at exploring the potential role of emotional sensitivity in moderating the link between stress and illness.

The instrument was entitled the Emotional Sensitivity Scale (ESS), where exploratory factor analysis uncovered two dimensions for positive (other-oriented) and negative (self-centred) emotional sensitivity. However, validation studies showed the positive scale to suffer from some limitations, which led to a revision. The revised instrument resulted in two orthogonal factors measuring positive interpersonal (PIPS) and negative egocentric sensitivity (NES), which showed high internal (coefficient alpha) and re-test reliability. Concurrent studies supported the validity of the scales, and the structure was further confirmed using confirmatory factor analysis.

The experimental validation supported the hypothesized higher reactivity of high NES individuals when exposed to stressful tasks, while supported the hypothesis that high PIPS scorers would be better able to recognise displayed emotions.

The moderating effects of emotional sensitivity in the relationship between stress and illness were tested through a longitudinal study that assessed health outcomes of individuals undergoing a potentially stressful period of adaptation. Findings showed negative sensitivity as the strongest predictor of self-reported physical and psychological symptoms, as well as its moderating role in the stress and symptom reports relationship. The findings also supported the hypothesis that the positive sensitivity (PIPS) would not have a direct impact on health

outcomes, but its influence would be protective in interaction with other personality variables, such as detached coping styles.

Finally, a cross-cultural study of the ESS using a Spanish speaking population was performed. The factor analysis yielded not two but three factors for the Spanish scale, with the positive and negative dimensions replicating very closely the original scales, while the third scale was concerned with emotional distancing. A comparison between British and Spanish undergraduates showed males not differing significantly in PIPS or NES, but British females showed a greater negative sensitivity than their Venezuelan counterparts.

Overall, the thesis presented extensive validation studies on the new ESS scale that support the notion of two different dimensions of positive and negative sensitivity. The new instrument covers a wider and more comprehensive range of emotional sensitivity, and the two dimensions are differentially related to aspects of health and adaptation.

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I would like to thank my daughter Alessandra, whose support, joy and companionship gave me the strength to achieve this goal. Thank you darling!

A special thank to my supervisor Dr. Derek Roger, whose support and remarkable guidance made this thesis a very gratifying experience. I will never forget his teachings about detachment, which became part of my personal and professional life. Many thanks Derek for the precious time you spent translating my writing.

My profound gratitude to my husband Fausto, who shared with me the illusion to achieve this goal and who joined me during these last years. To my parents, my brother and sister, who always encouraged me to continue, against all the obstacles.

Finally, many thanks to my colleagues in York: Dr. Daniel Olason, Dr. Veronica Greco, Dr. Jane Clarbour, Mike Rennie, Peter Titzman and Joanna Clarke, with whom I spent wonderful moments during my time in England and who helped me whenever I needed them. I will never forget them. To my close colleagues in Venezuela: Dr. Lya Feldman, Dr. Eleonora Vivas, Hatty Castillo, Marisela Hernández, Carlos Muñoz and Maria Gabriela Perez, whose emotional support kept me in the right way for finishing this work.

To Emanuel, wherever you are.

CHAPTER 1

LITERATURE REVIEW

1.1. Introduction

The present research was aimed at constructing a new measure of emotional responsivity, entitled E*motional Sensitivity,* and investigating its role as a moderator variable in the relationship between stress and illness. In particular, the research was aimed at studying the influence of emotional sensitivity on physiological reactivity and health status amongst individuals exposed to laboratory and naturalistic stressors.

The literature on the impact of individual differences on stress and illness is extensive, and a number of models have emerged from the empirical findings. This chapter will review some of these models and its contributions, although a special emphasis will be made on the *transactional model of stress*. According to this model, the stress responses occur through an imbalance between the intensity or patterning of stimulation and the psychosocial resources available to the individual to deal with the situation (Lazarus; 1999; Steptoe, 1989). Some of the personality variables which have been studied within this broad framework include: hardiness (Kobasa, 1979), locus of control (Levenson, 1973; Ormel & Sanderman, 1989; Syme, 1989; Lazarus, 1991), and neuroticism (Bolger & Schilling, 1991; Bolger & Zucherman, 1995; Larsen, 1992; Matthews & Deary, 1998).

Nevertheless, the findings so far have been equivocal, and according to Roger (1995) these inconsistencies may have resulted from using personality constructs that had not been developed specifically in the context of stress research. Roger and his colleagues proposed an alternative model based on emotion control (Roger & Najarian, 1989; Roger & Nesshoever, 1987), and two distinctive factors that emerged from this model (rumination and emotional inhibition) have already been shown to be significantly associated with

physiological indices of stress, such as heart rate recovery and cortisol secretion (Roger & Jamieson, 1988; Roger and Najarian, 1998).

The current research developed from the emotion control model, but with the specific aim of designing a new instrument to measure *emotional sensitivity* and to test its role as a moderator variable between stress and illness. The new construct is intended to address the shortcomings identified in the neuroticism assessment, and to then extend the emotional style model developed by Roger and his colleagues incorporating emotional sensitivity.

This first chapter provides a literature review aimed at placing the new construct in the context of the existing research on emotional response style. Special emphasis will be placed on Neuroticism and its shortcomings.

1.2. Understanding the concept of stress.

Stress has been acknowledged as an important mediator of health and behaviour relationships because it has broad effects that influence a range of bodily systems and behaviors (Baum & Posluszny, 1999). Despite its popularity, the term has been also accompanied by inconsistencies over its conceptualisation and measurement, and three different models have been described (Cox, 1978; 1990; Lazarus, 1999; Meichenbaum & Turk, 1982).

1.2.1. The stimulus approach: Life events.

The stimulus or "engineering" approach treats stress as a stimulus characteristic of the person's environment, usually expressed in terms of the load or level of demand from aversive or noxious element of that environment (Cox & Ferguson, 1991). Defined in this way, stress produces a stress reaction, and the stimuli are labelled as "stressors". Using a model entitled the General Adaptation Syndrome (GAS), Selye (1956) argued that sustained arousal will inevitably lead to exhaustion.

The Social Readjustment Rating Scale (SRRS) of Holmes and Rahe (1967) was one of the first stress measurement scales constructed within this approach, and was designed to identify common life changes (life events) on the basis of the amount of effort presumably needed to cope with them. The ability to point to harmful external events justifies the individual's emotional distress, subsequent illness, or dysfunction. However, most such events do not just happen to a passive recipients, the victim may have contributed to them in some way. Individuals may also cope with events successfully or unsuccessfully (Lazarus, 1999); and checklist measures like SRRS fail to take into account the individual perceptions of the events (Cooper, Cooper & Faragher, 1985; Eysenck, 1988; Herbert & Cohen, 1996; Lazarus, 1990; 1999; McCrae, 1990).

Schroeder and Costa (1984) addressed these problems in a systematic way by grouping life event items (including the SRRS) into confounded and un-confounded items according to three criteria; firstly, items were judged contaminated if they referred directly to physical health; secondly, if they were related to neuroticism; and thirdly if they included subjective evaluation (could not be objectively verified). The results showed that the total score from the life events list correlated with a measure of illness ratings, but, when the contaminated items were removed from the list, the relationship between the remaining life events items and illness disappeared, suggesting that the life event approach was an inadequate method for the measurement of stress (Schroeder & Costa, 1984). Indeed, using a longitudinal design, Aldwin, Levenson, Spiro and Bosse (1989), showed that the reporting of life events was confounded by neuroticism scores obtained by the subjects 10 years earlier, where high scorers on neuroticism reported higher levels of psychological symptoms under stress, than low scorers.

Overall, the literature on life events has shown that the relationship between events and illness rarely exceeds .30, thus accounting for less than 10 percent of the variance in illness (e.g. Cohen & Edwards, 1989; Denney & Frisch, 1981).

1.2.2. The stress response approach

According to this approach, stress is viewed as the response of an organism to environmental stimuli (stressors) which threaten its internal equilibrium, also called *homeostasis*. Such stimuli, which are perceived and evaluated by a cognitive/emotional system, may induce a variety of neuroendocrine, metabolic and behavioural changes in an attempt to maximise the probability of success over a demand. Once the intensity of the challenge reaches a level beyond which the specific homeostatic mechanisms (efficient under ordinary circumstances) may no longer ensure the maintenance of the internal equilibrium, a series of non-specific adjustments occur (Baum & Posluszny, 1999; Ramos & Mormede, 1998; Steptoe, 1991a). The psychobiological stress response itself is a complex system involving adjustments at the affective, cognitive and behavioural levels, together with associate changes in neuroendocrine, autonomic and immune functions (Steptoe, 1990).

When a situation is interpreted as threatening, the body is prepared for action through two related but separate routes; the hypothalamic adreno-cortical axis and the sympathetic adreno-medullary axis. The first of these refers to an activity pattern initiated in the hypothalamus with the secretion of corticotrophin-releasing factor (CRF). This stimulates the pituitary gland to release adrenocorticotrophin hormone (ACTH) into the bloodstream, which acts upon the adrenal cortex to secrete a range of steroid hormones, including cortisol (Turner, 1994; Zillman & Zillman, 1996). Elevations in cortisol levels offer a reliable index of stress (e.g. Leedy & Wilson, 1985; Lundberg & Frankenhaeuser, 1980) since there is good evidence for the role of sustained elevations of cortisol in compromising immune function (Asterita, 1985; Eysenck, 1988).

The sympathetic adrenomedullary system is also initiated by the hypothalamus, which stimulates the adrenal medulla to trigger the rapid release of cathecolamines. One of these, adrenaline, affects the cardiovascular system by increasing heart rate and blood pressure. The enhanced blood flow to the skeletal muscles, liver, and CNS prepares the organism for action, a process

described informally as the "fight and flight" response (Davison & Pennebaker, 1996; Turner, 1994; Zillman & Zillman, 1996); although sustained activation may contribute to coronary heart disease.

1.2.3. The transactional model of stress

A third and more integrative approach to the study of stress has been offered by Lazarus and his colleagues (see Folkman & Lazarus, 1985; Lazarus,1981; Lazarus & Folkman, 1984; Lazarus, Kanner & Folkman, 1980; Lazarus & Launier, 1978), who have described the stress as a *process or transaction* between the individual and the environment. The transactional model highlights the nature of the interchange and fit between the organism and environmental demands, and it is the person's perception of the stressfulness of the event and the appraisal of their ability to cope that ultimately defines stress. Thus, the way the organism interprets an environmental stimulus and the resources for responding to the demand it's what is considered stress, and not the stimulus or response per se (Lazarus & Folkman, 1984; Meichenbaum & Turk, 1982).

The appraisal process, which is a fundamental feature of this model, comprises two levels or sub-components: primary and secondary appraisal. In primary appraisal, the stress response occurs if the situation is evaluated as involving potential harm, threat or challenge, where harm refers to damage already incurred, threat the anticipation of imminent harm, and challenge to those demands that individuals expect to deal with successfully (Lazarus & Folkman, 1984). Primary appraisal depends upon the perceived features of the stimulus situation and the psychological structure of the individual, and is affected by individuals' beliefs about themselves and the environment, their values and commitments, and their personality dispositions (Herbert & Cohen, 1996).

Secondary appraisal or coping refers to the resources the individual has to deal with the potentially stressful situation – if they believe they can deal with it they will not experience stress, but if not, stress occurs. According to the transactional model, secondary appraisal informs primary appraisal in a continuous process, and it is this interaction that constitutes the appraisal process and modulates the degree of stress experienced (Lazarus & Folkman,

1984). Appraisal of demands leads to coping which may either feed back into the appraisal process (emotion-focus) or may aim to change external demands through behaviour (problem-focus).

Stress-related appraisals and unsuccessful coping may generate a cascade of possible stress outcomes: autonomic arousal, health problems, difficulties with social relationships and cognitive and behavioural disturbances (Matthews & Deary, 1998). Appraisal and efforts at coping vary dynamically as the event develops and unfolds, so that the symptoms of stress vary across occasions and across individuals.

Several studies have shown the influence of individual differences in the style of appraisal and coping (see Matthews & Deary, 1998 for a review). For instance, trait anxious subjects rate negative events as more probable when they are evaluated prior an exam (Butler and Matthews, 1987), interpret experimentally controlled feedback as more negative (Smith & Sarason, 1975), and tend to compare themselves unfavourably with their friends (Greenberg & Alloy, 1989). High neuroticism individuals appraise academic stressors as more threatening (Gallagher, 1990), and tend to believe that they make a poor impression in social interactions (De Paulo et al., 1987). Neuroticism is also associated with lower use of problem-focused and more use of emotion-focused and avoidance coping strategies (e.g. Bolger, 1990; Deary, Blenkin, Agius, Endler, Zealley & Wood, 1996; Endler & Parker, 1990; McCrae & Costa, 1986).

A number of other individual differences have been related to stress appraisals and coping styles. For example, high levels of optimism, self-efficacy and hardiness are related to decreased appraisals of threat or negativity of events (Jerusalem, 1993; Rhodewalt & Zone, 1989; Wiebe, 1991), while individuals high on hardiness appraise laboratory stressors as less threatening than individuals low on hardiness (Wiebe, 1991). Negative affect/pessimism has also been shown to be a strong predictor of self-reported physical health status of subjects undergoing a stressful period of adaptation, while positive affect/optimism serves as a buffer for the effects of stress and emotional

rumination on depression, with additional beneficial effects on well-being (Olason, 2000).

In summary, the transactional model of stress proposes a reconciliation of the earlier models, and describes stress as a multidimensional phenomena where biological, psychological, social and environmental variables act simultaneously to determine the final level of adaptation of individuals to internal and external demands.

1.3. Models for the relationship between personality and health.

Two approaches have been used to understand the relationship between personality and health, the *specificity* approach and the *generality* approach (Cohen, 1979; Furnham & Heaven, 1999; Hawkins, 1982; Ranchor & Sanderman, 1991). Specificity assumes that specific personality traits relate to a specific disease, and much of the current work in this area has focused on the *so-called coronary-prone and cancer-prone personalities* (Friedman & Both-Kewley, 1987; Friedman & Rosenman, 1974; Grossarth-Maticek & Eysenck, 1990; Grossarth-Maticek, Eysenck & Barret, 1993, for review). The generality approach assumes that an individual's general susceptibility to illness is affected through personality factors that facilitate or inhibit the onset of a variety of diseases (Sanderman & Ranchor, 1997).

The relationship between personality and health has been further conceptualised using other models or approaches, although some of them replicate the notions of specificity versus generality. Thus, Krantz and Hedges (1987) distinguish three models which explain the role of personality in relation with illness: the etiologic trait approach, the stress-moderator approach, and the illness behaviour approach.

1.3.1. The etiologic trait approach

Here personality is viewed as a risk factor for disease, independent of other risk factors (Sanderman & Ranchor, 1997). The model implies individual differences

in physiological reactivity, making highly reactive individuals more likely to contract cardiovascular diseases such as hypertension (Friedman & Booth-Kewley, 1987; Turner, 1994). This approach and the specificity model described earlier share the same principle about the relationship between personality and illness, and has been the dominant view in this field of research. In fact, the extended investigation on Type A behaviour pattern as a risk factor for CHD has found support for this model, as well as the study of the Type C personality profile as a risk factor for cancer (Cooper, 1988). However, the evidence supporting the notion of personality as an etiologic factor is generally weak.

1.3.2.The stress-moderator approach

This approach assumes that personality acts as a moderator variable in the stress-illness relationship. In this view, personality interacts with stress increasing the risk for an individual exposed to high stress to develop somatic complaints (Sanderman & Ranchor, 1997). This approach shares the basic principles of the etiologic trait model, except that it is explicitly focused on interactional rather than main effects (see Denney & Frisch, 1981). A number of personality variables have been studied in this context including locus of control and neuroticism, but again the results have been equivocal (see Denney & Frisch, 1981).

1.3.3.The illness behaviour approach

The illness behaviour approach assumes that personality affects the health and illness behaviour of subjects, which in turns places the person either at higher or lower risk. The approach focuses on individual differences in the perception of physical symptoms, and the actions that people take when they perceive themselves as ill, such as symptom reports, work absenteeism, medical care utilisation, and self-medication (Wiebe & Smith, 1997). Subjects high on neuroticism typically tend to amplify somatic complaints, even in the absence of objective illness (Matthews & Deary, 1998), and the consistent positive relationship with somatic complaints had made Stone and Costa (1990) describe high neuroticism individuals as having a "distress-prone personality".

In summary, the models presented raise questions about direct or moderating effects of personality variables on health and well-being. Among the clearest findings have been those indicating neuroticism as a confounding variable in illness reporting, although neuroticism has also been investigated for both direct and moderating effects on health (De Jong, van Sonderen & Emmelkamp, 1999; Gilbert et al., 1996; Hills & Norwell, 1991; Korotkov & Hannah, 1994; Roger & Najarian, 1998; Ursin et al., 1984; Vedhara, Shanks, Wilcock & Lightman, 2001). Since neuroticism is the main focus of attention in this thesis, research on the role of this variable in stress and health will be returned to later in this chapter.

1.4. The Emotion Control Model. Emotional style and its relationship with stress and health.

The inconsistencies reported in the literature on the moderating effects of personality on stress led Roger (1988; 1992) and Roger and Nash (1994) to argue that the personality constructs used in earlier studies were inappropriate, since they had not been developed specifically in the context of stress research. Roger and his colleagues proposed an alternative model based on *emotion control*, building on earlier suggestions by Cameron and Meichenbaum (1982) that rumination over emotionally distressing events may result in delayed recovery following a stressful experience. The potential importance of emotional control as a stress moderator, together with the shortcomings of earlier scales claiming to measure emotional expressive style (Roger & Schapals, 1996) provided the rationale for the development of the Emotional Control Questionnaire (ECQ- Roger & Nesshoever, 1987; Roger and Najarian, 1989).

The original Emotion Control Questionnaire (Roger & Nesshoever, 1987) comprised originally four scales entitled rehearsal, emotional inhibition, aggression control and benign control. Rehearsal measured the tendency to be preoccupied with emotional upset, while emotional inhibition referred to "bottling up" or inhibiting the expression of experienced emotions. Aggression control and benign control were found to be moderately correlated, and to form part of the extraversion constellation. A later expansion of the scale resulted in a 56-item

version (ECQ2 - Roger & Najarian, 1989), where the factor analysis confirmed the four-factor structure of the earlier scale.

Subsequent validation studies showed that rehearsal was strongly related to physiological indices of adaptation, such as delayed heart-rate recovery (Roger & Jamieson, 1988) and prolonged elevations in urinary-free cortisol secretion following exposure to stress (Roger & Najarian, 1998). Rehearsal also interacts significantly with negative life events to predict deteriorated health status in undergraduate students during periods of adaptation (Roger, 1995), and inversely with positive affect/ optimism to predict depression in similar samples (Olason, 2000). These effects on physical and psychological symptoms remained even after the initial values measured 6 weeks earlier were controlled for (Roger, Guarino & Olason, 2000). The role of emotional inhibition in prolonging physical activation has also been demonstrated by independent studies of delayed muscle tension recovery following stress (Kaiser, Hinton, Krohne, Stewart & Burton, 1995).

Later scales developed to assess the rehearsal/rumination construct include the Response Styles Questionnaire (RSQ- Nolen-Hoeksema & Morrow, 1991), which was developed to assess ruminative responses to negative emotion. This index was significantly associated with depression amongst a sample of bereaved adults (Nolen-Hoeksema, Parker & Larson, 1994). Research on emotional inhibition has also been extended by King and Emmons (1990), whose Emotion Expressiveness Questionnaire (EEQ) was positively correlated with measures of well-being, although positive correlations were also found with reports of negative daily affects. Other studies have suggested that the expression of emotions serves to reduce or attenuate physiological arousal associated with stress (Mendolia & Kleck, 1993), and scores of the Fear of Disclosure (FOD) index from the Interpersonal Trust Questionnaire (ITQ - Forbes & Roger, 1999) were significantly related to deterioration in health status among a sample of women undergraduates during a period of adaptation.

In view of the prominent role of the ECQ rehearsal and inhibition scales in predicting physiological and health parameters, a new scale was devised

focusing only on these two dimensions, entitled the Inhibition-Rumination Scale (IRS - Roger, 2002, in preparation; Roger, Guarino & Olason, 2000). The revision added future-oriented items to rehearsal, which was re-named rumination, while the emotional inhibition component was expanded by the addition of items adopted from the fear of disclosure and social coping sub-scales of the Interpersonal Trust Questionnaire (ITQ – Forbes & Roger, 1999). Preliminary factor analysis and confirmatory factor analysis of this new expanded scale yielded two unambiguous factors concerned with Rumination (18 items) and Inhibition (21 items) (Roger et al., 2000).

Emotional rumination and inhibition are stable personality characteristics that represent a prominent part of emotional "style", particularly in the context of stress, and with pervasive effects over health. The new construct of emotional sensitivity developed in the present research accounts for a further dimension of emotional style, and will be incorporated into the overall model to expand and complement the concept of emotional style.

1.4.1. Coping styles as moderator variables in the stress process. The Coping Styles Questionnaire (CSQ) and health outcomes.

Coping questionnaires have been widely used, despite their psychometric shortcomings. For example, the Ways of Coping Checklist (WCC – Folkman & Lazarus, 1980) was factor analysed using a sample of 100 subjects, and many of the resulting seven factors comprised too few items to be reliable (Aldwin, Folkman, Shaefer, Coyne & Lazarus, 1980). In a subsequent revision of the scale, Vitaliano, Russo, Carr, Maiuro and Becker (1985) again extracted too many factors, mainly because they relied on an eigenvalue-one extraction criterion. In fact, only the first three factors from this solution reached high eigenvalues, suggesting that only three general dimensions should be extracted. The later Ways of Coping Questionnaire (WCQ – Folkman & Lazarus, 1985), comprised eight factors, presumably based on an eigenvalue-1 criterion, and the authors used a small sample with repeated administrations for the factor analysis (see Roger, Jarvis & Najarian, 1993).

The COPE questionnaire (Carver, Scheier & Weintraub, 1989) was similarly flawed, with the authors claming 14 discrete factors. In fact, a psychometrically appropriate re-analysis of the COPE suggested the presence of only three factors (Lyne & Roger, 2000), and the three-factor primary structure of coping was confirmed by the more recent Multidimensional Coping Inventory (MCI) developed by Endler and Parker (1990).

The many shortcomings identified in coping scales led Roger, Jarvis and Najarian (1993) to construct a new measure entitled the Coping Styles Questionnaire (CSQ), using a sample of 521 subjects and a scenario technique (see Forbes & Roger, 1999) to generate items. In addition to the well-established task, emotional and avoidance dimensions, the factor analysis yielded a fourth factor entitled "detachment", referred to the tendency to be able to view emotionally distressing issues in perspective. The pattern of correlations among the four scales suggested a group of two adaptive coping styles (detached and rational) and two maladaptive styles (emotional and avoidance), but a subsequent factor analysis of the scale into three factors merged the emotional (EMCOP) and detachment (DETCOP) scales into one bipolar measure, with detachment at one pole and emotional coping at the other (Roger, 1995).

Using the CSQ in conjunction with the Emotional Control Questionnaire has shown that deterioration in health status over periods of adaptation is explained in part by low detachment (high emotional coping) and high rehearsal and emotional inhibition (e.g. Roger, 1996; Roger & Najarian, 1997; Roger, Najarian & Jarvis, 1994). In a recent prospective study, Rector and Roger (1996) found evidence for interaction effects between emotional coping and self-esteem, where individuals with low self-esteem who engaged in emotion-oriented coping reported the most somatic complaints at follow-up. Again using the CSQ, Olason (2000) showed an interactive effect between detachment and negative affect/pessimism in the prediction of severity of somatic symptoms in undergraduate students, with those who scored high on coping and negative affectivity/pessimism reporting the highest incidence of physical symptom severity.

1.5. The construct of Neuroticism in Eysenck's biological theory of personality. Conceptual and psychometric shortcomings.

Eysenck's biological theory (1967) originally described two orthogonal dimensions of personality, Neuroticism and Extraversion. Neuroticism (N) is thought to reflect emotional sensitivity, mediated by the limbic system, while Extraversion (E) describes differences in cognitive arousal mediated by the reticular formation. These two dimensions were assessed using the Eysenck Personality Inventory (EPI – Eysenck & Eysenck, 1964), which also included a small Lie (L) scale. A later revision, the Eysenck Personality Questionnaire (EPQ – Eysenck & Eysenck, 1975) included a fourth Psychoticism (P) dimension, thought to be regulated by the endocrine system and linked to levels of male hormones (Eysenck & Eysenck, 1985).

The influence of N and E on reactivity, performance and adaptation has been extensively investigated, but evidence for E has been stronger than for N. In the model, extraverts are thought to have relatively low levels of cortical arousal, (Eysenck, 1967; Eysenck & Eysenck, 1985), and therefore seek to maximise stimulus intensity in order to optimise their activation. This prediction has been confirmed through several studies, as for example by Geen (1984), who found that extraverts tend to perform better than introverts when background noise levels are high, while the opposite occurs to introverts. Directly manipulating arousal levels by administering drugs also showed that extraverts have significantly lower anaesthetic sedation thresholds than introverts (Claridge, Donald & Birchall, 1981), and compared to introverts, their performance on cognitive tasks is impaired when their arousal levels are enhanced by caffeine (Anderson, 1994) or reduced by haloperidol (Corr & Kumari, 1997).

Studies using more sophisticated techniques such as positron emission topography (PET) have also supported the physiological substrate for extraversion. For instance, Fischer, Wik and Fredrikson (1997) used PET measures of regional cerebral blood flow (rCBF) to investigate central neural differences in extraversion and neuroticism in a group of 30 female volunteers exposed to videotapes. Analyses revealed that introvert females had higher

rCBF in the caudate nucleus, the putamen and the secondary visual cortex, compared to extraverts. The authors concluded that Eysenck's arousal theory of personality, which predicts an increased cerebral blood flow among introverts, was supported by the increased activity in the secondary visual cortex. A dopaminergic difference between introverts and extraverts was also obtained, since the blood flow in the putamen was left lateralized among introverts but not extraverts.

In sharp contrast to the findings of Fischer et al. (1997) for extraversion, there were no significant differences in rCBF as a function of N, and support for the physiological substrate for N have generally been less clear. According to Eysenck's theory, high-N subjects are more reactive to emotional stimuli, and react more strongly and more lastingly than low-N subjects (Eysenck, 1994). However, the majority of studies of N fail to show associations between this personality trait and electrocortical and autonomic nervous system arousal. A comprehensive review of electrodermal activity studies (Naveteur & Freixa i Baqué; 1987) showed no consistent evidence for a relationship between either N/trait anxiety or state anxiety and tonic skin conductance level (SCL), rate of spontaneous skin conductance responses (SCRs), or amplitude and rate of habituation of event-related SCRs.

Neuroticism encompasses such a wide range of emotions that it is difficult to discriminate it experimentally from other psychological constructs, and to test its particular contribution to the stress process. For example, in comparison with low scorers, individuals high on N tend to perceive life-events as more stressful, to cope less well, to report greater dissatisfaction with social supports, have generally lower psychological well-being, make more somatic complaints, and express more anxiety, anger, sadness and disgust (Costa & McCrae, 1987; McCrae, 1990; Watson & Clark, 1984). Findings such as these have led to a view of N as a confounding rather than a moderator variable in studies of stress and health (Schroeder & Costa, 1984).

The findings led Eysenck and others to seek methodological explanations of the inconsistencies. One possibility that has been proposed is that the laboratory environment may be insufficiently emotionally stressful to activate the viscero-

cortical system (Eysenck, 1994; Matthews and Deary, 1999). Another possible explanation is the use of "normal" samples such as the students, whose reactions are generally moderate, instead of using samples of patients whose more pronounced emotional reactions have yielded clearer results. The difficulties in providing clear support for the model led Eysenck even to question the model itself, noting that ..."perhaps the fault lies in a theory that is not specific enough to make precise prediction, unlike the E-arousal theory" (Eysenck, 1994, p. 186).

Psychometric inconsistencies have also been reported for the E and N scales, and the corresponding scales on the EPI (Eysenck & Eysenck, 1964) and the EPQ (Eysenck & Eysenck, 1975) have been shown to not be psychometrically equivalent. For instance, Rocklin and Revelle (1981) found that only 25 of the 57 E, N and L items on the EPI emerged in the EPQ, and eight of the 25 common items had been reworded. Using a sample of 838 college students who completed both the EPI and the EPQ, the authors found that while the EPI-E included discriminable components of impulsivity and sociability, the EPQ-E scale was purely a measure of sociability. Later, Campbell and Reynolds (1982) found that while EPI-E correlated modestly and at the same level with both of the second-order Guilford Zimmerman Temperament Survey (GZTS), second-order components that represented socialbility and impulsivity, EPQ-E correlated substantially with only the GZTS sociability component. Furthermore, both the EPQ-E and Psychoticism (P) scales correlated to the same degree with the GZTS impulsivity component. As noted by Block (1978) and others, the impulsiveness items from the original extraversion scale had clearly migrated onto the new EPQ-P scale.

Eysenck's measures of N have also been criticised on psychometric grounds. For instance, Roger and Nesshoever (1987) reported the presence of two distinguishable factors for the EPI-N, labelled *Sensitivity* and *Hypochondriasis,* with only 19 of the 24 items of the N scale loading on both. Factor analysis of EPQ-N revealed that this scale comprised only a S*ensitivity* factor, with a different pool of items comprising a second factor regarded with *Moodiness* (Roger & Morris, 1991). Goh, King and King (1982) factor analysed all 90 items

in the EPQ questionnaire and found that 5 items of the N scale loaded significantly on the P scale, and the factors from the whole instrument accounted for only 18.9% of the variance in EPQ scores. These results replicated partially those found by Loo (1979), who confirmed a structure of sixteen interpretable factors from a first-order factor analysis of the EPQ. Further analysis yielded two third-order orthogonal factors, anxiety-paranoia and emotionality-psychopathy. The author concluded that these two factors combined elements of both N and P, which again confounds a clear structure of the construct. Helmes (1980) also failed to replicate the EPQ four-factor structure claimed by Eysenck (E, N, P, L), either at the first or at the third-order levels. These components only accounted for 30% of the variance, and the items did not load in accordance with the EPQ scoring key.

Summarizing, the E and N scales from the EPI and the EPQ questionnaires are clearly not psychometrically equivalent, and the psychometric inconsistencies might be responsible for the mixed results observed in the experimental settings. This finally creates difficulties in confirming the nature of the E and N personality dimensions stated in Eysenck's theory, and in the specific case of the stress and illness research, validity problems with N creates an additional shortcoming.

1.5.1. Neuroticism in the Five Factor Model of Personality

The Five-Factor model describes a personality structure based on Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness (Costa & McCrae, 1992a; 1992b). Neuroticism (N) here describes the tendency to experience negative affect such as fear, sadness, embarrassment, anger, guilt and disgust. Extraversion (E) describes the tendency to be sociable, confident, optimistic and cheerful, while Openness (O) describes people with an active imagination, aesthetic sensitivity, attentiveness to inner feelings, and with preference for variety, intellectual curiosity and independence of judgement. The dimension of Agreeableness (A) represents people highly sympathetic to others and eager to help them, as well as being trusting, straightforward, altruistic and compliant. Finally, Conscientiousness describes the tendency to feel self-competent and to show order, dutifulness, achievement striving, discipline and

deliberation (Costa and McCrae, 1992a). These dimensions are usually measured using the NEO-PI (R) questionnaire (Costa & McCrae, 1992a).

The Five Factor model of personality has been enthusiastically accepted, but at the same time it has received some criticism since it does not adequately explain the nature or development of the dimensions, and according to some authors is merely a description of personal characteristics (Cooper, 1998; Endler, 1999). High correlations have been found amongst the dimensions of the questionnaire, suggesting that they do not reflect their most parsimonious structure (Block, 1995; Eysenck, 1992), while other studies have failed to confirm the emergence of the five factors (Parker, Bagby, & Summerfeldt, 1993). Eysenck (1992) has argued systematically that 3 of the 5 factors are primary traits, rather than the higher-order dimensions claimed by Costa and McCrae (1992a; b), and a meta-analysis of factorial studies carried out by Royce & Powell (1983; c.f. Eysenck, 1992) revealed 3 main factors, which correspond closely to the Eysenck's P, E, and N dimensions. Furthermore, Eysenck has pointed out the lack of clear theoretical basis for the five factors, and that the model does not provide a biological link between genetic causation and behavioural organization (Eysenck, 1992).

Another weakness of the Five-Factor structure is the heterogeneity of its factors, and specifically for N, items assess anxiety, anger/hostility, depression, self-consciousness, impulsiveness and vulnerability. A multidimensional measure like this creates at least two major problems. First, from the theoretical point of view, the wide range of emotions, feelings and behaviours included in the measure make almost impossible to define or clearly delimit the concept and its nature. Secondly, owing to the inclusion of widely divergent items in the same factor, NEO-PI-N will always be highly intercorrelated with other measures of personality, creating a problem for discriminant validation.

In summary, apart from the psychometric shortcomings of the N scales, theoretically N is conceived in pejorative terms, only describing the negative facet of emotion and omitting the possibility of more positive and adaptive domains of emotionality. As an illustration, inspection of the items on the N

scales shows them to be confounded with low self-esteem. These shortcomings can be resolved by expanding the construct to incorporate "emotional sensitivity", which would include both positive and negative components of emotional lability. The development of such a measure is one of the main aims of this thesis.

1.6. Stress, Neuroticism and health. Is N a confounding or a moderator variable?

According to the Transactional Model of stress, extensively presented in section 1.2.3., the individual differences interact with the environment to determine the ultimate outcomes of an adaptation process, either by promoting or preventing a stress appraisal or by facilitating successful or unsuccessful coping (Cohen & Edwards, 1989). When the interaction between stress and personality is statistically significant, the personality variable is ultimately regarded as a moderator (see Denney & Frisch, 1981). Since N has been found to increase the emotional reactivity of individuals to stressful events (Bolger and Schilling, 1991), it may thus function as a moderator variable (Bolger, 1990; Bolger & Schilling, 1991; Bolger & Zuckerman, 1995), although other researchers have found N to be directly related to outcomes, suggesting main rather than moderating effects (Hills & Norvell, 1991; Korotkov & Hannah, 1994).

On the other hand, high N scorers are more likely to report distress, even in the absence of any overt or objective source of stress (Bolger & Schilling, 1991; Watson & Clark, 1984). Schroeder and Costa (1984) point out that life events measures of stress are thus confounded by N. Indeed, high N individuals tend to endorse more symptoms and other health complaints on conventional checklists, and events that are not contaminated by N are not related to illness (Schroeder & Costa, 1984). In a review of the literature, Watson and Pennebaker (1989) found that N was not consistently related to a variety of objective health outcomes, including immunocompetence, health-care visits, hospitalisation, cholesterol levels or health-related absences from work or

school, and is also unrelated to risk factors for coronary disease, cardiovascular diseases or cancer (Almada et al., 1991).

In addition to concurrent symptom reporting, N also affects the recall of past illness information. In a longitudinal study of 43 undergraduates (Larsen, 1992), subjects completed a symptom checklist three times a day for 2 consecutive months, as well as a retrospective symptom assessment afterwards. Results indicated that N was related to both concurrent reports of symptoms and retrospective recall, but the direct path from N to recalled symptoms was larger than the relation between N and concurrent report. In fact, Brown and Moskowitz (1997) found no relation between scores on NEO-PI-N and current symptoms reports, thus reinforcing the view that the confounding effects may primarily be retrospective. Similarly, Feldman and colleagues (1999) administered the NEO-PI to healthy volunteers inoculated with a common cold virus, and found that N was directly associated with reports of unfounded symptoms at both baseline and postinoculation in those with and without colds. Using the same sample, Miller, Cohen, Rabin, Skoner and Doyle (1999), found no relationship between N, and cardiovascular, neuroendocrine and immunologic parameters. This tendency of high N individuals to report more symptoms and health complaints undermines the claim for moderating effects of N, and therefore there have been just few number of studies reporting significant interaction effects between stress and N (Cohen & Edwards, 1989).

Steptoe (1991b) has argued that a moderating effect for N might be more likely if more objective indices of health (e.g. physiological or immunological indices) are used, and Roger and Najarian (1998) found that scores on EPI – N were positively related to levels of cortisol in a sample of student nurses undergoing a written examination, although the relationship with cortisol differences was in fact stronger for scores on ECQ-rumination. Gilbert and colleagues (1996) also found that changes in natural killer activity during exams were associated with N, when investigating the role of this personality variable and smoker status on immune functioning. Ursin, Mykletun, Tonder, Vaernes, Relling, Isaksen & Murison (1984) compared levels of plasma immunoglobulin and complement components in two groups of workers with chronic and acute stress,

respectively, and correlated these indices with psychological variables, including N. Significant inverse correlations were found with factors such as IgM in the acute but not the chronic stress group, and N explained a substantial proportion of interindividual variance, even after gender, age, job seniority and employment factors were controlled for. The relevance of IgM is that these antibodies are the first to be produced during infection. Furthermore, Kiecolt-Glaser and collegues (1993) found an interaction effect between the stress triggered by a marital conflict and negative emotionality over the immunologic change profile in 90 newlywed couples. Subjects who exhibited more negative and hostile behaviours during a 30-minute discussion of marital problems showed greater decrements on four functional immunologic assays (natural killer cell lysis, blastogenic response to two mitogens, and the proliferative response to monoclonal antibody to the T_3 receptor), as well as larger numbers of total T lymphocytes and helper T lymphocytes.

Other confirmatory findings include those of Vogeltanz and Hecker (1999), who investigated the role of N and controllability/predictability in determining physiological responses. High N subjects are more physiologically and subjectively aroused than the low group, and N proved to be more important than the stressor characteristics (control/predictability) in understanding physiological reactivity following exposure to aversive stimuli. Similarly, in a study designed to evaluate the emotional arousal of 56 patients with alexithymia, Infrasca (1997) found a positive relationship between alexithymia and N, as well as a high and stable level of autonomic reactivity amongst those subjects at baseline and under stress.

However, in contrast to these findings Kirkcaldy (1984) failed to find differences in heart rate between high and low N subjects in a choice-reaction time paradigm, and Fredrikson and Georgiades (1992) did not find differences in heart rate responses between individuals high and low on N in reaction to a stressful classical conditioning paradigm involving shapes paired with mild electric shocks. Schwebel and Suls (1999) found no differences between high and low N subjects in cardiovascular reactivity to five laboratory stressors and seven field stressors. Aggregating the findings across studies, data showed that

individuals high on N did tend to have higher heart rate responses than individuals scoring low on N, but no changes were observed for blood pressure, and the authors concluded that the overall pattern of the findings did not support the reactivity hypothesis.

Furthermore, Roger and Jamieson (1988) failed to support the predictions about the relationship between N and HR reactivity and recovery in a sample of students exposed to a laboratory stressor. In this study, EPI-N was scored for the two component sub-scales of Sensitivity and Hypochondriasis (see Roger & Nesshoever, 1987), but results failed to support correlations with HR in either case.

Evidence for the interactive effects of N with other individual differences and psychosocial variables has come from De Jong, van Sonderen and Emmelkamp (1999), who administered questionnaires including an index of stress, N (using the EPQ), and different indices of psychological and physical health to a sample of 388 working adults. Data were analysed using LISREL, and results suggested that N was indirectly related to psychological symptoms via its association with experienced stress, problem-focused coping, satisfaction with social support, and lack of assertiveness. Similarly, Horner (1996) found interactive effects between N, locus of control and stress over reported physical illness, and Iskra-Golec, Marek and Noworol (1995) reported that N interacted with languidity and morningness to predict health and sleep complaints in a group of 100 female nurses.

On the other hand, additive rather than interactive effects of N were reported by Vedhara, Shanks, Wilcock and Lightman (2001), who followed fifty spousal caregivers of patients with dementia over six-monthly intervals. Scales measuring psychosocial mediators (coping and social support), psychological morbidity (anxiety, depression and stress), physical morbidity (health-related quality of life) and EPI-N were used, and the authors reported that anxiety and stress at 6 months were influenced by indices of coping and N, while at 12 months N was a significant and strong predictor of these indices, and depression.

Overall, N seems to exert both main and moderating effects in the relationship between stress and health, as was reported by Hills and Norwell (1991) in a study with highway patrol officers. The authors found that EPI-N showed strong main effects over indices of physical symptoms, while it moderated the relationship between daily hassles and emotional exhaustion (MBI-EE), between the report of perceived stress and physical symptoms, and in the relationship between attitudes toward court matters and the report of total job satisfaction.

A quite different approach to explain the implication of N in the stress-illness process has been described by Bolger and colleagues (e.g. Bolger & Schilling, 1991; Bolger & Zuckerman, 1995). Using a daily diary approach, the authors reported that high N subjects had, not only higher reactivity to the events, but also a greater exposure to them, specially to arguments with spouse and with others. In this study, exposure meant the presence of stressors whose initiation depended primarily on the subjects. The implications for the exposure-reactivity model were highly significant for anger and depression.

In summary, the relationship between N and stress has been extensively studied, but the results have been inconsistent. N is often seen as a confounding variable in stress research, but its moderating role has received some positive support. At the same time, contrary findings have also been reported. The conflicting evidence may be attributable in part to inappropriate experimental designs that rely on insufficiently stressful conditions (Eysenck & Eysenck; 1985). There are also psychometric shortcomings in the scales used to measure N, such as the EPI, EPQ, and NEO-PI, which were described earlier in this chapter. Furthermore, N has traditionally been construed in pejorative terms and confounded with self-esteem. The main aim of this project is to address these issues by proposing a new two-dimensional structure of positive and negative emotional lability. A more positive and adaptive dimension of emotional reactivity bears some theoretical relationship to the construct of empathy, which will be discussed in the next section.

1.7. Empathy

Wispé (1987) offered a comprehensive review of empathy, first used in ancient Greece (Ἐμπεθεία - *empatheia*) but adopted as *empathy* in early twentieth-century American experimental psychology. The concept has been used by many personality theorists of the 1930's, and terms such as sympathy, role taking, and perspective taking, have been used as synonymous. The ability to perceive and understand another's emotions is also thought to form part of the more recent construct of "emotional intelligence" (Ciarrochi, Chan and Caputi, 2000).

Experimental studies have shown that subjects with higher levels of empathy show a lower threshold for accurately discriminating between depictions of pleasant and unpleasant emotions in facial photographs (Martin, Berry, Dobranski, Horne & Dodgson, 1996), and Buck (1991; c.f. Martin et al., 1996) has suggested that this ability is based on the short afferent pathway into the limbic system. Those with greater empathy tend to be more aroused by others' emotional experiences, both positive and negative, and to be more emotionally reactive (Bryant, Yarnold & Grimm, 1996; Eisenberg, Fabes, Schaller, Miller, Carlo, Poulin, Shea & Shell, 1991; Eisenberg, Fabes, Murphy, Karbon, Maszk, Smith, O'Boyle & Suh, 1994; Mehrabian & Epstein, 1972).

Attempting to resolve the confusion that arises from the many different terms used to describe empathy, Mehrabian and Epstein (1972) suggested that they may represent either cognitive or emotional perspectives. In the former, an empathic individual can imaginatively take the role of another and can understand and accurately predict that person's thoughts, feelings and actions (Dymond, 1949; 1950; c.f. Cliffordson, 2002; Hogan, 1969), but the neutrality or detachment of this perspective is viewed as aiding accuracy. In the second approach, empathy is defined as a vicarious emotional response to the perceived emotional experiences of others, sharing those feelings at the gross affective level of pleasant or unpleasant emotions (Meharabian & Epstein, 1972; Scotland, 1969).

However, Eisenberg has adopted a more interactive approach (Eisenberg & Fabes,1998; Eisenberg, Wentzel & Harris, 1998). Although she describes *empathy* in emotional terms, she nonetheless considers that sympathy and empathy may both result from cognitive perspective taking. Similarly, Davis (1996) stresses that cognitive processes such as role taking contribute directly and substantially to affective outcomes, such as empathic concern.

Indeed, the two approaches are widely considered to be facets or dimensions of the same construct (Davis, 1980; 1983; Cliffordson, 2002), and Davis constructed the Interpersonal Reactivity Index (IRI, Davis, 1980) to assess four discriminable dimensions of his multidimensional model of empathy. The Perspective-Taking scale (PT) assesses the tendency to adopt spontaneously the psychological point of view of others, while the Fantasy (FS) scale taps respondents' tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, movies and plays. The Empathic Concern (EC) scale assesses "other-oriented" feelings of sympathy and concern for unfortunate others, while the Personal Distress (PD) scale measures "self-oriented" feelings of personal anxiety and unease in tense interpersonal settings. Eisenberg, Wentzel and Harris (1998), emphasize that the empathic individual is not necessarily feeling the same emotion as the other person. Rather, he or she is experiencing other-oriented concern, and the personal distress is an aversive emotional reaction to the vicarious experiencing of another's emotion.

Interestingly, the four dimensions of empathy described by Davis seem to be organised hierarchically, at least with regard to empathic concern to some extent subsuming perspective taking and fantasy. Confirmatory factor analysis conducted by Cliffordson (2002) showed that the best fit was empathic concern acting as a higher-order variable subsuming the rest of the dimensions, and the author suggests that empathy might be a generalised dimension with a main emphasis on emotional reactivity, but also involving cognitive processes.

1.7.1. Empathy and emotionality

Although part of the same general construct, the two emotional dimensions of empathy - empathic concern/sympathy and personal distress - may yield different outcomes, and have different implications on social functioning and well-being.

Eisenberg and Fabes (1992) have suggested that two types of personality variables are implicated in predicting whether individuals become overaroused in social contexts: their dispositional levels of emotional responsivity, particularly the intensity and threshold of responding, and their ability to regulate their emotional reactions. According to this model, individuals who experience high levels of negative emotionality and show low ability to regulate emotion are prone to experience Personal Distress (PD). In contrast, people who are also emotionally sensitive but show high levels of constructive modes of regulation, such as attentional control and activation control, are likely to be relatively high in sympathetic disposition or empathic concern (EC). Moderately high levels of inhibitory control are also hypothesized to be positively associated with sympathetic, other-oriented responding, thus describing people who are able to maintain an optimal distance from the emotionally evocative situation and of inhibiting self-oriented tendencies (Eisenberg & Fabes, 1992; Eisenberg et al, 1994).

A review of studies supporting the hypothesis regarding the relationships between emotional regulation, emotional intensity and the two dimensions of empathy have been presented (Eisenberg, Wentzel & Harris, 1998), although the majority of these studies support the relationship with personality variables separately, rather than interactively. For example, Eisenberg et al. (1994) found that both emotionality and regulation relate differently to individual differences in sympathy, distress, and perspective taking, especially when dispositional measures of the constructs are considered. Self-reported dispositional personal distress (assessed with Davis' 1994 questionnaire) was related to low levels of both self-reported regulation and friends' reports of subjects' coping, and both personal distress and sympathy were positively related to intensity of negative emotion and dispositional proneness to experience sadness. A regression

analysis showed that regulation and emotionality contributed unique variance to outcomes, and the predicted moderating (interaction) effects were not obtained in this study.

However, in a study with an elderly population, there was an interaction between dispositional negative emotional intensity and regulation when predicting personal distress, but only for women. The relationship between regulation and sympathy was stronger for women who were not prone to intense negative emotions (Eisenberg & Okun, 1996). In a study with children aged 6 to 8 years, there was some evidence of an interaction between general emotional intensity and regulation when predicting teacher-reported child sympathy (Eisenberg, et al., 1996). Children rated low in regulation were low in sympathy regardless of their general emotional intensity, but for children moderate or relatively high in regulation, sympathy increased with the level of general emotional intensity.

Later, in a study with the same children, dispositional sympathy was predicted by a similar interaction between behavioural regulation and general emotional intensity, but only for boys (Eisenberg, et al., 1998). Sympathy increased with regulation for boys who were moderate or high in general emotional intensity. Boys low in general emotional intensity were relatively low in sympathy regardless of regulation, perhaps because they were relatively unlikely to experience vicarious emotion. In addition, at this older age, children (girls and boys) who were low in both general emotional intensity but high in attention focusing were relatively high in sympathy.

In summary, studies have found support for the hypothesis that emotionality and regulation are individual differences that contribute significantly to experiencing sympathy and personal distress in social contexts, and there is some evidence for the interactive effect of both individual variables on empathy, in both children and adult samples. A more recent investigation (Okun, Shepard & Eisenberg, 2000) found that the relationship between negative emotional intensity and dispositional personal distress was moderated by perspective taking, so as perspective taking increased, the strength of the positive relation between negative emotional intensity and personal distress decreased. An exploratory

analysis within this same study also found that the likelihood of starting a volunteer position was observed to decrease as negative emotional intensity increased, thus suggesting the importance of a perspective taking empathy and processes of regulation for people involved in the care of others.

The implications of empathy for adjustment and prosocial behaviour have also been explored (e.g. Davis, Mitchell, Hall, Lothert, Snapp & Meyer, 1999; Okun et al., 2000). Highly empathic individuals will more frequently assist others in distress even if they can escape from dealing with the distressed person (Batson, 1987; Eisenberg & Fabes, 1990), and children show the same pattern of behaviour (Eisenberg, McCreath & Ahn, 1988). In a series of studies about the implications for social functioning of the empathy-sympathy dimension in children, Eisenberg and colleagues reported that children who tend to assist others spontaneously were emotionally expressive in response to peers' behaviour (Eisenberg, Cameron, Tryon & Dodez, 1981), were relatively socially skilled and assertive (Eisenberg, Pasternack, Cameron & tryon, 1984; Eisenberg et al., 1991), and tended to express relatively low levels of egoistic moral reasoning and high levels of other-oriented empathic reasoning (Eisenberg-Berg & Hand, 1979; Eisenberg et al., 1984). In general, Eisenberg and Fabes (1992) consider individuals high in sympathy/empathic emotionality as highly socialised and emotionally competent.

The relationships among the emotional dimensions of empathy, emotionality and regulation are central to this thesis, which proposes a distinction between negative and *positive emotional sensitivity*. The new positive dimension is expected to be related to *empathic concern,* and is expected to describe an other-oriented emotionality reflected in a tendency to react to others' emotions with feelings of concern and understanding of their suffering. Emotional regulation and perspective taking are also hypothesised to influence positive emotional sensitivity, and the interaction with detached coping (Roger, 1995) in the context of health will be explored and expected to affect differently the adaptation process.

1.8. Objectives

1.8.1. General Objective

The general objective of this thesis is to test the moderator role of *Emotional Sensitivity* in the relationship between stress and health outcomes. Emotional sensitivity is being proposed in this research as a new construct that redefines the concept of emotional responsivity, with the aim of differentiating a positive and a negative dimension. The construct of neuroticism will be specially discussed in the context of this thesis, due to its several theoretical and psychometric shortcomings as a description of emotional lability, and an additional more adaptive and functional sphere of this personality variable is then proposed and validated.

1.8.2. Specific objectives

a.- To design a new scale for assessing the construct of Emotional Sensitivity, which would comprise two factors for negative and positive sensitivity. Scenario techniques, factor analyses and confirmatory factor analyses will be used for this purpose.

b.- To perform concurrent and predictive validation studies of the scale using theoretically related measures and experimental designs.

c.- To evaluate the impact of emotional sensitivity over health reports, as well as its moderator role in the relationship between stress and health outcomes.

1.9. Overview of the following chapters.

The following chapter covers the construction of the Emotional Sensitivity Scale (ESS). The scale construction exercise was aimed primarily at generating a psychometrically improved measure to assess the construct of emotional sensitivity, which discriminates between negative and positive components.

The third chapter covers the concurrent validation of the first version of the scale, using measures with a theoretical relationship to the new scale; while chapter four focuses on predictive validation. This included a reactivity stress

test using emotional and non-emotional slides in experiment I, where significant differences between low and high negative sensitivity subjects were found for heart rate. Experiment II used exposure to depictions of facial emotions developed by Ekman and Friesen (1975), but the results did not support the hypothesised higher ability of high positive sensitivity subjects to recognise accurately emotional expressions.

These experimental results, together with the results from the concurrent validation, suggested that the scale may not have yielded discriminable positive and negative components, and a decision was taken to revise the scale. Accordingly, chapter five reports the revision of the ESS, which includes both a new test construction exercise and a concurrent validation study using related measures. The revised scale resulted in two orthogonal factors, describing self-oriented emotionality, named Negative Egocentric Sensitivity (NES), and an other-oriented emotional reactivity, labelled Positive Interpersonal Sensitivity (PIPS). Confirmatory factor analysis supported the new factorial structure, and the concurrent validation reported in chapter 5 provides clear support for the revised version in comparison with the original.

Chapter six reports the results of two experiments testing the predictive validity of the new ESS, using revised experimental designs in order to address shortcomings identified in chapter four. The first experiment exposed the subjects to a Stroop test paradigm while measuring heart rate and blood pressure, and results supported the hypothesised higher reactivity of high NES as compared with low NES subjects. The second experiment again used the Ekman and Friesen (1975) facial emotions, but based on a computer program that allowed rapid exposure. Results supported the hypothesised higher ability of high PIPS individuals to accurately recognise emotions in faces.

Chapter seven reports the exploration of the moderating role of Emotional Sensitivity in the relationship between stress and health outcomes. Using entry to university as a stressor, two samples of undergraduates were administered health checklists, the new ESS and several other personality questionnaires at the beginning and at the end of the first term. The data were used to test both

the relationship between individual differences and health outcomes, and the mediation of the emotional sensitivity dimensions in the stress-illness process.

In view of widely-shared stereotypes about cultural differences in emotional responsivity, the ESS was translated into Spanish and tested in a study of health outcomes in Venezuelan college students. Chapter eight reports on an exploratory factor analysis in the Venezuelan sample, which yielded a three-factor structure, later confirmed using confirmatory factor analysis. A concurrent validation study with theoretically related measures supported the expected relationships, and a predictive study of health and adaptation indicated that the negative dimension of the Spanish ESS was primarily involved in predicting health deterioration after eight weeks. A comparison of the British and Venezuelan samples regarding their scores on the ESS was performed, and this is reported in chapter nine, based on cross-cultural approaches to personality and individual differences.

Finally, the main findings are drawn together in the concluding chapter, which also indicates suggestions for future research.

CHAPTER 2

THE CONSTRUCTION OF THE EMOTIONAL SENSITIVITY SCALE (ESS)

2.1. Introduction

The present chapter describes the construction of the *Emotional Sensitivity Scale* (ESS), which was developed to assess emotional responsivity to environmental stimuli, and particularly the ability to perceive and recognise emotional states in individuals themselves and in others in response to environmental demands. The questionnaire was developed in the context of research on the role of personality in moderating the relationship between stress and illness. The aim of the scale construction exercise was to address the shortcomings identified in existing measures of emotional responsivity, especially in the neuroticism (N) scales (Eysenck & Eysenck, 1964; 1975), and to test the moderating role of this new personality variable in the stress-health relationship.

2.1.1. N and Negative Sensitivity

In the personality literature, two higher-order constructs that differentiate between cognitive and emotional dimensions have consistently emerged from factor analyses of trait descriptors. The two dimensions are conventionally labelled extraversion (E) and neuroticism (N), respectively, and although they are subsumed within the broader framework of stimulus intensity control (Roger & Raine, 1984), they are distinguished from one another both physiologically and psychometrically. Extraversion, for example, is thought to involve cortical arousal via the cortico-reticular loop, but without incurring emotional arousal. On the other hand, N includes emotional arousal via collateral projections from the reticular formation to the limbic system (Eysenck, 1967).

As the literature reviewed showed, confirmatory evidence for cortico-reticular involvement in regulating individual differences in E has come from studies in which

arousal levels were systematically manipulated using drugs such as sodium amytal (e.g. Claridge & Herrington, 1963) or caffeine (Revelle, Amaral & Turriff, 1976). The findings for N have been less clear-cut, and when both N and E were manipulated simultaneously in Claridge's study of sedation thresholds (Claridge, Donald & Birchall, 1981), differing levels of neuroticism served to confound the results. In fact, the literature reviewed in Chapter 1, uncovered a number of unresolved issues in the way that emotion and emotional response style are explained in terms of neuroticism.

E and N are thought to be statistically orthogonal, and although this has been confirmed, there is a range of psychometric shortcomings in the measure used to assess both dimensions. For example, extraversion in Eysenck's original Eysenck Personality Inventory (EPI – Eysenck & Eysenck, 1964) incorporates impulsiveness and sociability, while the impulsiveness items in the later Eysenck Personality Questionnaire (EPQ – Eysenck & Eysenck, 1975) had migrated onto the psychoticism subscale (Rocklin & Revelle, 1981; Campbell & Reynolds, 1982).

Neuroticism also has different sub-components in the EPI and EPQ versions, and the measures in the two questionnaires are clearly not psychometrically equivalent. For instance, Roger and Nesshoever (1987) reported the presence of two distinguishable factors for the EPI-N, labelled *Sensitivity* and *Hypochondriasis,* with only 19 of the 24-items of the N scale loading on both. A further factor analysis of EPQ-N revealed that this scale replicated only the S*ensitivity* factor included in EPI-N, with a different pool of items comprising a second factor concerned with *Moodiness* (Roger & Morris, 1991).

In a similar vein, Goh, King and King (1982) factor analysed all 90 items in the EPQ questionnaire and found that 5 items of the N scale loaded significantly on the P scale. Likewise, the factors from the whole instrument accounted for only 18.9% of the variance in EPQ scores. These results replicated partially those found by Loo (1979), who confirmed a structure of sixteen interpretable factors from a first-order factor analysis of the EPQ. Further analysis yielded two third-order orthogonal

factors, anxiety-paranoia and emotionality-psychopathy. The author concluded that these two factors combined elements of both N and P, which again confounds a clear structure of the construct. Helmes (1980) also failed to replicate the EPQ four-factor structure claimed by Eysenck (E, N, P, L), either at the first or at the third-order levels. These components only accounted for 30% of the variance, and the items did not load in accordance with the EPQ scoring key.

Costa and McCrae (1995) have also described the multidimensionality of the Eysenck's EPQ-N, reporting a correlation of 0.81 between this scale and a factor extracted from the scales of the Eysenck Personality Profiler which incorporated inferiority, unhappiness, anxiety, dependence, hypochondriasis, guilt and obsession; once again confirming the ambiguity of the construct and its measure. Moreover, Eysenck's N scale from the P-E-N questionnaire (Eysenck & Eysenck, 1972; c.f. Farley & Goh, 1976) was particularly susceptible to socially desirable responding and fakeability (see Farley and Goh, 1976 for a review).

Summarizing, the E and N scales from the EPI and the EPQ questionnaires are not psychometrically equivalent, which in tum raises the question about the validity of these personality constructs. The psychometric inconsistencies might be also responsible for the mixed results observed in experimental settings, undermining support for Eysenck's theory.

In the specific case of N, the construct is further marred by apparent confounding with a range of other variables, especially self-esteem, which may well account for the "third-variable" confound effect of neuroticism (e.g. Roger, 1995). The construct is also conceptually biased by a definition that is explicitly pejorative – N is construed in exclusively negative terms. The definition of neuroticism includes an element of emotional sensitivity as well as lability, and since emotional sensitivity may be positive or even advantageous in some circumstances – in psychotherapy, for example- the negative bias represents a serious limitation, both theoretically and psychometrically. These shortcomings can be resolved by expanding the construct to incorporate both positive and negative components of emotional sensitivity.

As described in chapter 1, the positive dimension of emotional sensitivity can be theoretically related to the construct of empathy, since this individual difference has been conceptualised as a kind of emotional sensitivity which reflects the emotion perception threshold of people to recognise basic emotions either in themselves or in others (Martin et al., 1996). The next section will review briefly some of the traditional scales to measure empathy, as well as their limitations that restrain the possibility to use them in a reliable way.

2.1.2. Empathy and Positive Sensitivity

Empathy refers to the dispositional ability of a person to perceive, recognise and share another's feelings and thoughts, as well as react to the observed experiences of another (Mehrabian & Epstein, 1972; Davis, 1983). However, since the construct of empathy has been recognised as a multidimensional individual characteristic by some theorists (Davis, 1980; 1983; Cliffordson, 2002), comprising both a cognitive and an emotional component, positive sensitivity in the new emotional sensitivity construct was expected to be related only to the emotional aspect of empathy.

Specifically, the multidimensional approach of empathy proposed by Davis (1980; 1983) comprises four different dimensions, each tapping some aspect of the global concept. These dimensions measured by the Interpersonal Reactivity Index (IRI - Davis, 1980) are all concerned with responsivity to others, but according to Davis (1983) are also discernable from one another. The Perspective-Taking scale (PT) assesses the tendency to spontaneously adopt the psychological point of view of others; while the Fantasy (FS) scale taps respondents' tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, movies and plays. The other two sub-scales measure typical emotional reactions of the respondents: the Empathic Concern (EC) scale assesses "other-oriented" feelings of sympathy and concern for unfortunate others, and the Personal Distress (PD) scale measures "self-oriented" feelings of personal anxiety and unease in tense interpersonal settings.

From these, the dimension which seems most closely related to the *positive emotional sensitivity* factor proposed in the new scale is the *empathic concern* construct, since it reflects the tendency of the respondent to experience feelings of warmth, compassion and concern for others undergoing negative experiences. However, two basic shortcomings were identified in the *empathic concern* scale proposed by Davis (1980). Firstly, the scale comprises only seven items, so is unlikely to provide a sufficient sampling of the possible other-oriented emotional reactions of an individual (e.g. Kline, 1993). Secondly, some of the items of the scale were borrowed from existing scales, while the author according to his own view of the construct wrote others. This may not take into account the real reactions of people in natural situations, perhaps introducing some bias in the measurement of the concept.

Other measures have been proposed to assess empathy, but limitations can also be identified in them. For instance, the Questionnaire Measure of Emotional Empathy (QMEE - Mehrabian & Epstein,1972) contains some items assessing cognitive responses (e.g., "I rarely become involved when I watch a movie"), even though it was conceived by the authors as a measure of emotional empathy (Davis, 1980; Cliffordson, 2002). Secondly, the items in Mehrabian and Epstein's questionnaire measure the two different kinds of emotional empathy described earlier (empathic concern and personal distress), but the authors consider them to be a unique dimension forming a total empathy score.

Another available questionnaire is the Hogan Empathy Scale (HES; Hogan, 1969), which suffers the same limitations as Mehrabian and Epstein's scale. Thus, items in this questionnaire tap both the affective and cognitive domains of the construct, all summed up in a single empathy score, thus obscuring the separate influence that those components may have on behaviour (Davis, 1980; Cliffordson, 2002).

Finally, a scale measuring empathy was proposed by Eysenck and Eysenck (1978; 1985) as part of their Impulsiveness, Venturesomeness and Empathy Scale (I_7). This is a 20 item-scale, mainly constructed from Mehrabian and Epstein's

Questionnaire Measure of Emotional Empathy. A factor analysis of this scale conducted by Thornton and Thornton (1995), revealed that the items constitute a quite homogeneous dimension labelled by the authors "Emotional Response Matching", which describes the tendency to become emotionally involved with, and be disturbed by, other people's problems or distress. High scorers in this factor tend to respond to others' emotions with a matching emotional reaction, thus explaining the positive correlation between the Empathy and Neuroticism scales (Eysenck & Eysenck, 1978). Regardless of the properties of this scale, the construct behind differs substantially from the one proposed for Positive Emotional Sensitivity. Specifically, positive sensitivity refers to empathic concern and the ability to sympathize with others in stressful circumstances, but without experiencing the same distress. Only in this way the Positive Emotional Sensitivity could act as a type of protective and functional emotional reactivity. It is also expected that the two dimensions of the new scale – Negative and Positive Emotional Sensitivity- will be orthogonal to one another.

In summary, the main aim of this chapter is to address the shortcomings identified in the measures of neuroticism and empathy, by constructing and validating a new instrument that distinguishes between the positive and negative components of emotional responsivity. The new construct will be called emotional sensitivity, and the aim of this chapter is to establish a factorial structure that discriminates between the positive and negative factors.

2.2. Method

2.2.1. Subjects

The subject sample consisted of 270 university undergraduates from the University of York (mean age= 19.78 ; SD= 4.78), 121 males (mean age= 19.29 ; SD= 3.99), and 149 females (mean age= 20.18; SD= 5.32), who voluntarily participated in the study.

2.2.2. Item Construction

New questionnaires are often constructed by appropriating items, or even entire scales from existing questionnaires. For example, in the construction of the original Repression-Sensitisation Scale a series of sub-scales from the Minnesota Multiphasic Personality Inventory (MMPI) were simply pooled on the basis of their face validity to provide items (Altrocchi, Parsons & Dickoff, 1960). These were subsequently refined by Byrne and his colleagues (Byrne, 1961; Byrne, Barry & Nelson, 1963) to form a shorter scale, but the pitfalls of the procedure were revealed by a factor analysis of the R-S. This showed that the primary component of the scale was in fact sociability, with only a very small number of items addressed to emotional response style (Roger & Schapals, 1996).

Other widely-used techniques for generating item pools include consultation with experts in the field, but this involves inherent biases. A more reliable alternative, and the one used in this study, was to elicit items from a scenario study. The scenario technique was pioneered in the personality research programme at the University of York (see for example Forbes & Roger, 1999), and involves the administration of a series of relevant scenarios to a sample of subjects who are asked to say how they would think, feel and act in the circumstances described. Their responses are then used as closely as possible to verbatim, which ensures that the items are phrased in the vernacular rather than in academic or research terminology.

A scenario study was then carried out to generate the original pool of items, which constituted the preliminary version of the questionnaire. A total of 14 open-ended questions were sent to 26 undergraduate students from a previous volunteer subject panel. Examples of the scenarios are:

- *You are home after a tough day, you decide to cook something really good for dinner, but before you can start to you are forced to wash the dirty dishes and saucepans your roommates left in the kitchen sink after lunch.*

- *Your cousin is getting married and asked your father to be his best man. At the wedding your father stands up to give a speech and you see* from the way he is *fumbling around in his pocket that he forgot his notes. You see him get all red in the face as he desperately tries to remember what he intended to talk about.*

The responses yielded over 200 statements, and after rejecting inappropriate or repeated responses, a pool of 79 items formed the preliminary scale (see Appendix A). The subjects answered the scale using a forced-choice format (*true - false*).

2.2.3. Preliminary version of the ESS.

The 79-item version was sent to the subject panel, together with other questionnaires. The data were factor analysed using principle axis factoring from the Statistical Package for the Social Sciences (SPSS – Norusis, 1997). The Scree test (Cattell, 1966) suggested 3 factors, so an initial three-factor solution using Varimax orthogonal rotation and .30 as criteria for significant factor loading was performed.

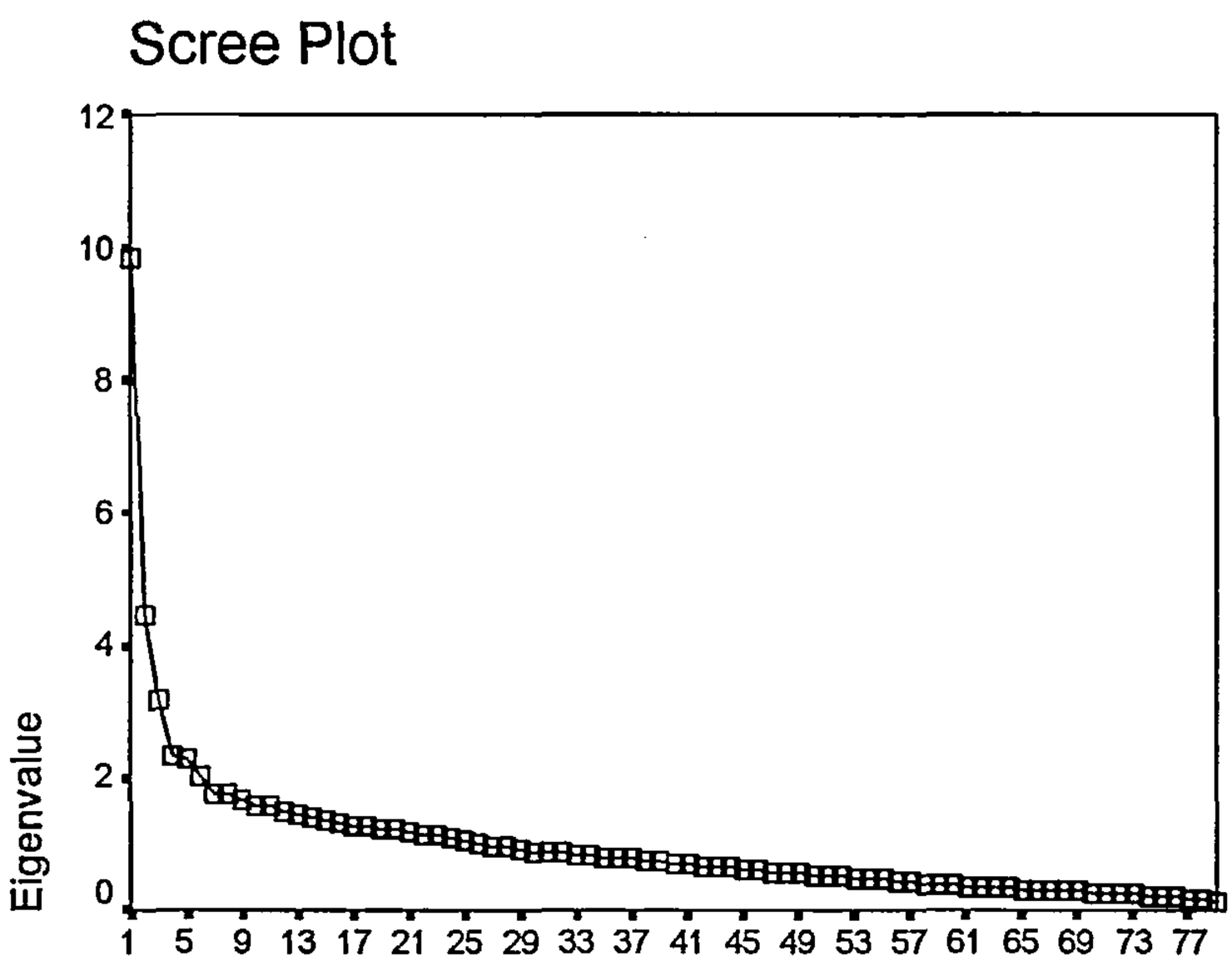


Figure 2.1. Scree test for preliminary ESS

The three factor solution extracted 38 items on the factor 1, 12 items on factor 2, and 9 on factor 3. The highest loading item on factor 1 was item 33 "little things are often enough to put me in a foul mood" (0.68); while the highest loading item on factor 2 was No. 57 "If any of my family or friends have problems I always try to find a way to help them" (-0.62). For factor 3, the highest loading item was No. 4 "I often worry that I have done something to upset people" (0.50). Inspection of other items on the factors suggested that factor 1described negative feelings and emotions oriented to the self, while factor 3 referred to similar emotions but mainly generated in social situations, describing social sensitivity. Alternatively, factor 2 comprised items related to sensitivity toward others, very similar to the construct of empathy. Since factors 1 and 3 described similar negative emotions but in different contexts, a two-factor solution was attempted. It was hypothesised that items in factor 3 would migrate to factor 1 if the two factors were closely related, and the small size of the third factor was as an additional reason to explore a more restricted solution.

As expected, the majority of the items from factors 1 and 3 emerged in factor 1, with four items specifically from factor 3. Thus, factor 1 comprised 40 items with the highest loading on item 33, "little things are often enough to put me in a foul mood" (.63). The second factor had15 items, with the highest loading again on item 57 "If any of my family or friends have problems I always try to find a way to help them" (0.58), related to a dimension of emotional sensitivity to others. This second factor comprised all 12 items from the second factor of the earlier analysis and 3 of the third factor, respectively. 24 items remained out of these two factors.

In order to explore further the internal structure of factor 1, an analysis of this factor alone using a two-factor terminal solution was carried out. Varimax orthogonal rotation yielded two different sub-factors, which included 27 of the items. The first comprised 19 items, but with 7 further items double-loading on the second factor. The highest loading item on sub-factor 1 was again item 33 "little things are often enough to put me in a foul mood" (0.62), with the rest of the items referring to the negative dimension of emotional sensitivity. Interestingly, sub-factor 2 comprised 8

items, with the two highest loadings on items 53, "my feelings always leave me so confused" (0.67), and 52, "I am often unsure how I feel about things" (.57). Thus, this group of items were all referred to *uncertainty about personal emotions.* At least 6 of these items had loaded on factor 1 in the original 3-factor solution, but was the process of exploring factorially the structure of the scale that emerged here at defining items of a discrete sub-factor.

2.2.4. Final version of the ESS

The detailed factorial exploration of the data set reported above uncovered a cluster of 8 items from the scenarios, which were concerned with emotional uncertainty (sub-factor 2 of factor 1). Since this construct did not relate directly to emotional sensitivity, and was too small to be factorially reliable, these 8 items were removed. Further analyses indicated that some items were highly inter-correlated, which would serve to bias the analyses, and these were also removed. A final two-factor solution using Varimax orthogonal rotation and .30 as criteria for extraction was performed with the remaining 66 items (eigenvalues for factor 1 = 7.47 and factor 2 = 4.17 for factors). Forty-one items loaded significantly on the two factors, factor 1 comprising 27 items and factor 2 comprising 14 items (see Appendix B, with all significant factor loadings). The two highest loadings on factor one were item 33, "little things are often enough to put me in a foul mood" (0.63) and item 39, "I often feel sorry for myself" (0.58). This factor was named *Negative Emotional Sensitivity (NES)* since it clearly described a tendency to experience high levels of self-oriented negative emotions such as helplessness, vulnerability, apprehension, self-criticism, upsets and anger. No double-loading items appeared in this final factor.

The two highest loadings on factor 2 were item 32, "I feel upset when I realise that there is nothing I can do to help other people who are having problems" (0.58), and item 57, "If any of my family or friends have problems I always try to find a way to help them" (0.58). Item 21, "I often feel responsible for how other people are feeling" also loaded on factor 1, but in a much lesser magnitude (.33), so it was retained for factor 2. This factor clearly comprised items referring to *empathic*

concern or *other-oriented emotional sensitivity* and was then namely *Positive Emotional Sensitivity (PES).* The items describe concern about other's emotions and well-being, ability to recognise and understand other's emotions, intentions to help others facing problems and generally react to other's emotional experiences. Table 2.1. sets out further examples of items from the two factors.

Table 2.1. Example of items from the two factors of the ESS

Number of item	Item content	Item loading
Factor 1 (NES)		
Item 68	I am generally an apprehensive person	.55
Item 73	I can easily control my nerves	-.50
Item 25	I get angry when things don't work out	.42
Factor 2 (PES)		
Item 78	I like to stay away from other's emotional reactions	-.53
Item 43	I try to detach my self from other people who are facing difficult situations in order to not get involved	-.44
Item 14	I find it easy to understand other's people feelings	.40

In summary, the final version of the *Emotional Sensitivity Scale* (ESS) comprised 41 items, grouped in two factors: Negative Emotional Sensitivity (NES) with 27 items, and *Positive Emotional Sensitivity* (PES) with 14 items. The final scale is presented in Appendix C.

2.3. Reliability Analysis

2.3.1 Test-Retest reliability

For the test-retest analysis, the ESS was sent to a new sample of volunteer undergraduate students (cohort 2000-2001) from the University of York, who were tested twice with an inter-test interval of 8 weeks. The final sample for the analysis comprised 113 students, 39 males (mean age 18.85; SD= 1.04) and 74 females

(mean age 18.80; SD = .92). The test-retest coefficients were highly acceptable for both factors (see table 2.2).

Table 2.2. Test-retest correlations for the ESS dimensions

Factor	*Re-test correlation (N= 113)*
Negative Emotional Sensitivity (NES)	.849**
Positive Emotional Sensitivity (PES)	. 710**

** $p < 0.0001$

2.3.2. Coefficient Alpha

Internal consistency was assessed by computing Alpha coefficients for each factor, based on the whole original sample of 270 Ss. Results indicated a high internal consistency for factor 1 (NES = 0.87) and a moderate but acceptable consistency for factor 2 (PES = 0.65).

2.4. Descriptive statistics and Inter-correlations

The data presented in table 2.3 showed that females scored significantly higher than males on both NES (t = -2.09; p= .004) and PES (t= -3.36; p= 0.01).

Table 2.3. Descriptive statistics for the ESS factors

	NES	***PES***
	Mean scores (SD)	
Males (N= 119)	11.76 (4.45)	6.61(2.09)
Females (N=148)	12.90 (4.44)	7.47 (2.04)
Total (N = 266)	12.37 (4.47)	7.07 (2.11)
Possible Range	0-27	0-14
Males (N=119)	4-21	1-12
Females (N= 148)	3-22	2-14
Total	3-22	1-14

Table 2.4. presents the results of the correlations between the factors, for the whole sample and by gender.

Table 2.4. Simple correlations between the ESS scales

	Positive Emotional Sensitivity (PES)
Negative Emotional Sensitivity (NES)	
Total (N= 266)	.196**
Males (N=119)	.348**
Females (N= 146)	.022

**. Correlation is significant at the 0.01 level (2-tailed).

Overall, results showed that the factors had a low positive correlation, and owing to the relatively large sample the coefficient was significant ($p < 0.01$). However, the coefficient of determination indicated that the factors shared only 4% of the variance. Results by gender were slightly different, since the factors were positively related for men, but were approximately orthogonal for women.

2.5. Discussion and Conclusions

This chapter described the construction of the Emotional Sensitivity Scale (ESS), which has been devised as a new measure of emotional responsivity. The main aim of the test construction exercise was to address the shortcomings identified in traditional measures of N (e.g. EPI, EPQ and NEO-PI-N), which have been conventionally defined in negative terms and confounded with low self-esteem (Roger, 1995; Roger et al., 2000). The existence of a more adaptive and positive expression of the emotional responsivity has been neglected in traditional measures of N, so the construction of this new scale was aimed particularly at incorporating this second dimension of the construct.

Scenarios were used to generate items that represented a wide range of emotional reactions, and after performing several factor analyses, the scale construction finally resulted in two factors comprising 41 items in total. Factor 1 comprised twenty seven items describing the tendency to experience self-oriented negative emotions such as helplessness, vulnerability, apprehension, self-criticism, upsets and anger, so was consequently called *Negative Emotional Sensitivity (NES).* The second factor comprised fourteen items related to the tendency to perceive and recognise others' emotional expressions, concern about others' emotions and well-being, involvement in others' emotions, and intentions to help others facing problems. The factor was then named *Positive Emotional Sensitivity (PES).* Both factors were internally consistent and had adequate test-retest reliability over an inter-test interval of eight weeks. There are distinct parallels between NES and traditional neuroticism scales, and between PES and constructs such as empathy. They are, however, distinguishable from these constructs, as will be shown in chapter 3.

The gender differences for NES and PES replicated previous findings regarding related variables. Specifically, women reported higher negative emotional sensitivity than men, supporting previous studies where women have shown consistently higher than men in neuroticism (Bryant, Yamold & Grimm, 1996; Carter & Loo, 1979; Eysenck, 1958; Eysenck & Eysenck, 1978; Eysenck, Eysenck & Barrett, 1985; Smith & Reise, 1998), and these differences exist regardless of age (Eysenck, Eysenck & Barrett, 1985). Likewise, women in this study showed a higher ability to display concern empathically for others, similar to studies that have reported females scoring higher than males on empathy measures (Davis, 1980; Eysenck & Eysenck, 1978; Eysenck, Pearson, Eastig & Allsop, 1985; Hoffman, 1977; Martin et al., 1996; Mehrabian and Epstein, 1972). As with negative emotions, females tend to show higher emotional empathy independently of age (Eysenck, Pearson, Easting & Allsop, 1985).

Finally, the two scales were found moderately positively correlated. However, the very small magnitude of shared variance (4%) suggested that they are conceptually

independent. The presence of a small component of emotional involvement with others' problems in the positive sensitivity factor probably explains the relationship, and this is an issue that deserves further investigation.

The gender differences in the NES-PES correlations also deserve some attention. A moderately positive correlation between the factors was found for males, whereas for females the factors were almost completely independent. A possible explanation could be that men are not able to disengage or detach from the negative emotions and feelings of the others they sympathise with, thus conflating the two scales. Clearly, however, women do distinguish between self and other-oriented emotional concern, which may reflect stereotypical notions about women's greater capacity to empathise.

In conclusion, the construction of the Emotional Sensitivity Scale attempted to address the shortcomings of traditional measures of N or emotional lability, with the aim at assessing a wider range of emotional reactions, including positive and more adaptive expressions of sensitivity. The Negative Emotional Sensitivity (NES) scale particularly assesses the tendency to experience a self-oriented negative emotionality, while the Positive Emotional Sensitivity scale measures the tendency to perceive and identify emotions in others, as well as to sympathize and be concerned about others' well being. NES should thus relate significantly to measures of negative emotionality, while the PES scale should be associated with measures of empathic concern, sympathy and positive emotionality. The next chapter will explore these issues in order to determine more precisely the nature of the factors.

CHAPTER 3

CONCURRENT VALIDATION OF THE ESS

3.1. Introduction

The results from the factor analysis reported in chapter 2 uncovered two relatively independent factors that were subsequently named Negative Emotional Sensitivity (NES), and Positive Emotional Sensitivity (PES). The two factors were shown to be internally consistent and to have satisfactory retest reliability over an eight-week inter-test interval. The concurrent validation of the ESS will be based on comparison with existing scales.

As described in the previous section, the NES scale measures the tendency to experience self-oriented negative emotions, whereas PES assesses the tendency to recognise and react to others' emotional experiences. In contrast with the negative dimension of sensitivity, the positive dimension measures an other-oriented emotional reactivity. It might be thus expected that NES would correlate positively with measures of negative emotionality; while PES would be associated with measures assessing empathy or other-oriented emotionality.

A total of four mail-outs each with a different set of scales were posted to undergraduate samples through winter 1999 and spring 2001 (cohorts 1999-2000, and 2000-2001, respectively), and data were used to validate the final form of the 41-item ESS. Owing to the different number of subjects responding in each mail-out, the number entered into the analyses varied to some extent from one analysis to another. The scales used in the present study have been all extensively validated, and have either been used in health related studies or are specifically related to the constructs of negative or positive sensitivity.

3.2. The criterion variables

The scales used for the first concurrent validation exercise were the following:

1. ***The 20-item Empathy index from the I_7 Impulsiveness, Venturesomeness and Empathy Questionnaire*** (Eysenck & Eysenck, 1978), which was

expected to correlate positively with the PES scale. The reliability for this scale is relatively weak as reported by its authors (0.654 for men; 0.637 for women; Eysenck & Eysenck, 1978). The scale can be answered through a *yes* or *no* format, and responses to the items are added up to form a total score for empathy.

2. ***The NEO Five-Factor Inventory*** (NEO-FFI; Costa & McCrae, 1992a). This is a 60-item version from the original questionnaire (NEO-PI-R; Costa and McCrae, 1985), that can be scored for the five domains of personality: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. The neuroticism (N) domain describes the tendency to experience negative affects such as fear, sadness, embarrassment, anger, guilt and disgust. Extraversion (E) describes the tendency to be sociable, confident, optimistic and cheerful; while openness (O), although less known than N and E, describes people with an active imagination, aesthetic sensitivity, attentiveness to inner feelings, with preference for variety, intellectual curiosity and independence of judgement. The dimension of agreeableness (A) represents people highly sympathetic to others and eager to help them, as well as trusting, straightforward, altruistic and compliant. Finally, the scale of conscientiousness (C) describes the tendency of individuals to feel self-competent and to show order, dutifulness, achievement striving, discipline and deliberation (Costa and McCrae, 1992a). Reported test-retest reliabilities for these scales are .79, .79, .80, .75 and .83, respectively (Costa & McCrae, 1992a). The N scores were expected to positively correlate with NES, while a positive correlation was expected between PES and scores on both the extraversion (E) and the agreeableness (A) dimensions.

3. ***The Emotional Expressivity Scale*** (EES – Kring, Smith and Neale, 1994), which comprises 17 items measuring the extent to which people outwardly display their emotions, regardless of valence (positive or negative) or channel (facial, vocal or gestural). Although expressivity may be different from sensitivity, a moderate positive correlation was expected between the ESS and EES scales, particularly PES, since high positive sensitivity subjects might be expected to be more expressive and open about their feelings when relating

with others. The authors of the EES reported high internal consistency (α= .91), and .90 as test-retest correlation for this scale.

*4. **The New Rumination and Emotional Inhibition** scales* from the Emotional Style Questionnaire (ESQ – Roger, Guarino & Olason, 2000). These scales are revised and expanded versions of the rumination (R) and emotional inhibition (E-I) scales from the Emotional Control Questionnaire-2 (ECQ-2, Roger & Najarian, 1989). The items in the original ECQ-R scale comprised items that were concerned primarily with rumination over past events, and the revision of the scale included the addition of a number of future-oriented items. The E-I component was also expanded by the addition of items adapted from a new set of scales aimed at assessing the capacity to use social support (ITQ – Forbes & Roger, 1999), mainly the fear of disclosure and social coping sub-scales. A preliminary factor analysis of this new expanded 67-item pool yielded two unambiguous factors concerned with rumination (18 items) and inhibition (21 items) (Roger et al., 2000). Alpha reliabilities for both scales were satisfactory (.875 and .905, N= 174, respectively). Previous findings revealed a positive association between the rumination factor and the overall N scores from the EPI, whereas no relationship was found with the emotional inhibition scale (Roger & Nesshoever, 1987). Also reported in the study was the correlation between the empathy scale from the I_7 questionnaire (Eysenck & Eysenck, 1978), where the negative correlation with emotional inhibition approached significant (Roger & Nesshoever, 1987). Considering the tendency of negative sensitivity subjects to be self-oriented about their negative emotions, a positive correlation between this scale and scores in rumination was expected. A negative relationship between scores on the emotional inhibition scale and those on the PES was anticipated, since empathic and emotionally other-oriented individuals might be expected to be more expressive and open about their feelings.

*5. **The Positive and Negative Expectancy Questionnaire*** (PANEQ - Olason & Roger, 2001). This 48-item questionnaire was designed to assess three different factors measuring expectancies and affectivity, named *positive affect/optimism (PAO), negative affect/pessimism (NAP) and fighting spirit (FS)*, and they were

included in order to explore the relationship between the ESS scales and an index of affectivity. It was expected that NES would correlate positively with the pessimism scale, which is a proxy for negative affect, and inversely with optimism, which assesses positive affect (Olason & Roger, 2001).

Fighting spirit measures expectancies for success, determination and endurance, and was also expected to correlate negatively with NES. Correlations with the PES dimension were expected in the opposite direction, as previous findings suggest a direct and positive association between dispositional positive affect and empathic concern (Eisenberg et al., 1994). Alpha coefficients for the PANEQ factors were satisfactory (Pessimism = .90, Fighting Spirit = .87, and Optimism = .75, respectively) (Olason & Roger, 2001).

3.3. Method

3.3.1. Subjects and Procedure

Sample 1: Subjects were 270 undergraduate students from a volunteer panel at the University of York (cohort 1999-2000), other than psychology students. 121 were males (mean age 19.29 yr; SD 3.99), and 149 females (mean age 20.18 yr; 5.32). This sample was administered a series of scales (mail-out 1), including the ESS and the PANEQ. Some weeks later, a sub-sample of 82 students also completed the Empathy scale (Eysenck & Eysenck, 1978) as part of an experimental session. This group comprised 38 males (mean age = 20.13, SD = 5.40), and 44 females (mean age = 19.50, SD = 4.05). Finally, a second mail-out was carried out, and a sub-sample of 166 students (61.48% from the original sample) were administered the NEO-FFI, the ESQ and the EES scales. This group comprised 75 males (mean age = 19.58, SD = 5.16) and 91 females (mean age = 19.67, SD = 4.53).

3.3.2. Statistical analysis

Scores were computed for all the scales in each mail-out and bivariate Pearson correlations were calculated between the ESS scales and the criterion variables.

3.4. Results

An inspection of the data revealed that the pattern of correlations between the ESS scales and empathy and PANEQ scales were generally in the expected direction (see table 3.1). Firstly, NES correlated positively with the pessimism scale, significantly inversely with optimism and fighting spirit, and non-significantly with the I_7 empathy scale. On the other hand, a moderately high positive correlation was found between PES and the I_7 empathy scale, as expected, and this association remained even after controlling the effects for gender ($r = .507$; $p < 0.001$). However, a significantly positive correlation was found between PES and pessimism, which accounted for only about 5% of common variance but was contrary to expectations. The association between PES and PAO was positive but non-significant.

Table 3.1. Intercorrelations among the ESS dimensions and measures of empathy, pessimism, optimism and fighting spirit

Criterion	NES	PES
I_7 – Empathy	.197 (N=81)	.507** (N=81)
NAP- Negative affectivity/Pessimism	.702** (N=264)	.243** (N=266)
PAO – Positive affectivity/Optimism	-.280** (N= 262)	.103 (N= 264)
FS- Fighting Spirit	-.249** (N= 264)	.043 (N= 266)

** $p < 0.001$, *$p < 0.05$. NES = Negative Emotional Sensitivity. PES = Positive Emotional Sensitivity

Table 3.2. sets out the results for the correlations computed on data from the second mail-out, where the NEO-FFI, the ESQ and the EES were administered together with the ESS.

Table 3.2. Intercorrelations among the ESS dimensions and the NEO-FFI factors, ESQ and EES scales

Criterion	NES	PES
NEO-FFI-N	.657** (N=164)	.073 (N=164)
NEO-FFI-E	-.195* (N=162)	.248** (N= 162)
NEO-FFI-OE	-.013 (N= 162)	.025 (N= 162)
NEO-FFI-A	-.383** (N= 163)	.303** (N= 163)
NEO-FFI-C	-.215** (N= 162)	.060 (N= 162)
ESQ-Rumination	.699** (N= 166)	-.026 (N= 166)
ESQ-Emotional Inhibition	-.028 (N= 166)	-.407** (N= 166)
EES	.102 (N =166)	.399** (N =166)

** p< 0.001, *p< 0.05. NES = Negative emotional sensitivity. PES = Positive emotional sensitivity. N= Neuroticism; E= Extraversion; OE = Openness to Experience; A= Agreeableness; C= Conscientiousness EES = Emotional expresivity scale.

The correlations among the ESS dimensions and the NEO-FFI domains were in the expected direction. For instance, NES was highly positive related with N, while inverse significant correlations emerged with E, A, and C. Contrarily, PES was positively related to E and A. Correlations between the two dimensions of the ESS and O were non-significant.

As expected, NES correlated highly positively with rumination, while a correlation near zero resulted in PES. For emotional inhibition, there was a non-significant association with NES, but a significantly inverse correlation with PES. Results for the EES scale were also in the expected direction, with a moderately high positive association with PES, and a non-significant correlation with NES.

In summary, these results provided good evidence for the discriminant validity of the ESS scales. NES showed the strongest relationship with negative affect/pessimism, neuroticism and rumination, which supports the notion that the NES scale was predominantly a measure of negative emotionality, and there was an inverse association between NES and variables related to positive affectivity such as optimism, fighting spirit, agreeableness and conscientiousness. In contrast, PES was positively related to measures of empathy and emotional expressivity; the only contrary result was between the

PES and NAP scales. Subsidiary analyses using other related measures will be presented in the next section in order to extend the present results.

3.5. Subsidiary Analyses

As indicated above, data for the concurrent study were collected through winter 1999 and spring 2001, and two different cohorts of undergraduate students participated. In this second stage, a different series of questionnaires were used in order to expand the results of the study. These were:

1. ***The Interpersonal Reactivity Index*** (IRI - Davis, 1980). This is a 28-item scale comprising four 7-item subscales measuring cognitive and emotional dimensions of empathy. The perspective-taking sub-scale assesses spontaneous attempts to adopt the perspective of others and to see things from their points of view, while the fantasy scale measures the tendency to identify oneself with characters in movies, novels, plays and other fictional situations. The other two subscales explicitly tap respondents' chronic emotional reactions to the negative experiences of others. For example, the empathic concern scale enquires about respondents' feelings of warmth, compassion and concern for others, while the personal distress scale measures the personal feelings of anxiety and discomfort that result from observing another person's negative experience. From these dimensions, the empathic concern scale was expected to relate to the PES scale, owing to their conceptual similarity, while none or a low correlation between PES and personal distress was hypothesised. The internal reliability coefficients (standardized alpha) were acceptable for the four subscales, ranging from .70 to .78. Results for test-retest were also acceptable, ranging from .61 to .79 for males and from .62 to .81 for females (Davis, 1980).

2. ***The Questionnaire Measure of Emotional Empathy*** (QMEE, Mehrabian & Epstein, 1972). This questionnaire comprises 33 items measuring the tendency to share others' emotions and feelings and to become involved with others' emotional reactions. Since PES is a scale of other-oriented emotionality, a positive association was expected between the two sets of scores. The reported split-half reliability for the entire measure was 0.84, and according to the

authors, the total empathy scale is not correlated with the Crowne and Marlowe Social Desirability scale (Mehrabian & Epstein, 1972).

*3. **The Coping Styles Questionnaire*** (CSQ – Roger, Jarvis & Najarian, 1993; Roger, 1995). The 41- item version of the questionnaire (Roger, 1995) comprises a combined detached/emotional coping scale (22 items; Alpha = 0.88), a rational coping scale (9 items; Alpha = 0.82) and an avoidance scale (10 items; Alpha = 0.69). In this study the merged factor was labelled detachment, where high scores indicate detached as opposed to emotional coping. The original CSQ (Roger, Jarvis & Najarian, 1993) comprised four factors (Detached, Emotional, Rational and Avoidance), but a subsequent factor analysis into three factors merged the emotional and detachment scales into one bipolar measure of adaptive and maladaptive coping, with detachment at one pole and emotional coping at the other (Roger, 1995). Evidence for the relationship between coping styles and individual differences show that high N individuals tend to use more maladaptive ways of coping (Bolger, 1990; Deary, Blenkin, Agius, Endler, Zealley & Wood, 1996; Endler & Parker, 1990; Kardum & Krapić, 2001; McCrae & Costa, 1986; Parkes, 1986, 1990). A positive correlation was thus expected between NES and the avoidance coping scales, and an inverse association with the detached and rational scales. Positive emotionality has not been extensively investigated in the context of coping, and it was assumed that PES would be independent of the coping styles.

*4. **The short form of the Crowne-Marlowe Social Desirability Scale*** (Reynolds, 1982). This is a brief 13-item measure used as a manipulation check on the responses of the subjects (Alpha = 0.734, N= 133). An analysis of the social desirability of personality questionnaires, such as N scales is important, since evidence of the fakeability of these scales have been reported (e.g. Farley & Goh, 1976, for a review). Neuroticism correlates negatively with indices of social desirability (Farley, 1966; Farley & Goh, 1976; Helmes , 1980), while empathy is related positively (e.g. Eisenberg et al., 1989; 1991), and these findings were expected to be reflected in correlations with the ESS scales.

3.5.1. Sample and procedure

Sample 2: constituted by 177 first year undergraduate students (cohort 2000-2001) from the University of York (excluding Psychology students), 75 males (mean age = 18.60, SD = 1.05) and 102 females (mean age = 18.73, SD = 1.06). This group was administered the ESS, the IRI and the CSQ. For the fourth mail-out, the QMEE and the Social Desirability Scale were sent out and replies received from 137 subjects (77.40% of the original sample), 51 males (mean age = 18.92, SD = 1.23) and 86 females (mean age =18.85, SD = 1.04).

3.5.2. Results

Table 3.3. sets out the results of the correlations between the two ESS scales and the criterion variables for the subsidiary analyses.

Table 3.3. Intercorrelations among the ESS dimensions and the IRI, CSQ, QMEE and Social Desirability scales

Criterion	NES	PES
IRI-Empathic Concern (EC)	.020 (N= 177)	.685** (N=177)
IRI-Personal Distress (PD)	.521** (N=176)	.196** (N= 176)
IRI-Perspective Taking (PT)	-.168* (N= 176)	.233** (N= 176)
IRI-Fantasy Scale (FS)	.171* (N= 177)	.415** (N=177)
QMEE	.243** (N= 133)	.668** (N= 136)
CSQ-Detachment	-.777** (N= 172)	-.201** (N= 172)
CSQ-Rational	-.445** (N= 176)	-.018 (N= 176)
CSQ- Avoidance	.271** (N= 176)	-.075 (N= 176)
Social Desirability	-.399** (N= 137)	.098 (N= 137)

** p< 0.001, *p< 0.05. NES = Negative emotional sensitivity. PES = Positive emotional sensitivity. QMEE= Questionnaire of measure of Emotional Empathy.

As expected, NES correlated significantly with measures of emotionality and negative emotions, such as PD, avoidance, detachment and rational coping (inversely with these two last variables), and also correlated significantly negatively with social desirability. Interestingly, NES also correlated significantly positively with QMEE, which is a measure of emotional empathy. PES correlated

significantly with QMEE, as expected. PES also correlated with the other empathy dimensions, but the association with personal distress was marginal, accounting for less than 4% of the common variance. PES also correlated highly positively with QMEE, as expected. Among the coping styles, PES showed an unexpected inverse correlation with detachment, indicating that high PES subjects tend to use more emotional coping when dealing with stress. Finally, PES was independent of social desirability.

3.6. Discussion

Results from the concurrent validity study supported the two-factor structure of the ESS. In general, both dimensions of the ESS correlated significantly with conceptually similar constructs, while low or zero order correlations resulted with conceptually dissimilar constructs. Nonetheless, some results deserve special attention, since they emerged in the opposite direction from that predicted. These findings will be discussed for each scale separately.

3.6.1. Negative Emotional Sensitivity

As expected, results showed that subjects with high negative sensitivity tended to score high on measures of negative affectivity such as N (NEO-FFI - Costa & McCrae, 1992a), personal distress (IRI- Davis, 1980), rumination (ESQ, - Roger et al., 2000), and pessimism (PANEQ - Olason & Roger, 2001), thus supporting the nature of the dimension assessed by NES. At the same time, high NES subjects tended to cope with stress more emotionally and less rationally, and to use avoidance, which is highly congruent with previous findings reporting positive correlations between maladaptive coping styles and personality dimensions related to negative emotionality (Bolger, 1990; Deary, et al., 1996; Endler & Parker, 1990; Kardum & Krapić, 2001; McCrae & Costa, 1986; Parkes, 1986; 1990; Olason & Roger, 2001). NES was also inversely related to constructs reflecting more positive attributions, such as extraversion, agreeableness, conscientiousness, optimism and fighting spirit. These relationships are consistent with NES as a negative emotional construct, thus providing discriminant validity for it.

Finally, NES correlated inversely with social desirability, as previous findings reported for the N scales (Farley, 1966; Farley & Goh, 1976; Helmes, 1980).

Overall, the concurrent validity study supports the NES scale, showing that it is measuring the tendency to experience high negative emotional reactivity or negative emotional arousal. What is also important is that NES and the NEO-FFI-N scales share just around 43% of common variance, suggesting that the NES scale measures a construct somewhat distinct from N.

3.6.2. Positive Emotional Sensitivity

Results showed, as expected, that the PES scale was positively related to measures of empathy (e.g. I_7 – Empathy, EC and QMEE), which is consistent with the assumption that PES is a measure of other-oriented emotionality and sensitivity to others' emotions. The magnitude of the correlation with empathy measures indicates a degree of overlap with this construct, but the range in the correlations indicates that PES may constitute a more broadly defined index. Among the empathy scales used in this concurrent exercise, the empathic concern scale from the Interpersonal Reactivity Index (IRI- Davis, 1980) was the most strongly related to PES. The PES scale also correlated positively with extraversion and agreeableness, perhaps owing to shared components of sociability, sympathy with others, and willingness to help. Cawley, Martin and Johnson (2000) reported similar results for positive associations between empathy and the corresponding scales of the NEO-PI questionnaire. Regarding the relationship between PES and measures of emotional expressivity, the results were congruent with expectations. Thus, PES was significantly inversely related to emotional inhibition scale, but was positively correlated with emotional expressivity, supporting the notion about the higher expressivity of high PES individuals. The ability to express their own emotions may be considered a positive feature of the PES profile, since positive sensitivity individuals are expected to show their concern and sympathy to those facing difficulties or experiencing stress, as a preliminary approach to help them.

However, some of the correlations between the PES scale and measures included in the study were in the opposite direction from predictions. For example, the correlation with the negative affectivity/pessimism scale (Olason & Roger, 2001) was significantly positive, as was the correlation with the personal distress scale (PD – Davis, 1980), while the correlation with the CSQ-detachment scale (Roger, Jarvis & Najarian, 1993) resulted in significantly inverse findings. These findings may be explained in part by some confounding of the PES measure by the inclusion of items describing feelings of discomfort, upset and worry about others' emotions and well-being. This degree of involvement in others' emotions may make it difficult for high PES subjects to detach themselves from experiencing the same distress. The emotional way to cope with stress just worsens their adaptation in social contexts.

In sum, the concurrent validity study partially supports the validity of the PES scale as a measure of other-oriented emotionality and emotional sensitivity to others.

3.7. Conclusions

The results were clearer for the NES scale, where high positive correlations were found with measures of negative affectivity/emotionality. However, the PES construct could only be partially supported, as the results of some of the correlations in this study were unexpected.

The next chapter will present the results from two experiments aimed at expanding the validation of the ESS scales, providing then final conclusions about the constructs and its measures.

CHAPTER 4

PREDICTIVE VALIDITY STUDIES

The previous three chapters have focused on the construction and validation of the Emotional Sensitivity Scale (ESS), which assesses individuals on two relatively independent dimensions of negative (NES) and positive (PES) emotional sensitivity. The former refers to the tendency to experience high levels of self-oriented negative emotions, and the latter refers to the tendency to experience positive other-oriented emotional responses, especially sympathising and having concern about others. In general, the two scales correlated with conceptually similar constructs, while showed low or zero correlations with conceptually dissimilar constructs, especially the NES scale. However, some unexpected findings arose for the PES scale, which produced significant results that correlated with scales measuring different constructs.

This chapter reports on the first two experiments, carried out to test the predictive validity of the scales devised to measure the emotional sensitivity of subjects. Experiment I was carried out to test the cardiovascular reactivity of high and low NES subjects exposed to stressful stimuli, while Experiment II tested the validity of the PES scale in discriminating individuals able to recognise facial emotional expressions on pictures.

Experiment I

Negative Emotional Sensitivity (NES) as predictor of cardiovascular reactivity to aversive stimuli

4.1. Introduction

The ESS was devised in the context of the emotional control model of stress (Roger, 1988; 1995), and the NES scale was designed as a measure of personality that might moderate the effect of stress on health. Experiment I was therefore aimed at evaluating the validity of the NES construct in predicting the

cardiovascular reactivity of subjects exposed to aversive or stressful stimuli, expecting that high NES individuals would experience higher physiological reactivity under stress than low NES.

Considering that negative sensitivity is closely related to neuroticism, some experimental findings of the stress reactivity of N scorers are revised. Specifically, high N individuals have shown more likely than low N scorers to become autonomically aroused, and to experience distress and agitation when subjected to stress (Clark, Watson & Mineka, 1994; Cooper, 1998; Eysenck, 1982; Geen, 1997; Matthews & Deary, 1998). They also are likely to perceive life as more stressful, to cope less well, to be more dissatisfied with social supports, to have lower psychological well-being, to make more somatic complaints, and to express more anxiety, anger, sadness and disgust (Costa & McCrae, 1987; McCrae, 1990; Watson & Clark, 1984).

However, the experimental evidence for N has been inconsistent and equivocal, with the majority of studies failing to show associations between this personality trait and electrocortical and autonomic nervous system arousal. In fact, the most comprehensive review of electrodermal activity studies carried out by Naveteur and Freixa i Baque (1987) showed little evidence for either N, trait anxiety or state anxiety relating consistently to any tonic skin conductance level (SCL) or rate of spontaneous skin conductance indices. Likewise, Kirkcaldy (1984) failed to find differences in heart rate between high and low N subjects in a choice-reaction time paradigm, while Fredrikson and Georgiades (1992) did not find differences in heart rate responses between individuals high and low on N, in response to a stressful classical conditioning paradigm involving shapes paired with mild electric shocks. Another contrasting result was reported earlier by Roger and Jamieson (1988), using the EPI-N scored for the two component sub-scales of emotional sensitivity and hypochondriasis (see Roger & Nesshoever, 1987). The authors failed to support the predictions about the relationship between N and HR reactivity and recovery, in a sample of students exposed to a laboratory stressor. Furthermore,

Schwebel and Suls (1999) found no differences between high and low N subjects in cardiovascular reactivity to five laboratory stressors and seven field stressors.

Aggregating the findings across studies, data showed that individuals high on N did tend to have higher heart rate responses than individuals scoring low on N, even though no changes were observed for blood pressure. The authors concluded that the overall pattern of the findings did not support the reactivity hypothesis, although the stressors used in half of the experiments were physical rather than psychosocial in nature, so an appropriate test of the hypothesis was not possible using these data. In fact, the subjective appraisal of the stressors by the subjects, which is a fundamental variable in stress reactivity paradigms, was not reported in the study.

By contrast, Maushammer, Ehmer and Eckel (1981) did find relationships between EEG, sensory evoked potentials (Eps) and N. Using thirty subjects, the authors examined pain thresholds and pain tolerance, and results indicated that N was positively correlated with peak latencies on the sensory EP, correlations depending on the stimulus and intensities used. Likewise, Haier and Hirschmann (1980) studied defensive reactions and orienting responses (ORs) following slide presentation of scenes of violent death. Heart responses were recorded, and initial accelerative responses, indicative of defense, were elicited more frequently from subjects low on E and high on N. Initial decelerative responses, indicative of orienting, were elicited by subjects scoring high on E and low on N. More recently, Vogeltanz and Hecker (1999), investigated the role of N and controllability/predictability in the physiological responses of ninety-four undergraduates to emotionally arousing slides. Results indicated that the high N group was more physiologically and subjectively aroused than the low group, and N proved to be more important than the stressor characteristics (control/predictability) in understanding the physiological reactivity following exposure to aversive stimuli. Finally, a slower physiological habituation rate to negative stimuli, as well as slower recovery after a stress reactivity test have been reported for high N subjects (Barlow, Cohen, Waddell, Vermilyea, Klosko, Blanchard, & DiNardo, 1984; Bull & Nethercott, 1972, Pitman & Orr, 1986).

With a view to resolving the inconsistencies in these findings with N, experiment I in the present chapter was designed to test the cardiovascular reactivity of high and low NES individuals exposed to stressful stimuli.

4.2. Method

4.2.1. Subjects

The subjects in the experiment were 42 undergraduates from a voluntary subject panel, which comprises students from a broad range of academic disciplines other than psychology at the University of York. The panel had previously been sent the Negative Emotional Sensitivity scale (NES) from the ESS, and a total of 55 subjects with the highest and lowest scores were invited to participate in this experiment. The final sample comprised 19 males (mean age= 21.21, SD =7.50) and 23 females (mean age =19.17, SD =2.90), with 11 males and 12 females in the high NES group and 8 males and 11 females in the low NES group.

4.2.2. Instruments

a) Omron M4 arm cuff : is a fully automated electronic blood pressure monitor that provides measures of systolic blood pressure (SBP), diastolic blood pressure (DBP) and heart rate (HR). The cuff was attached to the students' left forearm, rested on the arm of the chair.

b) PsyScope is a generator package for psychology experiments (Cohen, MacWhinney, Flatt & Provost, 1993) which was used for the programming of the emotional stimuli used in the study. The experiment progressed in four consecutive stages, a baseline phase, the experimental condition, the habituation test and the recovery phase.

i) Baseline measures - Each participant was asked to rest for 3 min. after the pre-measure. Then, two more measures were taken before starting the exposure to the emotional stimuli. Immediately after, subjects were asked to read the instructions

shown on the screen (the specific instructions can be seen in Appendix D). After the participant had read the instructions and pressed the spacebar, a "please wait" signal appeared on the screen for 10 seconds before the experimental condition began.

ii) Experimental condition - consisted on the presentation of 3 stressful (emotional) and 3 non-stressful (neutral) stimuli on the computer screen, in alternate order for a period of 50 seconds each. Immediately after each slide, a sound signal started and the heart rate and blood pressure were taken.

iii) *Habituation test*: To test the habituation response rate of the high and low NES participants to stressful stimuli, 4 new different slides with emotional images were shown continuously, followed by a blood pressure and heart rate measure.

iv) Recovery phase: Immediately after the physiological measures for the habituation test were taken, participants were asked to rest for 3 min. and the final recovery measure was taken.

At the end of the experiment, participants were asked to complete a rating scale about the slides, scoring them in a 9 point-scale according to the degree of excitement or arousal they provoked, where *1= complete relaxation/calm* and *9= excitement/high arousal* (see appendix E).

c) The CD-ROM from the International Affective Picture System (IAPS, Lang, Bradley & Cuthbert, 1999) was used as a source of stimuli, which have all been rated according to their emotional content and have been used in previous experiments (Bradley, Cuthbert & Lang, 1989; 1991; 1996; Vrana, Spence & Lang, 1988). Among the slides previously approved by the Departmental Ethics Committee, the following were the slides randomly chosen for the experimental condition: a baby (IAPS image 2058), attack with a knife (IAPS image 6350), dead body (IAPS image 3120); clouds (IAPS image 5891); starving child (IAPS image 9040), and nature (IAPS image 5780). The slides used in the habituation test were:

sad child (IAPS 2800), war victim (IAPS 9250) injury (IAPS 3550), and baby in hospital (IAPS 3350).

4.2.3. Procedure.

Subjects were initially naive as to the aims of the study, but after a brief explanation about the procedure of the experiment, they all consented to participate by signing the consent form (see Appendix F). Each participant was told that the session would consist of watching some photographs on a computer screen and having their blood pressure taken throughout, and a pre-measure of blood pressure (systolic and diastolic) and heart rate was taken in order to adjust the cuff of the blood pressure monitor. Subsequently, the baseline measures were taken.

4.3. Results

4.3.1. Analysis of Baselines for High and Low NES

Mean values for the two baselines in each cardiovascular measure were obtained, and comparisons between the high and low NES groups using t-tests for independent samples were performed as a manipulation check. Results indicated no significant differences between groups on any of the measures, confirming the equivalence of the physiological indices of the subjects in the resting condition. Descriptive data are shown in table 4.1.

Table 4.1. Means for Baseline Measures for High and Low NES subjects

	High NES		**Low NES**	
	Values	Mean (SD)	Values	Mean (SD)
BL1- SBP	110.96	110.00 (13.46)	110.79	111.48 (14.20)
BL2- SBP	109.04		112.11	
BL1- DBP	70.70	70.00 (6.98)	72.11	72.47 (7.84)
BL2- DBP	69.30		72.84	
Bas.L1 - HR	73.96	75.17 (9.64)	75.89	76.00 (13.34)
Bas.L2 - HR	76.39		76.11	

BL1 = baseline 1. BL2= baseline 2. SBP = Systolic Blood Pressure. DBP = Diastolic Blood Pressure. HR= Heart Rate.

4.3.2. Negative Emotional Sensitivity and physiological reactivity to emotional slides

Table 4.2 presents the descriptives for the physiological measures across the experimental conditions for both males and females, and for high and low NES groups. An average score for the SBP, DBP and HR measures to neutral and stressful slides was obtained for each group, at the experimental and habituation phases.

Table 4.2. Descriptives (Means and SD) of the physiological measures across the conditions for High and Low NES

	Time of Measure									
	Baseline		***Neutral stimuli***		***Stressful stimuli***		***Habituation***		***Recovery***	
	High	*Low*	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*	*Low*
Females										
SBP	*102.92*	*104.73*	*101.92*	*107.64*	*101.92*	*104.90*	*100.08*	*101.82*	*99.83*	*102.27*
	(10.97)	*(10.11)*	*(12.84)*	*(12.00)*	*(13.97)*	*(9.78)*	*(11.16)*	*(9.84)*	*(10.25)*	*(10.30)*
DBP	*67.58*	*69.22*	*69.08*	*72.18*	*66.83*	*69.36*	*67.75*	*68.27*	*68.33*	*72.27*
	(7.85)	*(5.18)*	*(11.10)*	*(11.63)*	*(9.00)*	*(5.97)*	*(10.80)*	*(5.40)*	*(8.25)*	*(7.16)*
HR	*76.92*	*78.50*	*74.17*	*74.36*	*78.25*	*78.09*	*77.75*	*77.54*	*73.58*	*72.45*
	(10.00)	*(14.39)*	*(12.65)*	*(10.37)*	*(10.76)*	*(13.19)*	*(11.29)*	*(11.80)*	*(11.73)*	*(14.20)*
Males										
SBP	*117.72*	*120.69*	*120.55*	*125.75*	*117.18*	*123.00*	*112.36*	*122.50*	*110.55*	*117.00*
	(11.86)	*(14.27)*	*(15.07)*	*(17.77)*	*(14.49)*	*(12.11)*	*(10.98)*	*(15.58)*	*(8.77)*	*(13.21)*
DBP	*72.64.*	*76.93*	*73.45*	*75.38*	*73.18*	*72.88*	*73.36*	*75.00*	*73.09*	*75.75*
	(4.99)	*(8.96)*	*(5.35)*	*(10.21)*	*(5.82)*	*(10.82)*	*(5.97)*	*(10.07)*	*(4.53)*	*(9.45)*
HR	*73.27*	*72.56*	*72.18*	*73.25*	*74.45*	*71.75*	*74.45*	*75.88*	*72.27*	*75.38*
	(9.32)	*(11.88)*	*(7.00)*	*(13.02)*	*(10.33)*	*(6.94)*	*(9.87)*	*(8.90)*	*(8.76)*	*(8.77)*

N= 42

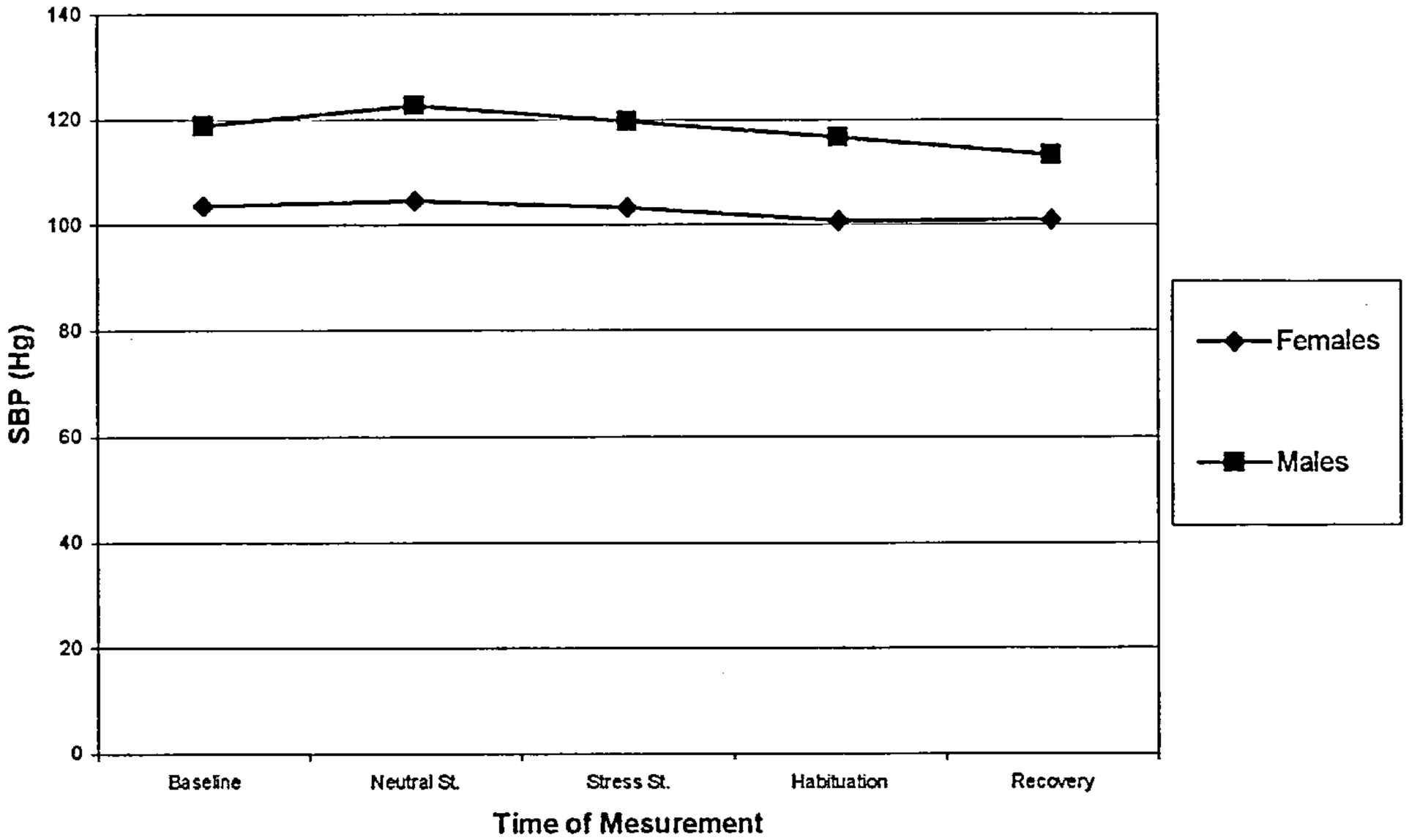
Data showed no important changes across the conditions for the groups in either the SBP or DBP, contrarily to the expectations. However, some variations could be seen for the HR measure for both males and females when exposed to the stressful stimuli.

To explore whether a difference between high and low NES and between genders might exist in response to the exposure to the stressful stimuli, data were analysed by a 5 (Time of measurement) X 2 (Gender) X 2 (High and Low NES) split-plot ANOVAs, one for each of the cardiovascular measures. As the data for SBP did not fulfil the criteria for Sphericity, the Greenhouse-Geisser correction for degrees of freedom was used.

Analysis for the SBP measure revealed a significant main effect for Time of Measurement ($F[2.61, 99.12] = 8.923$, $p < 0.0001$) as well as for gender ($F[1,38] = 20.46$, $p < 0.0001$). However, neither the effect for group nor the interaction were significant. Paired t-tests comparing means for SBP Time of Measurement showed significant differences between Baseline and Recovery ($t[41] = 4.373$, $p < .0001$), the neutral stimuli exposure and habituation ($t[41] = 3.373$, $p < .01$), the neutral stimuli exposure and recovery ($t[41] = 4.284$, $p < .0001$), and finally between the stressful stimuli exposure and recovery ($t[41] = 3.372$, $p < .01$). Among these, only the latter analysis (stressful stimuli-recovery) was in the expected direction, with overall reactivity to the stressful or emotional slides being higher than the overall recovery measure. Other results showed a less clear view about the pattern of reactivity across the experimental conditions.

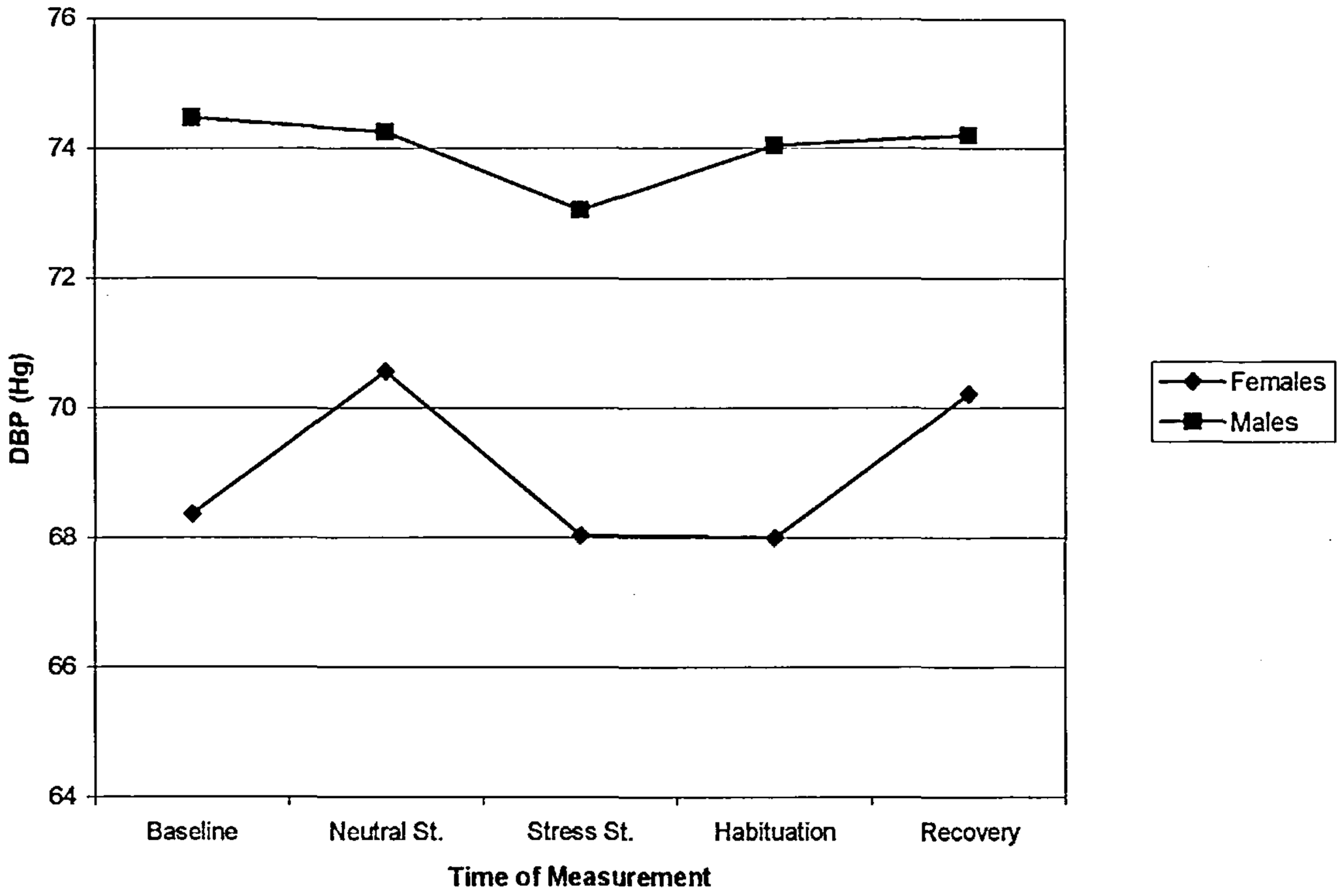
For gender, the overall trend showed that males ($M = 118.73$) were more activated than females ($M = 102.80$)(see Figure 4.1).

Figure 4.1: Systolic Blood Pressure for NES subjects



The analysis for the DBP measure revealed a main effect only for gender (see Figure 4.2), with males having a higher DBP than females (mean for males = 74.16; mean for females = 69.08; $F[1,38]= 4.956$, $p < 0.05$), while effects for time of measurement, group or the interaction were non significant.

Figure 4.2: Diastolic Blood Pressure for NES subjects



Finally, the effects for Heart Rate were all non-significant, although the effect for Time of Measurement did approach significance (F[3.153, 119.825] = 2.133, p= .096). An inspection of the descriptive data suggests a trend for both high and low groups to slightly react to the stressful stimuli, compared with the measures at rest.

4.3.3. Subsidiary analyses: change scores in cardiovascular reactivity.

In a final exploration of cardiovascular reactivity, change scores were calculated from baseline to the experimental condition (contrast 1) and from the experimental condition to the habituation test (contrast 2). For the experimental condition, only the average of the physiological indices to the stressful stimuli was taken. Table 4.3 shows the change scores for contrasts 1 and 2 discriminated by group and gender.

2 (high and low NES) x 2 (gender) between-Ss MANOVAs for each measure showed no significant main effects or interactions for either contrast, although the group by gender interaction for the DBP measure approached significance (F[1,41]= 3.87, p= 0.057) and suggested that the low NES male group showed a lower DBP in the experimental condition than at baseline.

Table 4.3: Cardiovascular change scores

Cardiovascular Change Scores for contrast 1	***Low NES Mean (SD)***		***High NES Mean (SD)***	
	Males	Females	Males	Females
SBP	2.27 (6.71)	.26 (4.40)	-.63 (4.00)	-1.14 (5.20)
DBP	-5.23 (8.88)	.29 (6.15)	.76 (4.25)	-1.18 (5.13)
HR	2.22 (10.00)	.22 (10.52)	1.56 (4.07)	1.75 (4.79)
Cardiovascular Change Scores for contrast 2				
SBP	-.42 (8.07)	-2.57 (8.86)	-3.50(8.43)	-1.42 (5.74)
DBP	3.43 (9.18)	-1.37 (5.20)	.48 (7.20)	1.15 (4.32)
HR	5.77 (6.75)	7.69 (10.58)	.12 (3.21)	-.35 (9.08)

In summary, the results using change scores did not support hypotheses of higher reactivity and lower habituation for the high NES group.

4.3.4. Ratings of the emotional stimuli

To explore the subjective perception of arousal provoked by each slide during the experiment, a 9-points rating scale (*1= complete relaxation/calm; 9= excitement/high arousal*) was administered to the participants at the end of the session. Descriptive statistics in table 4.4 suggest that the high NES group rated the slides as more arousing than the low NES group, but comparing the means using t-tests results indicated that none of the comparisons was significant. These findings might partially explain the lack of statistical differences in cardiovascular reactivity between the groups.

Table 4.4. Ratings for the experimental slides

	High NES	***Low NES***
Slide1 (neutral)	2.04 (1.16)	2.52 (2.21)
Slide 2 (stressful)	5.52 (1.96)	4.52 (1.73)
Slide 3 (stressful)	6.33 (1.85)	5.47 (1.87)
Slide 4 (neutral)	1.76 (0.94)	1.64 (0.70)
Slide 5 (stressful)	6.57 (1.96)	6.12 (2.20)
Slide 6 (neutral)	1.85 (0.85)	1.82 (0.88)
Slide 7 (stressful)	5.80 (2.29)	5.41 (2.32)
Slide 8 (stressful)	6.14 (1.76)	5.47 (2.06)
Slide 9 (stressful)	5.80 (1.69)	5.17 (1.42)
Slide 10 (stressful)	5.38 (1.85)	4.76 (2.41)

4.4. Discussion

Experiment I was designed to measure the cardiovascular reactivity of high and low NES subjects to stressful or emotional stimuli. High NES subjects were expected to show a higher physiological reactivity but slower habituation to stressful stimuli, compared with low NES subjects. The former group was also expected to perceive the emotional slides as relatively more stressful and arousing. However, results of the experiment did not support the reactivity hypotheses. One possible explanation is that the stimuli selected as emotional (pictures from the IAPS - Lang, Bradley & Cuthbert, 1999) were in fact not rated as significantly "more stressful" by the high NES group, compared to the low group. Using the IAPS stimuli to test the interactive effects of neuroticism and controllability/predictability on physiological responses, Vogeltanz and Hecker (1999) similarly reported a main effect for

neuroticism, but no interaction effect, and suggested this may have been due to the weak intensity of the IAPS pictures. In fact, Eysenck and Eysenck (1985) have pointed out that some of the inconsistent findings reported in the research of psychophysiological differences as a function of neuroticism ..."may lie in the persistent use of insufficiently stressful conditions" (pp. 234), as well as on the nature of the stimulus, since different stressful stimuli provoke different reactions among high anxiety subjects (Eysenck, 1994).

Another possible explanation for the equivocal findings may be that the subjects had been exposed several weeks earlier to the IAPS stimuli, which may have resulted in a response of habituation, and hence a decrease in their cardiovascular reactivity. In fact, Kelsey, Blascovich, Tomaka, Leitten, Schneider and Wiens (1999), indicate that cardiac reactivity peaks early during the initial presentation of a demanding task, when novelty and uncertainty are greatest, but declines with continued or repeated task exposure (Kelsey et al., 1999 for a review).

Finally, the inconsistency observed in the experimental results could be attributed to the nature of the stimuli itself, which can create differential patterns of autonomic activation. Thus, laboratory challenges that require mental effort (e.g., Stroop tasks, mental arithmetic) may induce a "fight-flight" cardiovascular response pattern, characterised by increases in heart rate, blood pressure, and other indices of cardiac sympathetic drive (Uchino, Berntson, Holt-Lunstad & Cacioppo, 2001), while emotional pictures or videos are more likely to produce a change in the vagal tone, with a consequent decrease of the heart rate (Carruthers & Taggart, 1973; McCabe & Schneiderman, 1985; Schneiderman & McCabe, 1989). The differential pattern of cardiac autonomic activity was also demonstrated by Bosh, De Geus, Kelder, Veerman, Hoogstraten and Amerongen (2001) who examined the effects of two laboratory stressors, namely "active coping" (time-paced memory test) and "passive coping" (stressful video showing surgical operations). The authors found that the memory test induced the typical "fight-flight" response, characterised by increases in heart rate and blood pressure, in association with a decrease in cardiac preejection period (PEP) and vagal tone. On the other hand, the surgical

video produced a "conservation-withdrawal"- like response, characterised by an enhanced vagal tone, a decrease in heart rate and a moderate sympathetic coactivation (with increased systolic blood pressure). The stressful stimuli used in the present experiment were a kind of "passive coping" stimuli, and cardiac reactivity was then less likely to occur.

Regarding the gender differences, the current data revealed that males had overall higher blood pressure (systolic and diastolic) than females throughout the experiment, supporting previous findings (e.g. Dembroski, MacDougall, Cardozo, Ireland & Krug-Fite, 1985; Frankenhaeuser, Dunne, & Lundberg, 1976; Stoney, Davis & Mattews, 1987; Turner, 1994).

Experiment II

Positive Emotional Sensitivity (PES) as predictor of the ability to recognise emotional expressions

4.5. Introduction

As Martin, Berry, Dobranski, Horne and Dodgson (1996) claimed, a measure of emotional sensitivity reflects the emotion perception threshold of people to recognise basic emotions either in themselves or in others, and this ability is not mediated by cognitive processes. At the same time, people with low thresholds (more sensitive) tend to have higher scores in empathy measures. Likewise, people who are highly emotionally empathic tend to show a vicarious emotional response to the perceived emotional experiences of others, sharing those feelings at least at the gross affect level (pleasant-unpleasant emotions) (Meharabian and Epstein, 1972; Scotland, 1969).

The aim of Experiment 2 was to test the predictive validity of the PES scale to reliably discriminate among individuals' ability to recognise facial emotional expressions. PES is thought to measure the tendency to react in an emotionally other-oriented way, and these people are expected to show a greater sympathy and concern about others. This should then facilitate high PES scorers' recognition of different kinds of emotions in people's faces.

4.6. Method

4.6.1. Subjects

The subjects in the experiment were 40 undergraduates from a voluntary subject panel, which comprises students from a broad range of academic disciplines other than psychology from the University of York. The panel had previously been sent the Positive Emotional Sensitivity scale (PES) from the ESS, and a total of 53 possible subjects with the highest and lowest scores on the scale were invited to participate in the experiment. The final sample comprised 8 males for the low PES

group (mean age= 18.87, SD= 1.12), 11 males for the high PES group (mean age= 19.18, SD= 1.16), 10 females for the low PES group (mean age= 19.90, SD= 4.99), and 11 females for the high PES group (mean age= 19.81, SD= 5.40).

4.6.2. Instrument

The facial expressions test (Ekman & Friesen, 1975). 14 photographs of people's facial expressions were randomly selected from the original test and presented separately on 9.5 x 13 cm cards.

4.6.3. Procedure

Participants received a brief explanation about the procedure of the experiment, and were told that the session would consist of seeing some photographs of people's expressions and attempting to recognise their emotions (for specific instructions, see Appendix G).

Once the students had consented to participate, they were given the cards one by one for a period of 5 seconds. Immediately after seeing each card, they had to write on a judgement sheet (see Appendix H) the emotion displayed on the picture. At the end of the experiment, an average of the accuracy in recognising the emotions (% of correct answers) was calculated using the test scoring key (Ekman & Frisen, 1975).

4.7. Results

A non-parametric statistic was calculated to compare the averages of correct answers between high and low PES subjects. Results are shown in Table 4.5.

Table 4.5. Results for High and Low PES subjects on the Facial Expressions test

	Mean Rank	Mann-Whitney U	Z	p
High PES	22.30			
Low PES	18.31	158.500	-1.089	.276

p= 2-tailed significant

Although a tendency for the high group to show a higher ability to recognise the emotions was evident from the data, the difference was not significant. There were also no significant gender differences (*Mann-Whitney U = 188.00; p = .752*), with males obtaining a mean rank of 19.89 and females 21.05.

4.8. Discussion

The results of the present experiment do not support the hypothesis that high PES subjects are more able to recognise emotions than low PES subjects, since differences were found non-significant. However, it could be observed a tendency of the high PES group to perform better on the test, compared to the low group, and this is encouraging for future research. Some limitations were then identified in this study.

One of these limitations may lie in the nature of the decoding process involved in this experiment. For example, Martin and colleagues (1996) have used Buck's theory (1991, c.f. Martin et al., 1996) to argue that Ekman and Friesen's photographs measure a cognitive "knowledge-by-description" rather than an emotional process. Specifically, the authors claim that this kind of test tends to assess the non-emotional (cognitive) processes of individuals, without accessing any immediate emotional response to the face, thus resulting in an unreliable measure of the individual differences in immediate affective responsiveness or emotional experiences. One way to use this test may be to display the photographs at a very high speed (short exposures), and Martin et al. (1996) did indeed hypothesise that those subjects who were able to correctly identify the emotional valence of a face following a shorter exposure, as compared to those who required a longer presentation, would be more sensitive to their own emotional states as well as to those of others. The authors suggest an emotion perception threshold of between 12 and 72 milliseconds, very much shorter than the exposures used in the current experiment.

In addition to these methodological considerations, it is also possible that the PES may not constitute a pure measure of emotional sensitivity. For example, the PES scale correlated moderately but positively with the `personal distress dimension from the Interpersonal Reactivity Index (IRI-Davis, 1980), which suggests that high PES individuals may not only recognise others' emotions but may also vicariously experience emotional distress on behalf of others whose emotions they identify with. This is supported by the positive correlation with the negative affectivity/pessimism scale from the PANEQ (Olason & Roger, 2001), and by the low but inverse association with the detachment scale from the CSQ (Roger, 1996). Finally, the PES showed a low but significant positive correlation with the negative sensitivity scale, confirming that both scales share a small proportion of variance.

The aim of the PES subscale was to assess sensitivity to others' emotions, but not a vicarious identification with them, since that would to some extent conflate the negative and positive components of the overall scale. The findings from the ESS reported so far suggest just such a conflation, and an inspection of the scale items reinforces that view. For example, PES includes items like " I go out of my way not to hurt other people's feelings", as well as items like "I often feel responsible for how other people are feeling".

In view of these findings, it was decided that the scale should be further revised in order to clarify the PES component in particular. The revision of the scale, and further validation studies will be reported in chapters 5 and 6.

CHAPTER 5

REVISION OF THE EMOTIONAL SENSITIVITY SCALE (ESS).

Study I: Scale Revision

Study II: Concurrent Validity Study

Study III: Confirmatory Factor Analysis

The findings reported in chapters 2 & 3 suggested that the positive sensitivity scale (PES) included a sub-component of items assessing negative emotionality, which were more closely related to negative sensitivity. This was mainly based on the results from the concurrent validation study, where positive sensitivity correlated positively with personal distress from the Interpersonal Reactivity Index (IRI-Davis, 1980), and with negative affectivity/pessimism from the PANEQ (Olason & Roger, 2001). Likewise, a low but inverse association was obtained with the detachment scale from the CSQ (Roger, 1996), suggesting that high PES subjects may tend to react in a less emotionally detached way to emotional stimuli. Finally, the positive sensitivity scale showed a low but positive correlation with the negative sensitivity scale.

The predictive validity study (see Experiment II, chapter 4) also failed to support the hypothesis about the ability of positive sensitivity subjects to recognise emotional facial expressions. According to the definition of the dimension, high positive sensitivity subjects should be able to accurately distinguish among different emotional expressions in other individuals.

In the light of these findings, it was clear that the positive sensitivity component of the PES in particular should be revisited in order to provide a less contaminated index of positive emotional sensitivity. The present chapter presents the results of three studies reporting the revision and factorial confirmation of the Emotional Sensitivity Scale. Study I will present the scale construction process and the revised ESS derived from it. Study II will consider the results of the concurrent study, where the revised ESS will be compared with similar and dissimilar

constructs. Finally, Study III will present the results from the confirmatory factor analysis aimed at confirming the structure of the revised scale.

Study I: Scale Revision

5.1. Method

5.1.1 Item Construction and preliminary version of the revised ESS

A new scenario study was performed to generate the additional pool of items to be incorporated in the revised scale. A total of 10 open-questions were sent to 60 undergraduate students from the volunteer subject panel at the University of York. They were asked to indicate how they would respond emotionally to the situations described in the scenarios, which referred to events designed to elicit responses such as concern, sympathy, compassion, understanding and helping behaviours (Appendix I). Thirty-one (51.66%) of the students replied, and based on their responses a pool of 40 new items was generated (Appendix I). These were added to the original 41-items version of the scale, and the 81-item scale was cast into a dichotomised forced-choice format (true – false).

5.1.2. Subjects

The subject pool consisted of two samples of university undergraduates. The first sample comprised a total of 244 first year undergraduate students from the voluntary subject panel at the University of York (cohort 2000-2001), who were mailed a package of several scales including the revised scale. One hundred and fifty eight (64.75%) of the students replied, 58 males (mean age = 18.92, SD = 1.23) and 100 females (mean age = 18.85, SD = 1.04). This sample was supplemented by the responses of a second group of first year undergraduate students from the Ripon & York College at York, who were given only the revised ESS items. This group consisted of 84 students, 24 males (mean age = 21.40, SD = 3.47) and 60 females (mean age = 19.94, SD= 1.97). The two samples were pooled to form one sample of 242 undergraduate students, 82 males (mean age = 19.35, SD= 3.09) and 160 females (mean age = 19.14, SD= 2.07).

5.1.3. Procedure

An analysis of the items' response frequencies was performed, and 26 highly skewed items based on an 80/20 response criterion were removed prior to the factor analysis. Skewed items included "I feel sympathy for people less fortunate than me" (frequency response Yes = .93, No = .07); "I would be willing to participate in aid programs for people in life-threatening situations, if there was something I could do" (frequency response Yes = .85, No = .15); and "I feel very satisfied when I'm able to help others with their problems" (frequency response Yes = .95, No = .05).

The remaining fifty-five items were factor analysed using principal axis factoring from the Statistical Package for the Social Sciences (SPSS – Norusis, 1997). The Scree Test (Cattell, 1966) suggested two or three factors (see Figure 5.1). Using Varimax orthogonal rotation and .30 as criterion for a significant factor loading, two and three factor terminal solutions were therefore performed and analysed.

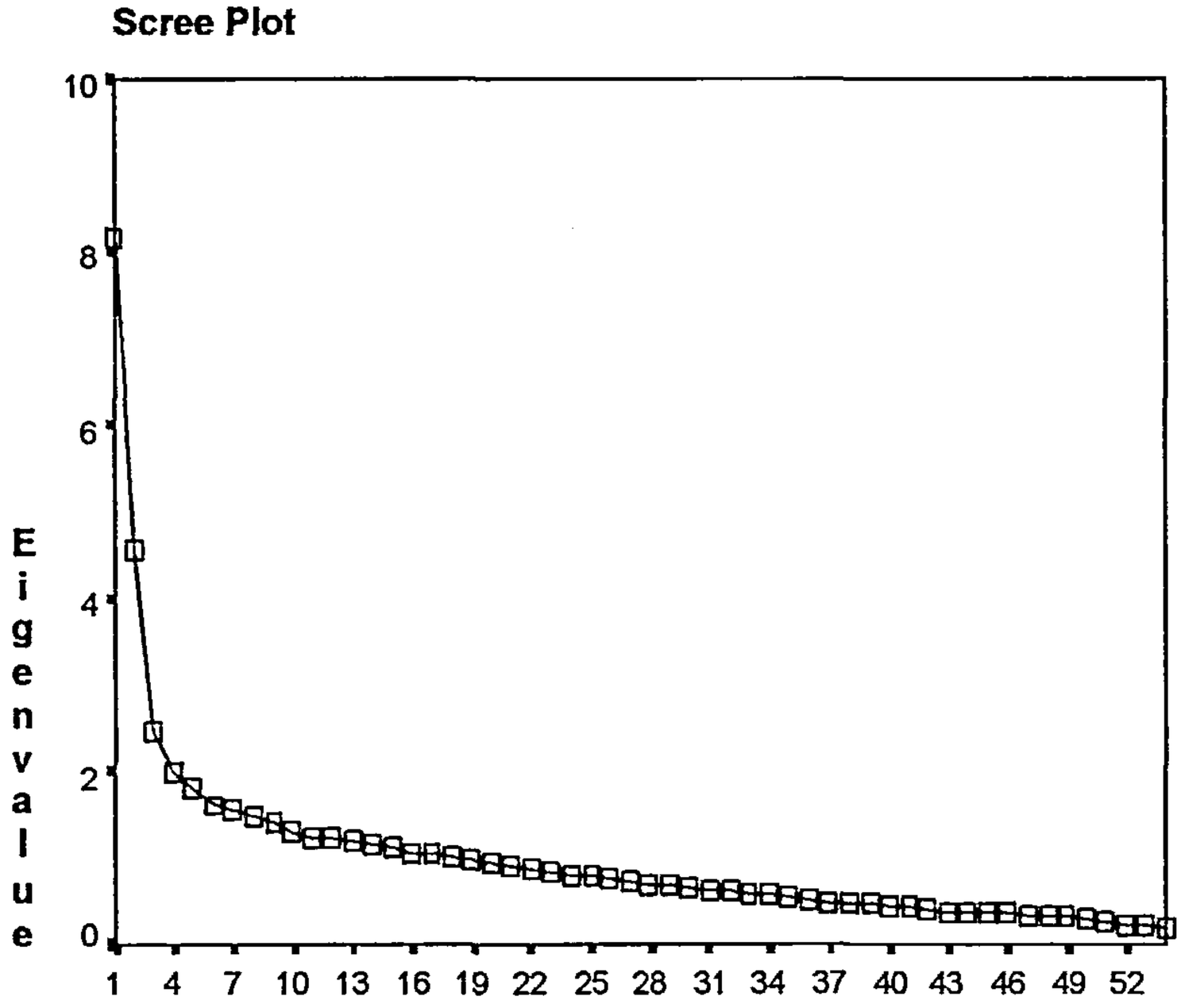


Figure 5.1. Scree test for the revised ESS

Results from the three-factor solution showed a first factor comprising 28 items, with the highest loading on item 40, "I often feel sorry for myself" (.69). The second factor comprised 13 items, with the highest loading on item 70 "I get upset when other people are having a hard time" (.59). Only four items loaded significantly on the third factor, with the highest loading on item 12 "I find it easy to understand other's people feelings" (.71). The third factor was clearly too small to offer a reliable assessment of behaviour, and a two-factor terminal solution was thus carried out using the same method.

Results showed the first factor comprising the same pool of 28 items as the previous solution, with the highest loading again on item 40 "I often feel sorry for myself" (.69). The second factor comprised 16 items, with the same item 70 (I get upset when other people are having a hard time) as its highest loaded item, and item 24 (I often feel responsible for how other people are feeling) double loading also on the first factor.

After removing this double loading item, a second two-factor Varimax orthogonal rotation was performed on the remaining 54 items. The first factor was unaltered with item 40 "I often feel sorry for myself" as its highest loaded (0.69), followed by item 37 "little things are often enough to put me in a foul mood" (0.67). The rest of the items in this factor referred to the same dimension of *Negative Emotional Sensitivity* described in the 41-items version of the scale (see chapter 2) and replicated the earlier factor almost identically. In fact, twenty-five of these items came from the former version of the Negative Sensitivity scale (27- items version), the other two items emerged from the previous Positive scale ("I often worry that I have done something to upset people" and "I find it easy to share in other's happiness"), and one item loaded from the new pool tested. Items in this factor represent a broad range of negative emotional reactions such as anger, vulnerability, frustration, worrying and apprehension, but the key feature is that they are predominantly self-oriented. Consequently, the factor in the revised scale was re-titled *Negative Egocentric Sensitivity (NES).*

The second factor comprised 15 items, with the highest loading on item 70 "I get upset when other people are having a hard time" (0.55), followed by item 35 "I

feel upset when I realise that there is nothing I can do to help other people who are having problems" (0.53). Compared with the original PES factor, items describe a more narrowly derived positive empathic concern about others' well-being and compassion for others, as well as willingness to help others in difficulty. The items describing emotional over-involvement and personal distress, which had linked PES to the original NES factor also appeared to have fallen out of the revised factor. In view of the explicit interpersonal orientation of the items, the factor was labelled *Positive Interpersonal Sensitivity (PIPS)*. From these 15 items, only 4 emerged from the previous version of the scale, with the other 11 items coming from the new pool of 40 items tested. The eigen values for the two factors were 8.167 and 4.553, respectively, explaining a total of 23.56 % of the variance. Table 5.1 shows a sample of the items loading in each factor, and Appendix K presents the items and loadings for the whole scale.

Table 5.1. Example of items from the two factors of the revised ESS

Number of item	Item content	Item loading
Factor 1 (NES)		
Item 36	I am easily frustrated	.64
Item 7	It often feels that my burden is greater than anyone else's	.58
Item 30	When things do not go according to plan, I can usually accept it if there is nothing I can do about it.	-.44
Factor 2 (PIPS)		
Item 18	I find it easy to understand others' feelings when they are distressed	.51
Item 65	Whenever I see someone in trouble, I feel it's my responsibility to help and give support	.48
Item 32	I find it easy to recognise the feelings and moods of people around me, even if they try to hide them	.44

Oblique rotation to a two-factor terminal solution using Direct Oblimin was also conducted. Inspection on both the pattern matrix and the structure matrix suggest that the oblique and orthogonal factors were identical; in fact, the same 43 items loaded significantly on the two factors, 28 items on the first one and 15 on the second one. A one-factor solution was also attempted comprising 29 items, with all of them except item 34 (I'm easily affected by others' emotional problems) coming from factor 1 in both two and three-factor solutions. This confirms that there is more than one factor in the structure of the item pool, and further justifies the two-factor extraction.

Additional factor analyses for males and females separately yielded a first factor for females comprising 26 items, with the highest loading on item 40 "I often feel sorry for myself" (0.73). The second factor comprised 13 items, with the highest loading on item 65 (whenever I see someone in trouble, I feel it's my responsibility to help and give support). For males 31 items loaded on the first factor, with the highest loading on item 37 "little things are enough to put me in a foul mood", and 17 on the second factor with the highest loading on item 32 "I find it easy to recognize feelings and moods of people around me, even if they try to hide them". The results from a separate analysis of males and females were clearly indistinguishable, so a unique solution for both genders was assumed.

The final version of the revised ESS comprised 43 items, 28 items representing the *Negative Egocentric Sensitivity* dimension (NES), and 15 items measuring the new *Positive Interpersonal Sensitivity* dimension (PIPS) (see Appendix L).

In order to compare the original and revised versions of the ESS, the original 41-item version and the revised 43-item scale were sent separately to a sample of 158 students, drawn from the voluntary subject panel from the University of York, with an 8 weeks interval in between. A total of 137 (86.70%) replied to both mail-outs, 51 males (mean age = 18.92; SD = 1.23) and 86 females (mean age = 18.85; SD = 1.05). Pearson correlations between the corresponding factors were 0.71 ($p < 0.001$) between PIPS and PES, and 0.99 ($p<0.001$) between Negative Emotional Sensitivity and Negative Egocentric Sensitivity. As had been expected, the revised NES scale (28 items) corresponded very closely to the previous version (27 items). However, the correlation between the two Positive scales,

although significant, was of a lesser magnitude, accounting for just more than 50% of the common variance.

5.2. Reliability Analysis of the revised ESS

5.2.1. Internal Consistency and re-test reliability

Alpha coefficients for the two factors were substantial, showing high internal consistency in each case (PIPS = .797; NES = .893).

After an inter-test interval of 6 weeks, the scale was completed by a sub-sample of 60 of the original subjects, representing an 85 % return of the 71 questionnaires sent out. This sample comprised 27 males (mean age = 18.96; SD= 1.23) and 33 females (mean age = 19.09; SD = 1.33) The retest coefficients were substantial (NES: .919, $p< 0.001$; PIPS: .893, $p<0.001$), indicating that the factors are assessing stable personality dispositions.

5.2.2. Descriptive Statistics and Inter-correlations

Table 5.2. presents the descriptives for the total sample and by gender, showing a moderately low score for NES, and a moderately high score for PIPS. Comparing males and females on both dimensions by means and t-tests, results showed that females scored significantly higher than males on Positive Interpersonal Sensitivity ($t (240)= -3.763$, $p< 000.1$). However, non-significant difference was found between males and females on the Negative Sensitivity scale ($t (240)= -1.59$; $p = .113$), although there was a tendency for women to score higher than men.

Table 5.2. Descriptive Statistics of the revised ESS for the total sample and by gender

	Negative Egocentric Sensitivity (NES)	***Positive Interpersonal Sensitivity (PIPS)***
	Mean scores (SD)	
Total (N=242)	12.09 (6.69)	9.39 (3.60)
Males (N= 82)	11.15 (6.75)	8.21(3.79)
Females (N=160)	12.59 (6.63)	10.00 (3.36)
Possible range	0- 28	0-15
Males	0- 28	1 -15
Females	0-27	0-15

Correlation between the two factors of the revised scale showed that they are clearly orthogonal (r= .029). This result confirms that the ESS measures two independent dimensions of the emotional sensitivity construct, the first a self-oriented and egocentric negative emotionality and the second an other-oriented and more positive emotionality. Correlations between the two scales by gender (males r = -.062; females r = .044) confirmed the statistical independence of NES and PIPS.

Study II: Concurrent Validation

5.3 Introduction

The concurrent validation study was aimed primarily at confirming the revised Positive construct by assessing its relationships with the measures used in the previous concurrent validity study (see chapter 3). However, additional scales were included in this study in order to expand the previous results for the two scales.

It was expected that the negative sensitivity dimension (NES) would again correlate positively with measures of negative emotionality, while the revised Positive Interpersonal Sensitivity scale (PIPS) would be associated with measures of empathic concern and other-oriented emotionality. A measure of self-esteem was also included in the present exercise.

5.4. The criterion variables.

The scales used for the present concurrent validation exercise were as follows:

1. ***The Interpersonal Reactivity Index*** **(IRI - Davis, 1980).** The IRI has already been described (see Chapter 3). In view of the revision made to the positive sensitivity component of the ESS, it was expected that the revised PIPS would correlate more strongly with the empathic concern sub-scale, compared with the correlation obtained with the previous scale, but would not correlate with the personal distress scale. Compared with the previous study, no differences were expected for the correlations between the revised PIPS and the other two sub-scales of the IRI, or between the IRI sub-scales and the revised Negative Egocentric Sensitivity dimension (NES).

2. ***The Questionnaire Measure of Emotional Empathy*** **(QMEE, Mehrabian & Epstein, 1972).** The QMEE was used again in the present concurrent exercise, and it was expected to have a strong and positive relationship with the PIPS scale, as in the previous study.

3. ***The EPI-N*** **(Eysenck & Eysenck, 1964).** The 24-item scale was administered but scores were computed for only 19 items, according to an earlier factor analysis that showed the presence of two sub-scales measuring *social sensitivity* and *hypochondriasis* (see Roger & Nesshoever, 1987). Alpha reliability for the 19 items was moderate (0.57; N= 71). Highly positive correlations were expected between the two sub-scales of the EPI-N and the revised NES. The EPI-N scale (Eysenck & Eysenck, 1964) was chosen instead of the EPQ-N due to its clearer factorial structure, since items are not related to any other factor on the whole inventory, as happens with the EPQ-N (e.g. Goh et al., 1982; Loo, 1979).

4. **The New *Rumination* and *Emotional Inhibition* scales (ESQ – Roger, Guarino & Olason, 2000).** The R and E-I scales have already been described in Chapter 3. As in the previous study, a positive correlation was

expected between the ESQ scales and NES, while an inverse association was expected between PIPS and emotional inhibition.

5. **The *Detachment/Emotional* scale from the CSQ (Roger, 1995).** This scale comprises 22 items (Alpha = .88, N= 172), and in this study the merged factor was labelled detachment, where high scores indicate detachment as opposed to emotional coping. The *detachment/emotional* scale was used again in the concurrent exercise to determine its relationship with the revised ESS dimensions. As has been suggested in chapter 3, an inverse association can be hypothesised between scores on NES and on the detachment scale (as the opposite pole of the emotional coping). The emotional sphere assessed by the revised positive sensitivity scale has not been investigated in the context of the coping process, but in principle, no relationship was expected between the PIPS and the detachment scale.

6. ***The UWIST Mood Adjective Checklist* (Matthews, Jones, & Chamberlain, 1990).** This is part of the Dundee Stress State Questionnaire (DSSQ – Matthews, et al., 1999), assessing four dimensions of mood and affectivity: energetic arousal (EA – 8 items), tense arousal (TA – 8 items), hedonic tone (HT – 8 items), and anger/frustration (AF – 5 items). For this study, it was expected that the NES scale would be positively related with negative moods (tense arousal and anger/frustration), while non-significant correlations were expected with the PIPS scale, even though a tendency toward a positive relationship between PIPS and hedonic tone may appear (e.g. Argyle & Lu, 1990).

7. ***Self-esteem Inventory* (RSE- Rosenberg, 1965).** This is a ten-item uni-dimensional measure of self-esteem scored on a four-point Likert scale, in the direction of high self-esteem. Although a high component of self-esteem has been identified on the Eysenck's scales and considered as one of its greatest shortcomings (e.g. Roger et al., 2000), an inversely moderate rather than high correlation with the NES scale was expected. Contrarily, no association was expected between self-esteem and the PIPS scale.

8. ***NEO-Five Factor Inventory* (NEO-FFI - Costa and McCrae, 1992a).** This 60-item inventory has been already described in Chapter 3. The same pattern of correlations between the NES and the NEO-FFI scales was expected in the present study, however, some new results were expected regarding the PIPS scale, considering the revision of the scale.

9. ***The short form of the Crowne-Marlowe Social Desirability Scale* (Reynolds, 1982).** This scale was used again as a manipulation check on the responses of the subjects. Specifically for the present study, an inverse correlation was expected with the NES scale, while no correlation was hypothesised with the PIPS.

5.5 Method

5.5.1. Subjects and procedure

In view of the number of the validation instruments in this study, they were administered from spring 2001 to summer 2002. Because of this, the number entered into the analyses varied to some extent from one analysis to another. The first set of scales was posted to 158 undergraduate students (cohort 2000-2001) of the voluntary subject panel from the University of York. Among these, 137 replied and a description of the sample can be found in section 5.3. A sub-sample of 71 students participated 6 weeks later in a session of two experiments and a set of three other questionnaires was given to them to be completed and returned by post. This last sub-sample comprised 31 males (mean age = 18.71; SD= 1.32) and 40 females (mean age = 18.66; SD = 1.16). Finally, subsidiary analyses were performed with a second sample (cohort 2001-2002) that completed a different set of questionnaires, with the ESS among them. From the 152 questionnaires mailed, 74 (48.68%) were received from 19 males (mean age = 18.84, SD .60), and 55 females (mean age = 19.09, SD 1,16).

5.6 Results

The scores of the ESS scales were correlated with the scores on the instruments included in this new concurrent exercise. Results will be presented in separate tables to facilitate their interpretation. Firstly, table 5.3.shows the correlations with the empathy scales.

Table 5.3. Correlations between the revised ESS scales and Empathy scales

	Negative Egocentric Sensitivity (NES)	***Positive Interpersonal Sensitivity (PIPS)***
IRI-Empathic Concern (EC)	.001 (N= 137)	.785** (N= 137)
IRI-Personal Distress (PD)	.452** (N= 137)	.117 (N=137)
IRI-Perspective-taking (PT)	-.185* (N= 136)	.356** (N= 136)
IRI-Fantasy Scale (FS)	.213* (N=136)	.363** (N= 136)
QMEE	.221* (N= 136)	.621** (N= 136)

***p< 0.001, *p< 0.05;* QMEE = Questionnaire measure of emotional empathy

The results showed that the revised positive dimension was, as expected, more highly correlated with the e*mpathic concern* dimension from the IRI, since the correlation with the original scale was .685. At the same time, the correlation with the p*ersonal distress* dimension of the IRI was non significant for the PIPS, indicating that the revision of the positive scale had achieved its aim. The correlations between the PIPS scale and the two dimensions of cognitive empathy (perspective-taking and fantasy) remained similar to those with the old scale.

Regarding the correlations between the NES scale and the IRI dimensions, results showed little variation from those obtained in the previous concurrent validation study (chapter 3). The negative dimension was not related with empathic concern, but a highly positive relationship was observed between NES and personal distress, as had been expected.

Finally, the correlation between PIPS and *QMEE* was highly significant, as expected, showing no differences from the one obtained with the old version of the positive scale.

Table 5.4. sets out the results for the correlations between the ESS dimensions and scores on the EPI-N sub-scales, ESQ and Detachment.

Table 5.4. Correlations between the revised ESS scales and EPI-N, ESQ and Detachment scales

	Negative Egocentric Sensitivity (NES)	***Positive Interpersonal Sensitivity (PIPS)***
Overall EPI-N	.804** (N=71)	.114 (N=71)
EPI-N Social Sensitivity	.788** (N=71)	.118 (N=71)
EPI-N Hypochondriasis	.723** (N= 71)	.049 (N= 71)
ESQ-Rumination	.850** (N= 61)	.006 (N=61)
ESQ-Emotional Inhibition	.393** (N=61)	-.486** (N=61)
CSQ-Detachment	-.776** (N=71)	-.086 (N=71)

***p< 0.001, *p< 0.05*

Results for the EPI-N scale showed as expected a low and non-significant relationship between the PIPS scale and both the EPI-N total score and the sub-scales. Contrarily and as expected, NES correlated highly positively with the scores on the EPI-N.

Regarding the correlations with the dimensions of emotional control, the PIPS scale showed no association with the ESQ-R scale, but a high and inverse correlation with the ESQ-EI scale, similarly as reported in chapter 3. NES again correlated highly positively with the R scale, although in the greater magnitude than with the previous scale. Interestingly, a significant positive correlation resulted between the NES and EI scales, which had not been observed in the former study.

As expected, the PIPS scale correlated non-significantly with the detachment index, in opposition to what had been observed with the former scale. This indicated again the achievements reached with the revision of the positive scale. On the other side, the highly positive correlation with the NES scale replicated the results reported in chapter 3.

Table 5.5. presents the results of the correlations between the ESS dimensions and scores on the UWIST Mood Adjective Checklist, and the social desirability index.

Table 5.5. Correlations between the revised ESS and the UWIST Mood and Social Desirability scales

	Negative Egocentric Sensitivity (NES)	***Positive Interpersonal Sensitivity (PIPS)***
UWIST-Energetic Arousal	-.386** (N=70)	.135 (N=70)
UWIST -Tense Arousal	.299* (N=71)	-.090 (N=71)
UWIST -Hedonic Tone	-.466** (N= 71)	.065 (N =71)
UWIST-Anger/Frustration	.295* (N= 71)	-.135 (N = 71)
Social Desirability	-.419** (N= 137)	.048 (N= 137)

***p< 0.001, *p< 0.05*

Consistent with the expectations, the negative mood scales (tense arousal and anger/frustration) correlated positively with the NES scale, while the positive mood scales (energetic arousal and hedonic tone) correlated inversely with NES. None of the correlations for the PIPS scale resulted in any significant findings, as expected. Finally, PIPS scores from the revised scale were again unrelated to *social desirabil*ity, while NES scores were again moderately inversely correlated with this index.

Table 5.6. presents the results of subsidiary analyses performed with a second sample of undergraduate students, using the ESS, the self-esteem inventory (RSE- Rosenberg, 1965), and the NEO-FFI (Costa & McCrae, 1992a).

Table 5.6. Correlations between the revised ESS scales and the Self-esteem and NEO-FFI scales

	Negative Egocentric Sensitivity (NES)	***Positive Interpersonal Sensitivity (PIPS)***
RSE	-.413** (N= 73)	-.155 (N= 73)
NEO-FFI-N	.614** (N= 73)	.017 (N=73)
NEO-FFI-E	-.347** (N=74)	.020 (N=74)
NEO-FFI-OE	.155 (N= 72)	.279* (N= 72)
NEO-FFI-A	-.330** (N=74)	.207 (N=74)
NEO-FFI-C	-.216 (N=74)	.018 (N=74)

***p< 0.001, *p< 0.05* . RSE= Rosenberg Self-esteem inventory; N= Neuroticism; E= Extraversion; OE = Openness to Experience; A= Agreeableness; C= Conscientiousness

As expected, NES correlated inversely with RSE, although the correlation produced a moderate result rather than high, as has been identified for the Eysenck's scales. Contrarily, the correlation between PIPS and RSE resulted in non-significant findings.

Regarding the relationships with the NEO-FFI scales, results for NES emerged in the expected direction and similar to those reported for the former scale (see Chapter 3). Interestingly, the NES and NEO-FFI-N scales share around 38% of the common variance, indicating the differences between the scales. A different pattern of association emerged for the PIPS scale, compared with the results for the former positive scale. Specifically, only the correlation with the NEO-FFI- OE factor resulted in anything significant.

Study III: Confirmatory Factor Analysis of the ESS

5.7. Introduction

Confirmatory factor analysis (CFA) estimates whether a factor model provides a good fit to the data by specifying the relationships of the underlying constructs, with or without allowing the constructs to inter-correlate freely, and can be used to suggest a different factor structure (e.g. Anderson & Gerbing, 1988; Byrne, 1994; Cole, 1987; MacCallum, 1995). The construction of models in CFA are

either based on substantive theories or on a-priori empirical information about the nature of the data structure (Byrne, 1994; Crowley & Fan, 1997). CFA analysis can also be used to revise and refine the factorial structure of existing instruments, although a successful confirmation is more likely if exploratory factor analysis was conducted in the initial development of the instrument (Bentler & Chou, 1987; Floyd & Widaman, 1995). The two techniques are, therefore, complementary to one another.

However, personality questionnaires typically comprise relatively large numbers of items, and confirming a theoretical factor structure is most successful when scales contain relatively few items and the data are consistent with a simple factor solution, loading either on a single factor or on a set of highly discrete constructs. This has been the case of the NEO-PI-R, whose structure could not be confirmed (Church & Burke, 1994; McCrae et al., 1996; Parker, Bagby & Summerfeldt, 1993) owing to the large number of items loading on inter-correlated factors. Furthermore, in relatively large samples the best models may not fit because the sample-size multiplier that transforms the fit function into a χ^2 will multiply a relatively small lack of fit into a large statistic (Bentler & Chou, 1987; Floyd & Widaman, 1995). Measures that include many items on each factor to achieve adequate internal consistency and reliability, also increase the potential for correlated error terms in CFA, and this has been identified as the most common problem in using items as indicators for latent factors in CFA (Floyd & Widaman, 1995).

As a solution to this problem, a number of researchers (Anderson & Gerbing, 1988; Floyd & Widaman, 1995; Yuan, Bentler & Kano, 1997) have recommended the use of item parcels rather than individual items for confirmatory analysis of lengthy questionnaires. Parcels are simple sums of several items assessing the same construct, and several parcels are normally constructed for each factor, where each item can only be assigned to one parcel (Kishton & Widaman, 1994). Parcel scores are likely to have greater reliability and generality, response bias and other characteristics that are idiosyncratic to individual items are likely to have less influence, the ratios of measured variables to corresponding factors and to estimated parameters are increased, and the distributions of item parcels

are less likely to cause problems for factor analysis (Marsh, Antill & Cunningham, 1989; Yuan, Bentler & Kano, 1997).

For parcel construction of uni-dimensional constructs, Kishton and Widaman (1994) suggested the following guidelines: the items for each construct have to be randomly allocated into parcels, the internal consistency of the parcels has to meet some minimum standard, and all parcels have to be uni-dimensional. It is also recommended that several models should be compared before a final decision is made about the goodness of fit of a particular model. Following these guidelines, the present analysis tested the fit of models for one and two factors, both by items and parcels.

5.8. Method

5.8.1. Subjects

The subject pool consisted of two samples of university undergraduates. The first sample comprised a total of 198 first year undergraduate students (cohort 2001-2002) from the voluntary subject panel at the University of York (exempt psychology students), who were mailed a package of several scales including the ESS. A total of 152 (76,76%) of the students replied, 55 males (mean age = 18.87, SD = 3.25) and 95 females (mean age = 18.85, SD = 1.04). The second sample comprised first year undergraduate students from the Ripon & York College at York (autumn term 2001), who only completed the ESS. This group consisted of 40 students, 8 males (mean age = 20, SD = 3.29) and 32 females (mean age = 20.59, SD= 4.48). The final combined subject pool thus consisted of 192 undergraduate students, 63 males (mean age = 19.44; SD 3.27) and 127 females (mean age = 19.67; SD 2.88).

5.8.2. Statistical Analysis

The models in this study were estimated using the maximum likelihood method (ML), which is the most commonly used approach in Structural Equation Modeling (SEM). Results were analysed using different parameters of goodness of fit, including the Comparative Fit Index (CFI), the NonNormed Fit Index (NNFI), the Goodness of Fit (GFI) and the Adjusted Goodness of Fit (AGFI) indices, and the Root Mean Square Error of Approximation (RMSEA). Chi-square is also

provided, but because it is sensitive to violations of normality and is related to sample size, large sample sizes with small discrepancy between the samples and fitted covariance matrices will significantly increase the chi-square value, and it is then a less reliable index (Cole, 1987; Byrne, 1994; Bentler, 1995; Floyd & Widaman, 1995). The current analysis will focus on CFI, NNFI, GFI, AGFI and RMSEA.

The incremental fit indices (CFI, NNFI) are generally based on a comparison between the χ^2 value for the hypothesised model and the χ^2 value for the null model. The range for CFI is between 0.00 – 1.00, but NNFI can exceed 1.00 (Bentler, 1995; Hu & Bentler, 1995). The overall goodness of fit indices measure the relative amount of variance and covariance that are jointly accounted for by the model (Joreskog & Sorbom, 1989). These indices are in general very similar to R squared in multiple regression. Normally, values greater than 0.90 indicates an acceptable fit to the data for both incremental and overall goodness of fit indices, although recently a value of 0.95 has been recommended for the CFI (Hu & Bentler, 1999). The RMSEA assesses the degree to which a confirmatory structure approximates the data being modelled, and can be regarded as a root mean square standardised residual. RMSEA also adjusts for model complexity and values less than 0.05 indicate a close fit of the model, values between 0.05 and 0.08 an acceptable fit and values greater than 0.10 a poor fit (Browne & Cudek, 1993).

5.9. Results

The data were first subjected to a by-item confirmatory factor analysis, testing both one and two factor models. The two-factor model provided a significantly better fit than the one-factor model (for example a CFI of .534 for two factors and .388 for one factor), but as had been anticipated, none of the fit indices were acceptable for the analysis by items.

For the next analysis, and following the guidelines from Kishton and Widaman (1994), the 43 items were therefore grouped randomly into five parcels for NES

and three parcels for PIPS. Table 5.7. presents the numbers of items and reliabilities for each parcel.

Table 5.7. Number of items and reliabilities for a priori randomly constructed parcels for the two factors of the ESS

Parcel	***Number of items***	***Reliability (Alpha)***
NESPAR1	6	.6454
NESPAR2	6	.4930
NESPAR3	6	.5241
NESPAR4	5	.4311
NESPAR5	5	.3865
PIPSPAR1	5	.5400
PIPSPAR2	5	.6539
PIPSPAR3	5	.5290

NES= Negative Egocentric Sensitivity; PIPS= Positive Interpersonal Sensitivity

The parcels were all constructed grouping a similar number of items, and although three parcels for the NES dimension fell below 0.50, the alpha reliabilities were generally in the acceptable range. The data from the 8 parcels were entered into CFA and comparisons between the two and one factor models were performed again. The factors for the two-factor model were allowed to correlate freely. Results are shown in table 5.8.

5.8. Goodness of Fit indicators for the one and two-factor structures of the ESS: Parcel Analysis

	Models tested	
	Two Factor	**One factor**
χ^2	28.42* (df = 19)	186.00*** (df =20)
CFI	0.980	0.649
NNFI	0.971	0.509
GFI	0.966	0.803
AGFI	0.935	0.645
RMSEA[a]	0.051 (.000-.087)	0.209 (.181-.235)

N= 192; * p≤ 0.10 *** p≤ 0.001 level. χ^2 = Chi-square; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; GFI = Goodness of Fit Index; AGFI = Adjusted Goodness of Fit Index; RMSEA = Root Mean Squared Error of Approximation. [a] The values in the brackets are 90% population confidence interval for RMSEA.

The Goodness of Fit indices clearly showed that the two-factor model did fit the data very much better than the one factor model, and the indices supported the existence of two factors or dimensions for the ESS. The difference in the chi-square statistic also showed that the two-factor model was of a significantly better fit than the one-factor model ($\Delta\chi^2_{(1)} = 157.58$ $p \leq 0.001$).

5.10. Discussion

This chapter focused on the construction, validation and factorial confirmation of the revised Emotional Sensitivity Scale (ESS). Three studies are described in this chapter, Study I presenting the results of the construction of the revised ESS, Study II the results of the concurrent validation exercise of the revised scale, and Study III the results of the confirmatory factor analysis of the ESS.

As was pointed out in chapters 2 and 3, the original PES component was confounded by a sub-component of negative emotionality in its structure, and this prompted a revision of the scale. Although the focus of the revision was mainly on the PES factor, the NES factor as part of the whole scale was included, so analyses to assess the concurrent and discriminant validity of the revised NES scale were also performed. Finally, the confirmatory factor analysis provided evidence about the structure of the revised scale.

5.10.1. Test construction

A new scenario study was performed to generate items for the revised questionnaire, and the new pool of items was analysed together with the items from the original scale. The Scree Test mainly suggested a two-factor structure, and rotation to an Orthogonal (Varimax) terminal solution yielded 28 items for the first factor, and 15 items for the second.

The items comprising the first factor were related to the tendency to react with negative emotions, especially anger, frustration, vulnerability and self-criticism. The structure remained almost identical to the one observed in the first scale, and since the items were strongly self-referent the factor was labelled *Negative Egocentric Sensitivity (NES)*. On the other hand, there were major changes in the

structure of the second factor, where only 4 items emerged from the last version of the scale, with the remaining 11 items coming from the new pool. The items in the second factor described sensitivity and concern about others' emotions as well as empathy for others' well-being, thus the dimension was labelled *Positive Interpersonal Sensitivity (PIPS).*

The main difference between the two versions of the positive scale is that the former version included an element of negative emotionality, particularly p*ersonal distress* (Davis, 1980; 1983; Eisenberg et al., 1994; 1998). The presence of these items created a confounding effect in the validation studies reported in chapters 3 & 4, and the aim of the revision was to clarify the structure of the scale. As a result, the emphasis in the revised version was primarily with *empathic concern* about others' well-being, but without the distress arising from becoming identified with their emotional state. The factors in the revised ESS were highly internally consistent, had high test-retest reliabilities and were statistically orthogonal.

Interestingly, males and females did not differ significantly in their scores on the revised NES, whereas they were so for the 27-items version. This result is opposite to typical findings for measures of negative emotionality and affectivity, where women show higher scores than men (Heaven & Shochet, 1995; Lynn & Martin, 1997; Martin & Kirkcaldy, 1998; Roberts & Gotlib, 1997). However, it has been pointed out that the traditional N measures are affected by the differential item functioning (DIF), which biases women to endorse particular items and creates an artificial gender difference (Smith and Reise, 1998). It could be assumed that the NES scale does not include DIF, and if so the lack of difference between males and females in this scale may be authentic. It would be interesting to test samples other than students to determine whether findings replicate the current results.

The results of the study thus replicate previous findings for empathy, where women typically score higher than men (Davis, 1980; Eysenck & Eysenck, 1978; Eysenck, Pearson, Eastig & Allsop, 1985; Hoffman, 1977; Lennon & Eisenberg, 1987 for a review; Martin et al., 1996; Mehrabian & Epstein, 1972). Females again scored higher than males on the positive sensitivity measure, as was the case with the original version.

5.10.2. Concurrent Validation

The Positive Interpersonal Sensitivity Scale (PIPS)

Overall, the positive interpersonal sensitivity scale was positively related to similar variables, and negatively associated with dissimilar ones. For example, the positive and strong correlation with the empathic concern scale from the IRI shows that this revised positive scale assesses primarily sensitivity to others' emotions. Moreover, the lack of negative emotionality within its structure confirms that the PIPS scale can be acknowledged as a measure of functional emotional reactivity, which it is supposed to be highly adaptive when combined with a detached coping style under stressful social encounters.

The results fit well into the theoretical framework of the empathy model (Davis, 1980; 1983; Eisenberg & Fabes, 1992; Eisenberg et al., 1994; Mehrabian & Epstein, 1972), where cognitive and emotional empathy are two different spheres of the construct. Within the emotional empathy sphere, the dimensions of empathic concern/sympathy and personal distress are empirically discriminable, having different implications for individuals' behaviours and emotions (Davis, 1980; 1983; Eisenberg et al., 1991; 1992; 1994; Okun et al., 2000). Thus, empathic concern reflects the tendency of the respondent to experience feelings of warmth, compassion and concern for the distress of others, and people high in empathic concern are able to sympathise with others but without themselves experiencing the feelings of distress. This kind of emotional reactivity has also been shown to facilitate helping behaviours (Davis et al.,1999; Okun et al., 2000). The PIPS scale seems to have isolated this functional sphere of empathy, and combined with other items assesses validly the construct of positive other-oriented emotional sensitivity.

The removal of the personal distress component from the Positive scale provides an improved instrument for measuring this dimension of emotional sensitivity, and addresses the shortcomings identified in the current Empathy scale proposed by Davis (Interpersonal Reactivity Index, 1980). For instance, the PIPS scale measures a broader range of emotional reactions, compared with the seven items of the e*mpathic concern* scale (IRI – Davis, 1980). Secondly, Davis's e*mpathic concern* scale has been shown to be related to indices of negative

emotionality (Eisenberg et al., 1994; 1998; Okun, et al., 2000), thus confounding results in research on interpersonal adjustment and social functioning, whereas the revised PIPS is independent of this kind of confounding.

The predicted positive correlation between the PIPS and the perspective-taking dimension from the IRI suggests that those high on positive sensitivity are also better able to see situations in perspective, and may thus be more able to cope in a more rational and detached way. However, this last assumption will be discussed in detail later, when the results about detachment will be presented.

The highly positive correlation between the PIPS and the Questionnaire Measure of Emotional Empathy (QMEE - Mehrabian & Epstein, 1972) was in the expected direction, confirming the similarities of both scales in measuring the sphere of emotional empathy. However, the scales are not identical, since they share just over 38% of the common variance. Furthermore, the QMEE correlates positively with the NES scale, suggesting the presence of a negative emotionality component in its structure.

As expected, the PIPS scale does not correlate with either EPI-N (EPI-N, Eysenck & Eysenck, 1964) or with its sub-components of social sensitivity and hypochondriasis (Roger & Nesshoever, 1987). PIPS was also inversely related to the emotional inhibition scale from the ESQ (Roger et al., 2000), but unrelated to the rumination dimension. These latter results replicate those observed in the previous concurrent study using the original PES scale (see chapter 3).

However, contrary to the results obtained previously, the revised PIPS scale was unrelated to the detachment scale from the CSQ (Roger, 1996). This means that four groups of individuals can be identified using these two variables. Thus, among high PIPS scorers it is possible to discriminate high and low detached individuals, one hypothetically able to emotionally detach from the stressful situations, and the other not able to disengage themselves from the distress, and then likely to get involved in the negative emotions of the others they sympathise with. Implications of this result will be discussed in the final chapter. PIPS was also unrelated to measures of mood, supporting other findings that suggest a non-significant correlation between the emotion perception threshold score and

current moods (Martin et al., 1996). The emotion perception threshold has been described as a trait-like individual difference in emotional sensitivity, theoretically related with the dimension measured by the PIPS scale.

PIPS scores were also unrelated to *social desirability*, replicating the results of the previous positive scale (see chapter 3) and indicating that positive sensitivity is not confounded by fake. A low and non-significant correlation was found between PIPS and self-esteem, showing thus the independence of these two constructs. This result contrasts with the findings reported by some studies indicating a positive relationship between empathy and self-esteem (Jarymowicz, 1977; Larrieu & Mussen, 1987; Miller, 1979; Rigby & Slee, 1993). However, the current result is identical to that reported by Martin et al. (1996), where the emotion perception threshold score was unrelated to a measure of self-esteem. Finally, correlations between PIPS and the NEO-FFI scales were non-significant, with the exception of openness to experience. These results contrast with those observed in Chapter 3 for the former positive sensitivity scale, where positive and significant relationships were found as a result of applying the extraversion and agreeableness factors.

The Negative Egocentric Sensitivity Scale (NES)

Results from the concurrent study for the revised NES scale were almost identical to those obtained with the previous version, so the discussion will not be repeated here. The only exception was the correlation with the ESQ-Emotional Inhibition scale, which resulted in findings highly different from those previously obtained and so deserves further interpretation. Thus, the positive correlation between these two scales suggests that high negative sensitivity people tend also to inhibit and "bottle up" their emotions, which might have important implications over health. However, it contrasts with previous evidences reporting no association between the E-I scale and measures of negative emotionality (e.g. Roger & Nesshoever, 1987; Olason, 2000).

Some new scales were included in the present concurrent validation study of the NES scale, with the aim at expanding the previous results. One of these scales was the EPI-N, and findings were consistent with predictions that high positive correlations with both, the total N score and the sub-scales of social sensitivity

and hypochondriasis would be found. However, the results indicated that EPI-N and NES share around 64% of the common variance, which makes both measures significantly different. For instance, the N scale contains a clear and discriminable component of hypochondriasis, with items openly referring to health symptoms, while the NES scale does not comprise such a component. On the other hand, many of the items in the EPI-N scale are referred to negative feelings and emotions triggered in interpersonal settings, while items in the NES scale describe similar emotions but in no specific contexts, in other words, they describe generalised negative emotions. In summary, the NES scale appears to be a measure of negative emotional reactivity, with a homogenous and uni-dimensional structure, and items are not confounded with health symptoms or social anxiety. Interestingly, when correlations between the old and revised versions of the NES and NEO-FFI-N scales were compared, results indicated that the revised negative scale was even less correlated with NEO-FFI-N than it was with the former scale, supporting the statement about the novelty of the NES scale.

Another of the new measures included in this exercise was the UWIST Mood Adjective Checklist (Matthews, Jones, & Chamberlain, 1990), measuring four dimensions of mood state and affectivity. Results for the NES scale were highly consistent with the expectations, since NES correlated inversely with moods representing feelings of vigour, energy and happiness, while correlating positively with dimensions representing tension, nervousness and feelings of anger. These results support previous findings reporting the correlations between neuroticism and mood states (Cooper, 1998; Dorn & Matthews, 1995; Matthews & Deary, 1998, Matthews, Jones & Chamberlain, 1990; Matthews, Joyner, Gilliland, Campbell, Falconer, & Huggins, 1999; Watson & Clark, 1992; Williams, 1989).

The correlation between NES and self-esteem can be considered moderate, suggesting that both scales share only around 17% of the common variance. However, the correlation between the NEO-FFI-N and the RSE scales resulted in stronger correlations ($r = -.644$, $p < 0.0001$), thus indicating that this N scale contains much more items confounded with low self-esteem. In fact, this has been one of the greatest shortcomings of the Eysenck's scales (e.g. Roger et al., 2000), which also replicates in the Costa and McCrae's scale, thus confounding

the validity of the construct of emotional lability and creating major problems when using these scales in the context of the stress and illness process.

5.10.3. Confirmatory Factor Analysis

In order to further explore the structure of the revised ESS and to confirm the presence of the two factors described from the exploratory factor analysis, a CFA was performed using a new sample of undergraduate students.

Two and one-factor models of the revised 43-items version of the ESS were tested using the EQS program (Bentler, 1995) and the different parameters of goodness of fit, such as the chi-square, the Comparative Fit Index (CFI), the NonNormed Fit Index (NNFI), the Goodness of Fit (GFI), the Adjusted Goodness of Fit (AGFI), and the Root Mean Square Error of Approximation (RMSEA) were used to consider the best model for the scale.

Considering the statements of Bentler and Chou (1987) and Floyd and Widaman (1995) about the restrictions of lengthy scales and the recommendations in using item parcels rather than individual items, several parcels were randomly constructed for each factor to test the two and one-factor models. Results clearly showed a good fit for the two-factor model, compared with the one-factor model. Values of the parameters for the two-factor model ranged between 0.935 and 0.980, with a RMSEA of 0.051; while the values for the one-factor model ranged between 0.509 and 0.803, with the RMSEA far from the values accepted (0.209). Thus, the two-factor model of the revised-ESS was confirmed in view of the pattern of goodness-of-fit indicators, which resulted in significantly higher values for the two-factor solution than for the competing one-factor model. This was further confirmed, as the nested two-factor model had a significantly lower chi-square value than the one-factor model.

In summary, the CFA confirmed the two-factor structure of the revised ESS, thus indicating that the construct of *emotional sensitivity* comprises two dimensions of negative egocentric and positive interpersonal sensitivity. This result highly complements the previous analysis of concurrent validation, showing then a reliable and valid measure of emotional responsivity.

5.11. Conclusions

The results of the scale construction of the revised ESS have yielded a measure of two statistically and empirically discriminable factors for negative and positive emotional sensitivity, and both concurrent and discriminant validity were also confirmed. The two-factor structure of the ESS was subsequently confirmed using the CFA method. The revised PIPS scale is a substantially improved index of positive sensitivity, defined as other-oriented empathic concern and sensitivity to others' emotions. This individual difference is an essential personal characteristic for individuals dealing with other people who are under stressful or difficult situations, as for instance social workers, counsellors, medical doctors, etc.

For the NES scale, results of the present exercise showed a consistent pattern of relationships with measures of negative emotionality. However, the NES scale seems to be a highly different measure of negative reactivity, compared with the traditional inventories (e.g. EPI-N and NEO-FFI-N) with which it shares no more than 65% of the common variance.

In sum, the revision of the ESS addresses the psychometric shortcomings identified in previous scales of emotionality or emotional reactivity, and provides a new and independent dimension to assess a more adaptive and functional sphere of emotional sensitivity –PIPS-.

Considering together the nature of each dimension and the concurrent validation exercise allow us to give a description of personality profiles as follows. Firstly, an individual scoring high on the Negative Egocentric Sensitivity scale shows a tendency to overreact to the environmental demands (either internal or external) with negative self-oriented emotions. Specifically, may show strong feelings of low esteem and devaluation, high vulnerability to be emotionally or psychologically hurt in an interpersonal encounter, with high tendency to self-criticism about the possible negative outcomes of the situation. Likewise, high NES individuals experience strong feelings of upset and anger, both self and other-directed. Based on the results of the concurrent and discriminant validity studies, a person scoring high on the NES scale may experience a personal

distress kind of empathy when relating with others undergoing stress, which means that he/she feels uneasy in front of the suffering person, as well as experiences negative moods such as frustration and tense arousal. Finally, the high NES person highly ruminates over past and future events and tends to cope stress emotionally.

Secondly, a person scoring low on the NES scale does not experience these kinds of negative emotions when dealing with stress or difficult situations, and does not overreact to the demands. Based also on the results of the concurrent and discriminant validity studies, a low scorer on the NES scale does not feel uneasy in stressful interpersonal situations, is able to express more openly his/her feelings and shows a highly adaptive detached coping style. The low NES person tends also to experience positive moods, such as vigour, energy and happiness. Likewise, this kind of people does not ruminate over past upsetting events, which reflects their ability to focus attention only on present or current experiences. These characteristics make to low NES people highly emotionally adaptive to stressful events.

Regarding the PIPS scale, high PIPS individuals are those who easily "pick up" on the emotions of others or in other words, are able to quickly recognise the others' emotions. Apart from the emotion recognition process, the high positive sensitivity person shows concern about the well-being of others and is able to sympathise with their suffering. He/she also shows disposition to help others in difficulty. Likewise, the high PIPS person is able to accept and recognise the different perspectives and opinions of others in difficult interpersonal encounters. Based on the concurrent analysis, the high PIPS individuals are more emotionally expressive and generally more open to new experiences.

By contrast, the low PIPS person shows difficulties in expressing his/her concern for others in trouble, is very low empathic and does not assume situations in perspective. At the same time, these people tend to inhibit their emotions and restrain themselves to experience new situations.

CHAPTER 6

EXPERIMENTAL VALIDATION OF THE REVISED EMOTIONAL SENSITIVITY SCALE

EXPERIMENT III

Negative Egocentric Sensitivity (NES) as predictor of cardiovascular reactivity to stress

6.1 Introduction

A new experiment was carried out to test the validity of the revised Negative Egocentric Sensitivity scale (NES) to predict cardiovascular reactivity of subjects performing a stressful task. The aim of the present experiment was to address the shortcomings observed in the experiment I (see Chapter 4), where non-significant differences were observed between high and low NES subjects, identified with the original Negative Emotional Sensitivity scale. Even though the negative sensitivity scale did not change significantly with the revision (the two versions correlated .99), the inconsistent results found in the previous experiment were considered a justification to carry out further analyses. Thus, the aim of the current experiment was again to test the hypothesis that high NES subjects are more reactive to stressful stimuli than low NES, but incorporating a new experimental design and using different stimuli.

As described in chapter 4, the previous experimental design was based on the use of stimuli extracted from the International Affective Picture System (IAPS, Lang, Bradley & Cuthbert, 1999). However, these were not perceived by the sample as "stressful", and in turn did not provoke the stress response expected for the high NES group. The subjects in the experiment had also been exposed several weeks before to the same set of stimuli, which may have created a habituation effect with the subsequent decrease in their cardiovascular reactivity. Finally, the non-significant effects could also be attributed to the nature of the stimuli, which involved "passive coping" that might provoke a conservation-withdrawal response. The present experiment used "active coping" stimuli that have been shown to provoke stress reactivity (Olason, 2000).

In general, it can be hypothesised that high negative egocentric sensitivity subjects will show a greater cardiovascular reactivity in response to the stressful task, compared with the low NES participants, supporting previous findings regarding the higher stress reactivity of high neuroticism individuals (Bolger & Schilling, 1991; Bull & Nethercott, 1972; Holden & Barlow, 1986; Infrasca, 1997; Vogeltanz and Hecker , 1999).

Measures of mood and anxiety were incorporated into the experimental design, expected to be different in both the between comparison (high vs. low NES), and across the experimental session. High NES subjects were expected to score higher than low NES on dimensions representing negative moods and anxiety, as has been reported for high N individuals (Cooper, 1998; Dorn & Matthews, 1995; Matthews & Deary, 1998, Matthews, Jones & Chamberlain, 1990; Matthews et al., 1999; Watson & Clark, 1992; Williams, 1989). In fact, Matthews and Westerman (1994) found a general increase in energetic and tense arousal after stressful tasks, especially attentionally demanding tasks, while Larsen & Ketelaar (1991) reported that the negative affectivity increases in high N individuals when they are exposed to negative events. State anxiety also seems to increase as a result of the stressful task among high trait anxious subjects, as long as this experience is subjectively perceived as difficult or threatening (e.g. Busch, King & Guttman, 1994; Weiner & Schneider, 1971).

In summary, the present experiment addresses the limitations of the first experimental validation, where high negative emotional sensitivity subjects were tested for cardiovascular reactivity to stressful stimuli. The current experiment will test the validity of the new version of the negative sensitivity scale, the Negative Egocentric Sensitivity scale, which measures the tendency of individuals to be emotionally over-reactive and negatively self-centred in response to environmental demands.

6.2. Method

6.2.1. Subjects

A total of 137 subjects from a volunteer panel at the University of York who had previously completed the revised ESS were invited to participate in the experiment. From these, 71 (51.82%) replied (31 males and 40 females), and

based on their scores of the NES scale (mean ± 1 SD), data from 19 subjects were used for the analysis. The final sample comprised eight subjects on the High-NES group (mean age = 19.13, SD= 1.64) and eleven subjects on the low-NES group (mean age = 19.18, SD= 1.72); 10 were males (52.63%) and 9 were females (47.37%).

6.2.2. Instruments and stress task

6.2.2.1. The task

A modified version of the Stroop task was used as the stressor. The task was set up on the PsyScope experimental generator package (Cohen, et al., 1993). The Stroop task consisted of four colour words (yellow, red, green and blue) appearing on the screen either in their own colour or in one of the remaining three colours (for example the word "red" written in yellow). There were two phases in this experiment, with the responses in the first phase (colour naming) being the colour the word was written in, and in the second phase (word naming) being the colour described by the word. 30 stimuli in each phase were presented and the total task lasted about 10 min. To maximise the effect of the stressor, the colour words were presented for only 100 ms on the screen and the subjects received immediate feedback for their performance through different audio signals for correct and wrong answers. The screen was left blank until a response was initiated. Since colours corresponded to numbers on the keyboard, subjects had the added pressure of having to remember which number corresponded to which colour. Additionally, the subjects were told that they were competing with the average score from everyone who had taken the test before them.

6.2.2.2. Physiological measures

Reactivity measures were obtained from an Omron M4 fully automated electronic blood pressure monitor, which provided measures for Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Heart Rate (HR). The reactivity measures were all obtained from the left arm for each subject, who rested their arm on a table with the palm of the hand facing upwards and the cuff at approximately heart level. Four different cardiovascular measures were taken during the experiment: Baseline, Inter-trial, Post-task and Recovery, respectively. The experimenter immediately after displayed on the monitor screen recorded

them all. The Inter-trial measure was taken immediately after the first phase of the experiment, while the Post-task measure was taken after the second phase. Change scores were calculated as a proportional rise or fall from baseline for each cardiovascular measure.

6.2.2.3. Questionnaires.

The following questionnaires were used in the present study:

1. ***The UWIST Mood Adjective Checklist*** **(Matthews, Jones, & Chamberlain, 1990)**, which is part of the Dundee Stress State Questionnaire (DSSQ – Matthews, et al., 1999). This scale was used as a measure of subjective state of stress before and after the experiment, assessing four dimensions of mood and affectivity: Energetic arousal (EA – 8 items), tense arousal (TA – 8 items), hedonic tone (HT – 8 items), and anger/frustration (AF – 5 items). The format of the checklist can be seen in Appendix M.

2. ***The short-form of the state scale of the Spielberger State-Trait Anxiety Inventory*** **(STAI-6, Marteau & Bekker, 1992)**. This is a six-items scale to measure the state anxiety, which was developed to be used in circumstances where the full-form is inappropriate, such as clinical or research environments. Items can be answered using a 4-point scale from 1 = *not at all*, to 4 = *very much*. The scale has shown acceptable reliability and validity, and the scores are similar to those produced by the full-form (Marteau & Bekker, 1992). The inventory was administered before and after the experimental session.

6.2.3. Procedure

The experiment was conducted in the stress research laboratory at the University of York. The subjects were received by the experimenter and taken to the laboratory. After thanking them for attending the session, subjects were told that they would answer a series of questionnaires and perform a task on the computer designed to measure different aspects of intelligence, while having their blood pressure recorded several times during the experiment. Once the students had consented and filled in the corresponding forms, they were asked to complete the set of pre-test questionnaires (UWIST and short-STAI). Subsequently, a pre-

measure of blood pressure and heart rate was taken in order to adjust the cuff and the blood pressure monitor. After doing so, the subjects were asked to relax alone for five minutes, and immediately after the resting period two baseline measures were taken with one minute in between. The average of the two measures was used as the final baseline measure in the experiment (see Shapiro, et al., 1996, for an account of this procedure).

The subjects were then seated at the computer and told: " Your task will be to perform an intellectual task designed to measure different aspects of intelligence. What I'm doing is devising a new measure of intelligence called COGNITIVE PROCESSING SPEED, in other words I am measuring how fast you can think. Your performance will be registered and then compared with the rest of the participants, providing you with a final score."

The experimenter then started the computer program, which recorded the subject's name and age and was followed by a general description of the "intelligence test" (the specific instructions which appeared on the screen can be seen in Appendix N). They then proceeded to the next page by pushing the spacebar and more detailed information followed about the Stroop task (colour naming task – Phase 1) and how they should answer. Immediately after, the subject started the practice trials, which were followed by the experimental trials. The Stroop test consisted of a 6-trials practice session and 120 experimental trials, 60 per each specific task.

Once they had finished the first 60 trials (colour naming task), the screen turned black for about 3 min. and the inter-trial cardiovascular measure was taken. After this period, a "Please Wait" message appeared on the screen and immediately after the instructions for the second task (word naming – phase 2) appeared. Then, the subjects performed the 6- trial practice followed by the 60 experimental ones. Once the subjects had completed this second task, the computer screen turned black again and the post-task cardiovascular measure was registered. Subsequently, the experimenter asked the subjects to rest for 5 min., and then the final physiological measure was taken (recovery condition). Finally, the subjects completed the post-task questionnaires (UWIST and short-STAI) and were paid for their participation in the experiment. In order to avoid anticipatory

responses in oncoming students and contamination of the data, the participants were asked to keep the confidentiality of the experimental procedure and not to inform any of their peers on campus about the session.

6.2.4. Statistical Analyses

Change scores for heart rate and blood pressure were calculated in order to assess the difference between the first (baseline) and second (experimental condition) measure of cardiovascular reactivity. The formula used was [(Time 2-Time 1)/Time 1] x 100, and three different change scores were obtained: Baseline – Intertrial, Baseline – Post-task, and Baseline – Recovery. A series of 2 (High and Low NES) x 3 (Time of measurement) split-plot ANOVAs were computed for each cardiovascular index to determine whether the personality condition produced a differential cardiovascular response to the stressful task. Furthermore, differences on the mood scales and on the state-trait anxiety inventory were analysed comparing High and Low NES subjects before and after the stressful task performance, using a 2 x 2 design.

6.3. Results

6.3.1. Analysis of Baselines for High and Low NES

An initial analysis of the baselines for each cardiovascular measure for high and low NES was performed through a series of t-tests. Results indicated no significant differences between any of the measures, thus revealing the equivalence of the physiological measures in resting condition. Table 6.1. shows the descriptives for each measure.

Table 6.1. Descriptives for Baselines for High and Low NES

	HIGH NES	**LOW NES**
	Mean (SD)	**Mean (SD)**
SBP	109.56 (16.63)	113.32 (9.77)
DBP	67.13 (7.32)	71.14 (4.50)
HR	71.69 (7.27)	69.64 (8.61)

6.3.2.Negative Egocentric Sensitivity and reactivity to the stressful task

Table 6.2 presents the descriptive data separately for groups, using the change scores to represent each point of the experimental session. According to the SBP and DBP data, high NES subjects were more reactive to the stressful task than their low NES counterparts. This trend was also observed at the post-task condition, where the high NES group showed a higher blood pressure than low NES group. A difference can also be seen for HR between high and low, although to a lesser extent. However, for the recovery condition there seemed to be no difference between high and low NES subjects, with measures nearly approaching the baseline level.

Table 6.2. Cardiovascular change scores for High and Low NES

	Negative Egocentric Sensitivity Groups	
Cardiovascular Change Scores	*High NES Mean (SD)*	*Low NES Mean (SD)*
Int/Bas		
SBP	17.29 (11.64)	6.36 (9.38)
DBP	18.81 (21.22)	1.96 (13.46)
HR	-5.02 (19.88)	1.74 (22.13)
Pos/Bas		
SBP	8.06 (6.24)	2.98 (7.63)
DBP	6.49 (8.31)	2.58 (9.67)
HR	-3.65 (9.14)	1.99 (5.83)
Rec/Bas		
SBP	-1.73(8.32)	-.43 (6.75)
DBP	.61 (11.76)	-1.26 (5.43)
HR	-3.64 (9.22)	-3.22 (11.60)

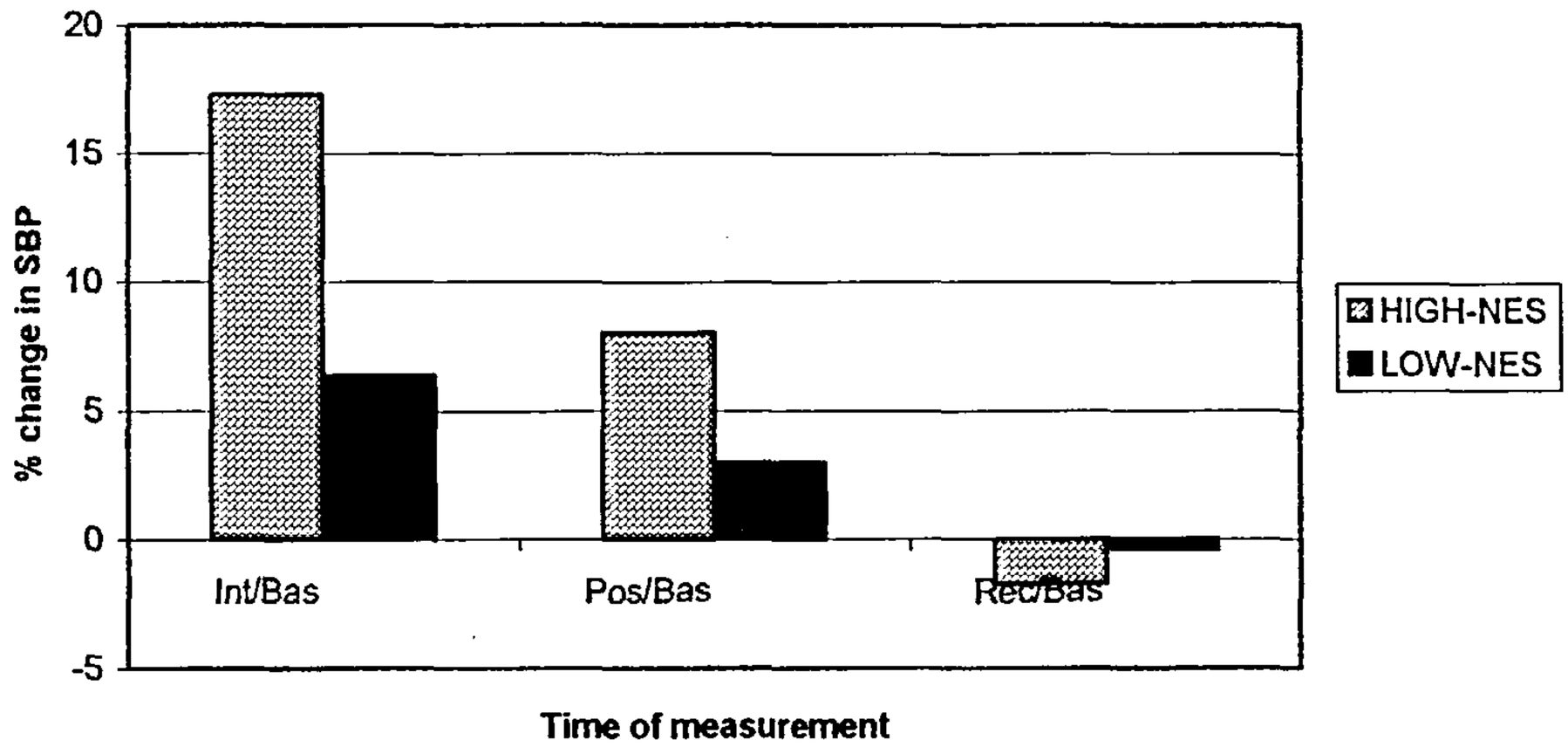
Int/Bas= Intertrial- Baseline difference; Pos/Bas = Post-task- Baseline difference; Rec/Bas= Recovery-Baseline difference.

To explore whether a difference between high and low NES subjects might exist in response to the stressful task, as well as along the rest of the experimental

conditions, several 3 (time of measurement) x 2 (high and low NES) split-plot ANOVA's were conducted for each cardiovascular measure.

Results for SBP showed a significant interaction effect (F[2,34] = 3.50, p= .042) between Time of Measurement and group (high versus low NES), as well as a main effect for Time of measurement (F[2,34] = 15.58, p > .0001). However, the main effect for group was non significant (F[1,17] = 2.93, p= .105). Fig. 6.1. shows the interaction.

Figure 6.1. Two way interaction between Time of measurement and NES in change scores for SBP



The figure shows that high NES subjects had a higher SBP reactivity than low NES at both Inter-trial and post-task conditions, but with the strongest effect after the first Stroop test (colour naming task). For the recovery time, both groups showed a decrease in their reactivity, however the high NES group decreased to a lower level than its own baseline. To further explore where the interaction effect might be, analyses of simple main effects were conducted and results indicated that the high NES group showed a significant difference along the three times of measurement (F[1,17] = 13.05, p< .05), compared with the low NES group (F[1,17]= 2.56, p = .128).

To determine when the measures of the high NES group were more reactive on their SBP, three t-tests for paired samples comparing each time point with the others were performed. Results indicated that the SBP for high NES subjects was

significantly higher on the inter-trial measure (after the first Stroop task) compared with the post-task (t [7] = .3.27, p< .05) and the recovery period (t[7]= 4.36, p< .01). At the same time, the post-task measure for this group was significantly higher than the recovery (t[7] = 3.77, p < .01). These results showed, in general, that the SBP reactivity did occur for the high NES group as expected, with a higher intensity at the first part of the stressful task. However, the reactivity was slightly lower after the second Stroop task, suggesting a habituation effect to the stimuli for this group.

Results for DBP revealed a significant main effect for Time of measurement F[2,34]= 3.41, p < .05), as well as a main effect for group (F[1,17] = 5.75, p < .05); however, the interaction effect was not significant F[2,34]= 1.96, p = .157), To further explore where the significant effects for Time might exist, paired t-tests among the three measures were performed and results indicated that a significant difference only existed between the inter-trial (Stroop task 1) and the recovery period (t[18] = 2.091, p = .05). This result indicated that an overall increase of the DBP occurred for both groups under the stressful task. On the other side, the trend for the group revealed that the high NES group showed a higher DBP (mean=8.64) than the low NES group (mean=1.09). In fact, descriptive data suggest that the reactivity to the stressful tasks (1 and 2) occurred mainly for the high NES group, since the change score for the recovery period nearly reached zero, with these values being higher than those shown by the low group.

Results for HR were analysed using the Greenhouse-Geisser correction for degrees of freedom, since data did not fulfil the criteria for Sphericity. The main effect for Time of measurement showed to be non-significant (F [1.475, 25.069] = .029, p= .937), as well as for the group (F [1,17] = 1.54, p = .231) and for the interaction (F [1.475, 25.069] = .065, p= .887), suggesting no reactivity for this cardiovascular measure during the experiment.

6.3.3. Subsidiary Analyses

6.3.3.1. *Negative Egocentric Sensitivity and Mood before and after the stressful task*

To determine whether mood and affectivity states from the UWIST changed during the experimental session for high and low NES subjects, scores for energetic arousal (EA), tense arousal (TA), hedonic tone (HT) and anger/frustration (AF) were obtained for the pre and post task periods. Descriptives are presented in table 6.3.

Table 6.3 Mean scores for Mood States and Affectivity for High and Low NES subjects

	PRE-TASK Mean (SD)	**POST-TASK Mean (SD)**
	Energetic Arousal	
High NES	17.88 (2.30)	21.13 (2.75)
Low NES	21.91 (4.41)	23.45 (2.46)
	Tense Arousal	
High NES	20.00 (3.59)	18.38 (2.88)
Low NES	16.91 (4.64)	17.45 (6.42)
	Hedonic Tone	
High NES	22.38 (4.80)	24.25 (5.12)
Low NES	27.00 (3.35)	25.91 (4.92)
	Anger Frustration	
High NES	8.63 (2.72)	8.00 (3.38)
Low NES	7.91 (2.30)	8.00 (2.93)

Subsequently, several 2 (groups) x 2 (time of measurement) split-plot ANOVAs were performed for each dimension of the questionnaire. As the data did not fulfil the criteria for Sphericity, the Greenhouse-Geisser correction for degrees of freedom was used.

The analysis for energetic arousal (EA) showed a main effect for time of measurement ($F[1.000, 17.000] = 8.00$, $p < .05$), as well as a main effect for group ($F[1,17] = 6.86$, $p < .05$). However, the interaction effect was not significant ($F[1.000, 17.000] = 6.73$, $p = .329$). The trend for time showed that EA was higher

on the post-task condition (mean=22.47) than in the pre-task (mean= 20.21), revealing that the stressful task had a general positive effect on subjects' arousal. On the other hand, the low NES group showed a higher EA (mean=22.67) than the high NES group (mean=19.50), as was expected.

For the tense arousal (TA) dimension, no significant main effect was found for time of measurement (t[1.000, 17.000] = .299, p= .591), or for group (F[1,17] = 1.02, p=.327). The interaction effect was also non-significant (F[1.000, 17.000]= 1.21, p = .287). The same pattern of results was found for hedonic tone (HT) and anger/frustration, with non-significant main effects or interactions.

6.3.3.2. *Negative Egocentric Sensitivity and State Anxiety before and after the stressful task*

As for the mood scales, a 2 (group) x 2 (time of measurement) Split-Plot ANOVA was calculated to determine the effects of the two variables over the scores on the STAI test. As the data did not fulfil the criteria for Sphericity, the Greenhouse-Geisser correction for degrees of freedom was used. Results showed a non-significant interaction effect (F[1.000, 17.000] = .071, p = .793) and non-significant main effect for time (F[1.000, 17.000] = .328, p = .574) and group (F[1,17] = 3.23, p= .09). Although the comparison was non significant, the high NES subjects tended to report a higher level of anxiety at both times, as seen in table 6.4.

Table 6.4 Mean scores for Anxiety for High and Low NES subjects

	PRE-TASK	**POST-TASK**
	Mean (SD)	**Mean (SD)**
High NES	13.25 (2.87)	12.75 (3.96)
Low NES	10.73 (2.24)	10.55 (3.53)

6.4. Discussion

6.4.1 Negative Egocentric Sensitivity and cardiovascular reactivity

Results from the current experiment gave support to the hypothesis that high Negative Egocentric Sensitivity (NES) subjects would be more physiologically

reactive to stressful tasks than low NES subjects. Specifically, the high NES group showed a higher SBP than the low group when they performed phase 1 of the Stroop test. Compared with their reactivity in the second phase and recovery, the high NES group showed a higher reactivity during the first stressful task, suggesting a higher reaction to the novel stressful stimuli and a habituation response to the same series of stimuli at the second phase. On the other hand, the low NES group did not show this pattern, since the change scores for reactivity did not differ significantly from one condition to another. Although the effect for the group was not significant for SBP, a clear trend was observed with high NES subjects being more reactive at both points of the stressful task than the low NES participants, that result is supported by the significant interaction effect.

The effect for the high NES group was consistent with the general finding that SBP, with its strong link to adrenergic sympathetic discharge on the heart (Obrist, 1981; see also Krantz et al., 1987), seems to be the most reliable cardiovascular index for active coping tasks (Gendolla & Krusken, 2001). However, the interesting result of this experiment is that this physiological effect was only for high NES subjects, who seem to have engaged more actively in the performance of the Stroop task, presumably in the hope of avoiding negative feedback at the end of the task.

For DBP, results also supported the hypothesis about the higher cardiovascular reactivity of high NES subjects, although to a lesser extent since no interaction effect was found and main effects were obtained only for the variables separately. Thus, both groups (high and low NES) appeared to be significantly different in their DBP throughout the experiment, with the high NES group being more aroused than the low. At the same time, results showed that the test did provoke the expected reactivity in the subjects, who showed a higher DBP in front of the first Stroop task, compared with the recovery measure. Even though a significant interaction effect was not found for this physiological measure, a clear trend could be observed for the high NES group to react in a greater magnitude to the two Stroop tasks compared with the low NES subjects, with a decrease at the recovery condition. Furthermore, the high NES participants showed also a

lower reactivity at the second Stroop test, compared with the first one, suggesting again a habituation effect.

Results for HR were opposite to that expected, since cardiac reactivity was also hypothesised for high NES individuals. Thus, no differences were found between the groups or across the experimental conditions, which means that this physiological measure was not affected by the stressful task in general, and specifically high NES subjects did not react with an elevated heart rate when they experienced specific stressful tasks. However, this result coincides with the findings reported by Fredrikson & Georgiades (1992), Kirkcaldy (1984) and Roger and Jamieson (1988), who failed to find heart reactivity in high Neuroticism subjects performing stressful tasks.

In general, results regarding the cardiovascular measures support the hypothesis of higher reactivity for high NES subjects performing a stressful task, compared with low NES. These results are congruent with findings showing higher stress reactivity of individuals high in neuroticism scores in both real-life and laboratory conditions (Bolger & Schilling, 1991; Bull & Nethercott, 1972; Eysenck & Eysenck, 1985; Friedman & Booth-Kewley, 1987; Gramer & Huber, 1994; Haier & Hirschmann, 1980; Holden & Barlow, 1986; Infrasca, 1997; Maushammer, Ehmer & Eckel, 1981;Roger & Najarian, 1998; Smith & Williams, 1992; Vogeltanz and Hecker, 1999). However, inconsistent reports about these relationships have also been reported (Fahrenberg, Walschburger, Foerster, Myrtek & Muller, 1983; c.f. Eysenck, 1994; Fredrikson & Georgiades, 1992; Kirkcaldy, 1984; Matthews & Deary, 1998; Myrtek, 1980; c.f. Eysenck, 1994; Naveteur & í Baque, 1987; Roger & Jamieson, 1988; Schwebel & Suls, 1999). This research proposes that the inconsistencies reported so far might be due to shortcomings in the psychometric measures used to assess negative emotionality and neuroticism (see Chapter 2 for a review). The Negative Egocentric Sensitivity scale appears then, to offer a valid measure that reliably identifies individuals prone to exhibit a higher level of autonomic activity under stressful circumstances.

6.4.2. Mood and Negative Egocentric Sensitivity under stress

Results regarding mood and NES in relation to the experimental manipulation were less clear, since significant changes were obtained only for energetic

arousal. As expected, the high NES group showed lower EA, compared to the low NES group at both pre and post-task periods. This means that the high NES participants showed lower feelings of vigour and energy than their low counterparts at the beginning and at the end of the experimental session. In this regard, Matthews and colleagues (1999) found a negative correlation between energetic arousal and Neuroticism in a study where subjects were exposed to the emotional Stroop test. Similar results are reported in chapter 5, where data collected for the concurrent study showed a negative correlation of -0.39 ($p < .001$) between EA and NES. On the other hand, the general perception of EA increased significantly from the pre to the post-task period, showing that the whole sample felt more energetic and vigorous after performing the Stroop test. This result coincides with that found by Matthews and Westerman (1994), who reported a positive association between enhanced performance and energy on a range of intentionally demanding tasks.

For the rest of the dimensions of the UWIST (tense arousal, hedonic tone and anger/frustration), non-significant main effects for group, time of measurement or their interactions were found, indicating no change between the two experimental conditions (pre and post-task) or between high and low NES. However, descriptive data showed a trend for high NES subjects to report higher tense arousal and lower hedonic tone (pleasant mood), as has been reported in the literature regarding the correlations between mood and neuroticism (for a review, see Matthew and Deary, 1998). In fact, a positive correlation was reported between TA and NES, while an inverse association was found with HT (see Chapter 5 for details), supporting the expected results for this experiment.

This tendency was however, opposite to that expected, since greater differences were hypothesised for the post-task condition, while data showed these differences at the pre-task period instead. Thus, high NES participants reported more tension and nervousness (TA), as well as lower pleasant moods at the beginning of the experiment, maybe indicating a higher level of anticipatory anxiety related to the task to be performed. In the case of anger/frustration, no effect was observed between high and low NES, contrary to the expectation that this dimension would be higher on high NES subjects as well as being higher at post-task.

Two possibilities may explain the non-significant results. Firstly, the small size of the sample might have compromised statistical power, and secondly the task may not have been perceived as stressful or demanding enough to affect significantly the mood states of the participants (see for example Matthews, Pitcaithly & Mann, 1995; Matthews & Westerman, 1994).

6.4.3. State Anxiety and Negative Egocentric Sensitivity

Although scores on the short STAI (Marteau & Bekker, 1992) did not change significantly throughout the experimental session, or between high and low NES, a tendency was observed for high NES participants to be more anxious than low NES under both pre and post-task conditions. These results partially support previous findings (e.g. Busch, King & Guttman, 1994; Weiner & Schneider, 1971), where state anxiety amongst high trait anxious individuals increased as a result of a task perceived as difficult or threatening.

6.5. Conclusions

The results of the current experiment strongly support the hypothesis that high negative egocentric sensitivity subjects are more reactive to stressful tasks than their low counterparts, as well as support the validity of the scale in discriminating among individuals with high and low negative sensitivity. Evidence for this hypothesis has been equivocal and inconsistent, and both the psychometric shortcomings of the N scales, and the inappropriate experimental designs to test it, have been suggested as possible explanations. The NES scale thus seems to have addressed systematically these shortcomings, acting as a reliable scale to measure the negative emotional lability of individuals.

The next stage in research with NES, to be reported in Chapter 7, was to test the predictive validity of the NES scale in discriminating among individuals with a higher and lesser probability to report health symptoms, and to identify those individuals who experience more physical and psychological complaints when experiencing stressful events in real life contexts.

EXPERIMENT IV

Positive Interpersonal Sensitivity (PIPS) and recognition of emotional expressions

6.6. Introduction

The aim of this experiment was to test the hypothesis that high Positive Interpersonal Sensitivity (PIPS) subjects are able to recognise more accurately facial emotional expressions than low PIPS subjects. This new experiment was designed to test the validity of the revised positive sensitivity scale, addressing also the shortcomings observed in the previous experiment (see Chapter 4).

The aim of the revision was to address the limitations identified in the former PES scale and to create a scale more consistent with the construct of positive sensitivity. Accordingly, the Positive Interpersonal Sensitivity Scale (PIPS) included 15 items, where 11 were obtained from a new pool of items. The correlation between the two versions of the positive scale was significant (.71; $p < 0.0001$), but several major differences emerged. The revised PIPS scale mainly contains items describing the construct of empathic concern or sympathy, which is an adaptive other-oriented sensitivity that constitutes one of the components of the multidimensional model of empathy (Cliffordson, 2002; Davis, 1983; Eisenberg et al., 1994; 1998). The items in the new positive sensitivity scale thus represent more accurately the construct initially described, and accordingly subjects identified with this scale should more easily recognise emotional expressions in others. More importantly, the revised Positive Interpersonal Sensitivity Scale was shown to be unrelated to the sub-scale of personal distress from the IRI (Interpersonal Reactivity Index – Davis, 1980), which was one of the key limitations of the former PES scale.

In order to test the validity of the revised PIPS scale, the present experiment was based on Buck's (1991, cf. Martin et al., 1996) theory about individual differences in emotion decoding ability (Martin, Berry, Dobranski, Horne and Dodgson, 1996). These authors claim that identifying facial emotions only evaluates cognitive processes, without accessing any immediate emotional response. However,

Martin et at. (1996) described a new technique for measuring emotion decoding ability which resulted from a modification of the Ekman and Friesen's (1975) method. The technique, referred to as the Emotion Perception Threshold, assesses the individual's accuracy in distinguishing various facial expressions of emotions using the tachistoscope, in which facial emotions are presented at a very short exposure duration. The aim was to determine the threshold at which individuals were able to distinguish facial expressions of pleasant versus unpleasant emotions, with those requiring a shorter duration being more sensitive to their own emotional states as well as to those of others (Martin et al., 1996). Results from this study supported the authors' view that there are individual differences in the ability to recognise emotional expressions. This ability was positively related to measures of empathy, and negatively associated with scores on the Thinking-Feeling scale. More importantly, the authors determined that the emotion perception threshold for accurate identification of emotional faces varies in a range between 12 and 72 ms.

What is clear from this study is that sensitivity in recognising emotional expressions can be assessed with very short exposures to the stimuli, instead of longer presentations that can activate cognitive processes of perception and description. This was the kind of procedure used in the previous experiment when the validity of the PES scale was tested, perhaps confounding the results. In the present experiment, the high PIPS subjects are expected to recognise more accurately the rapidly-presented emotional expressions, compared with their low counterparts.

6.7. Method

6.7.1. Subjects

The same pool of 137 subjects used in experiment III was used. Based on the scores of the PIPS scale (mean ± 1 SD), twenty-one subjects were used for the analyses. The final sample comprised 10 subjects in the High-PIPS group (mean age = 19.10, SD= 1.79) and 11 subjects in the Low-PIPS group (mean age = 19.18, SD= 1.72); 11 were males (52.38%) and 10 were females (47.62%).

6.7.2. Instruments and the Facial Emotions' Recognition test

Thirty pictures extracted from Ekman & Friesen (1975) facial expressions test were presented on a computer-based program. Six pictures of each of five basic emotions (happiness, anger, sadness, surprise and fear) were randomly extracted, three representing female faces and three male faces. They were presented through computer software (PowerPoint 2000), which was programmed to show each slide for a period of 100 ms, with a blank screen between of 5 seconds. The slides were presented continuously and the subjects were asked to name the emotion displayed by the face on the picture.

6.7.3. Procedure

Subjects were told that they would have to identify emotions in people's faces, which would be displayed on a computer screen. Once the subjects had consented and filled in the corresponding form, the experimenter explained that their answers would be recorded on a tape-recorder and written down by the experimenter. The pictures were identified on the record format by its respective code and the scoring key was kept apart to avoid bias while writing the answers. The subject was seated in front of the computer and the program was turned on, so the student read the following instructions:

"In this experiment you will be looking at a series of pictures of people's faces, which will be on the screen for a very short period. For each picture, you will be required to say what emotion the person is experiencing. You will have 5 sec. in between each picture to make your response, so please answer as quickly as you can.
The computer program will show you the pictures one at a time, and immediately after you have to give your answer. The experimenter will be writing down your answers and they will also be recorded. You might not know the answer, in which case please say "I don't know".
PLEASE, SAY YOUR NAME TO RECORD IT AFTER THE SIGNAL FROM THE EXPERIMENTER."

After checking that subjects had understood the procedure, the tape-recorder was switched on to record their names, and they were then asked to push the space bar to start the test. The answers were recorded on tape and written by the experimenter, to allow further reliability checks. Once the subjects had finished their answers to the 30 pictures, they were paid for their participation and left the

experimental room. In order to avoid anticipatory responses from other subjects, the participants were asked to keep the procedure confidential.

At the end of each experimental session, the experimenter checked the reliability of the written answers using the tapes. When a discrepancy between the two records was found, the answer recorded on the tape was chosen as the final for that specific picture. When an answer given by the subjects was not identical to the one indicated by the scoring key, but they shared the same meaning, they were given a correct score.

6.7.4 Statistical Analysis

Data were entered for each picture separately, in order to have both a total score of accurate answers as well as a score for each emotion individually. The frequencies of each picture were analysed to remove skewed data, using ≥ 85% of correct answers as criteria. Accordingly, thirteen pictures were removed from the analyses and seventeen remained. All the six pictures representing "happiness" fell within the criteria, as well as four pictures showing the "anger" emotion. The rest was a mixture of different photographs. The final set of expressions used in the analyses comprised anger, sadness, surprise and fear. Data were analysed by comparing the performance of high and low PIPS groups.

6.8. Results

6.8.1. Positive Interpersonal Sensitivity (PIPS) and recognition of emotional faces.

Table 6.5. presents the descriptives for both groups on the total score for accurate answers (maximum score= 17). As can be seen, the high positive interpersonal sensitivity (High PIPS) group recognised more accurately the pictures of the test than their low counterparts (Low PIPS).

Table 6.5. Descriptives for Total Accurate Answers by groups

Group	Mean	Standard Deviation
High PIPS	10.90	1.66
Low PIPS	8.54	4.41

Comparison using a t-test showed that the difference between the groups was not significant (t[19] = 1.585, p= .129), and a similar analysis based on a Mann-Whitney U test resulted also non-significant (Z = 1.50; p= .133). However, a closer examination showed that the low PIPS subjects were more heterogeneous in their performance (SD = 4.41), which resulted from one outlier obtaining the maximum score for the test. Performing the statistical analysis again omitting this subject, which reduced the mean for this group to 7.70, showed that the comparison between the high and low PIPS groups was statistically significant (t[18] = -2.557, p< .05).

6.8.2. Positive Interpersonal Sensitivity and the Recognition of specific emotions

Analyses comparing the performance of the two groups recognising specific emotional faces in the test were carried out, and results are shown in table 6.6. According to these data, the high PIPS subjects differed significantly from the low group only when recognising faces expressing "Sadness" - to other pictures, the ability to recognise specific emotions did not differ significantly between the groups.

Table 6.6. Comparisons for High and Low PIPS on the recognition of specific emotions

	Mean (SD)	t	p
		Anger	
High PIPS	.90 (.74)	-.847	.408
Low PIPS	.60 (.84)		
		Sadness	
High PIPS	3.70 (.94)	-5.337	**.0001**
Low PIPS	1.30 (1.06)		
		Surprise	
High PIPS	2.90 (.88)	-.590	.563
Low PIPS	2.60 (1.35)		
		Fear	
High PIPS	3.40 (1.77)	-.234	.818
Low PIPS	3.20 (2.04)		

6.9. Conclusions

The results from this experiment support the hypothesis about the greater ability of high positive interpersonal sensitivity (PIPS) subjects to recognise accurately emotions in faces, and confirm the validity of the scale. The Positive Interpersonal Sensitivity scale clearly measures the ability of the individuals to recognise others' emotions and show concern and empathy about others' well-being. This capacity is considered to be adaptive and is expected to have some positive correlates with well-being, in contrast with negative sensitivity.

The initial conceptualisation of the positive sensitivity dimension referred to the ability of individuals to quickly recognize and sympathize with the emotions of others, irrespectively of the valence of the emotions. This means that people high positive sensitivity would be able to quickly identify both negative and positive emotions. In fact, the first version of the positive scale (PES – see chapter 2 & 3) included an item specifically directed to measure the ability to recognize and empathize with positive emotions (*I can share in others happiness).*

However, as a result of the revision process and the use of new scenarios specially designed to elicit empathic and sympathetic responses, as well as a disposition about helping others, the new positive sensitivity scale (PIPS) comprised items mainly directed to measure the ability to sympathize with others experiencing "negative" emotions. This may be the explanation why the pictures representing the "happiness" emotion had to be removed from the present experiment, since they were recognised for more than 85% of the participant students. Although the high PIPS group performed statistically better than the low PIPS along the whole experiment for facial recognition, the detailed analysis of the pictures resulted in the high PIPS group recognising more accurately the "sadness" emotion. This result might be then a further indication that the new scale actually measures the ability of individuals to quickly recognize and sympathise with the suffering of others, mainly through the identification of their negative emotions.

The scale is still considered a measure of a more adaptive and functional emotional sensitivity in the individuals, since is able to identify those who are prone to direct their sensitivity and concern toward others under difficult or stressful circumstances, with the aim at sympathising and helping them. This ability is overtly contrasting to the tendency of high negative sensitivity individuals, whose main concern under stress is self-centred.

The confirmatory findings in this study were obtained only after removing an outlier from the low PIPS group. This subject obtained a score that was inconsistent with the rest of the sample, and the decision to remove it from the data-set was considered justifiable. In fact, examining the questionnaire returned by this subject suggested that she might well have misunderstood some of the questions, since she was an overseas student and English was not her first language. This does of course raise the possibility that there may be significant cross-cultural differences in emotional sensitivity, and this will be explored in the context of Spanish as compared to English-speaking cultures later in this thesis.

The results of this study were congruent with the literature on *empathy,* which states that this is "an affective response that stems from the apprehension or comprehension of another's emotional state or condition, and that is identical or

very similar to what the other person is feeling or would be expected to feel" (Eisenberg, Wenztel and Harris, 1998, pp. 506). Likewise, previous findings have shown that highly empathic people discriminate more accurately pleasant and non-pleasant emotional expressions on faces, than individuals with low scores on empathy scales (Martin et al., 1996).

The fact that the high PIPS subjects were better able to identify emotional faces in such short exposure times is consistent with the views of Martin et al. (1996), who stated that individuals who show a lower emotion perception threshold possess a higher emotional sensitivity. Low emotion perception thresholds are also related to scores on empathy, and can be distinguished from a general perception threshold. There thus seem to be specific emotion-related processes that enable the individuals to differentially perceive emotional information with very short exposures (Martin et al., 1996). Further research with the new scale should help to shed further light on these issues.

The analysis of the correct answers to the particular emotions of anger, sadness, surprise and fear showed that the high PIPS group was more able to recognise "sadness" faces than the low group, which is again consistent with the construct. Sadness is associated with feelings of pain and suffering, and is thus likely to provoke empathic or sympathetic responses. Sympathy stems from "empathic sadness, cognitive perspective taking, or accessing stored information relevant to the other person's situation from memory" (Eisenberg et al., 1998; pp. 507).

All of the findings reported in this chapter clearly support the construct validity of the new scale, in both positive and negative dimensions. Owing to the need to select high and low scorers from the overall samples, one acknowledged limitation of the experiment is the relatively small samples, and the findings will require replication in later studies that are beyond the scope of the thesis. The next stage for this research is the analysis of the scale in the context of the stress and health outcomes, and Chapter 7 will explore this issue, in the context of the effects of Emotional Sensitivity on health outcomes of students undergoing an adaptation process.

CHAPTER 7

EMOTIONAL SENSITIVITY AND HEALTH OUTCOMES

7.1. Introduction

The current chapter presents the results of the study aimed at investigating the relationship between emotional sensitivity and health outcomes in college students, during the potentially stressful period of adaptation to life at university. Likewise, the study explored the moderating role of the emotional sensitivity dimensions in the relationship between stress and health.

Entry to university implies a complete change in the environmental demands on the students, who need to adjust to new situations, new people and higher academic demands, in many cases away from the support of family and friends. All these circumstances may increase their levels of pressure and stress, compromising their physical and psychological well-being. The emotional sensitivity dimensions were studied in their relationship with the health status of the students before and after this period of adaptation to university.

The transactional model of stress was used as the theoretical background for this study, focusing on the moderating role of emotional sensitivity in the stress-illness process. Coping and emotional styles, specifically rumination and emotional inhibition, were also investigated in their relationship with emotional sensitivity, as well as their interactive effect on health status.

7.1.1. Emotional Sensitivity, life stress and health.

The Emotional Sensitivity Scale (ESS) has been constructed in an attempt to address the shortcomings of traditional measures of emotional responsivity, with the aim at assessing the emotional tendencies of the individuals reacting in front of the environmental demands. Based on a bi-dimensional concept of sensitivity, a second dimension emerged from the factor analysis, describing a more adaptive and functional emotional sensitivity oriented toward others. Thus, the

psychometric analysis yielded two different and independent spheres of the concept: negative egocentric sensitivity (NES) and positive interpersonal sensitivity (PIPS). These dimensions were expected to moderate the relationship between stress and health reports, following a transactional model of stress.

The Negative Egocentric Sensitivity scale (NES) describes the tendency of some individuals to react with negative emotions to internal and external changes, especially with anger, frustration, vulnerability and self-criticism. These individuals tend to concentrate on their own negative emotions and to exaggerate them when dealing with environmental demands, especially when those are perceived as stressful and uncontrollable. Overall, the main hypothesis about the relationship between stress and NES is that high NES individuals will over-react under stressful circumstances because they tend to appraise events more negatively and to adopt more ineffective coping strategies, which in turn might lead to more psychological and physical disturbances. The experimental findings reported in Chapter 6 support the notion about the pervasive impact of NES on the physiological reactivity of individuals coping with stress. Therefore, in the present study it was expected that high NES subjects would report more physical and psychological complaints than their low NES counterparts during a period of potential high stress, showing thus its moderating role in the stress-illness relationship.

However, to support the moderating effect, a significant interaction was expected between stress and NES in predicting health deterioration. Just very few findings have been reported so far where significant interaction effects have been found between stress and personality variables in predicting health outcomes, and these have been already reported in chapter 1. The present study was specifically aimed at confirming the interaction effect between stress and negative egocentric sensitivity in deteriorating the health status of the students.

On the other hand, regarding the possible relationship between positive interpersonal sensitivity (PIPS), stress and health, very little empirical evidence has been reported exploring similar issues with related constructs. In fact, for this study it was assumed that a direct relationship between PIPS and health indices would be unlikely to exist, although indirect effects could be observed considering

the highly inverse correlation between PIPS and the emotional inhibition scale from the ESQ (Roger et al., 2000) previously reported. Emotional inhibition has been found positively related with indices of urinary cortisol released under stress conditions (Roger & Najarian, 1998), with worse health status in a sample of undergraduates during a period of adaptation to college (Roger, 1996), and with a delay in muscle tension recovery following stress (Kaiser, Hinton, Krohne, Stewart and Burton, 1995).

Studies investigating the relationship between empathy and depression, specifically in professional staff such as nurses, counsellors and social workers, have indicated that this personality variable may act as a *risk* factor for depression under some circumstances (Gawronski & Privette, 1997; Schieman & Turner, 2001). The authors state that highly empathic people tend to seriously involve themselves with the emotions, problems and sorrows of others, putting them at risk of depressive feelings, especially when they have weak personal resources, like for instance, low self-esteem, social support and education. In the opposite case, when the personal resources are strong, the effects of empathy over depression are substantially diminished and these resources act as "buffers" in such a relationship (Schieman & Turner, 2001). In the relationship between empathy and depression, also other variables might play important roles, such as coping styles. The next section will explore this issue in more detail.

7.1.2. Emotional Style and its relationship with stress and health.

Rumination and emotional inhibition from the Emotional Control Questionnaire (ECQ; Roger & Nesshoever, 1987; Roger & Najarian, 1989) have been implicated in the stress and illness process, as well as in the report of symptoms in different populations. The questionnaire was constructed as a result of a wide investigation into the stress process carried out by Roger, who claimed that the personality constructs used in previous research were not developed specifically within the context of this research (Roger, 1995). Earlier, Cameron and Meichenbaum (1982) had suggested that rumination over emotionally distressing events results in delayed recovery following a stressful experience. The potential importance of emotional control as a stress moderator, together with the shortcomings of earlier scales claiming to measure emotional expressive style

(e.g. Byrne, Barry & Nelson, 1963), provided the rationale for the development of the ECQ (Roger & Nesshoever, 1987; Roger and Najarian, 1989). The original scale comprised four empirically discernable sub-scales called rehearsal, emotional inhibition, aggression control, and benign control, but a recent revision of the scale yielded a two-factor questionnaire, containing only the rehearsal/rumination and the emotional inhibition scales (ESQ – Roger, Guarino & Olason, 2000).

Specifically, the items in the original ECQ rumination scale comprised items that were concerned primarily with rumination over past events, and the revision of the scale included the addition of a number of future-oriented items. On the other hand, the emotional inhibition component of the ECQ was also expanded by the addition of items taken from a new set of scales aimed at assessing the capacity to use social support (ITQ – Forbes & Roger, 1999), and the items used were derived mainly from the fear of disclosure and social coping sub-scales. A preliminary factor analysis of this new expanded 67-item pool yielded two unambiguous factors concerned with rumination (18 items) and inhibition (21 items) (Roger et al., 2000).

Rumination has been frequently implicated in health research, showing strong relationships to physiological indices of adaptation such as delayed heart-rate recovery (Roger & Jamieson, 1988), and prolonged elevations in urinary-free cortisol secretion following exposure to stress (Roger, 1988; Roger & Najarian, 1998). Rumination has also been found to interact with negative life events to predict worse health status in undergraduate students after a period of adaptation to college (Roger, 1995), and with the positive affect/ optimism scale (PAO) from the PANEQ (Olason, 2000) to predict depression in similar samples. Likewise, rumination is shown to be the strongest predictor of physical and psychological symptoms, even after the initial values of these indices measured 6 weeks earlier were controlled for (see Roger et al., 2000 for details).

Based on these findings, the ESQ- rumination scale was included in the present study, to examine whether positive and negative sensitivity would moderate the effects of rumination on psychological and physical well-being.

7.1.3. Emotional Sensitivity and Coping Styles.

Evidence about the relationship between coping styles and individual differences show that high N individuals tend to use more maladaptive ways of coping such as avoidance/escape, passivity, wishful thinking and self-blame when dealing with stressful events (Bolger, 1990; Deary et al., 1996; Endler & Parker, 1990; Kardum & Krapić, 2001; McCrae & Costa, 1986; Parkes, 1986, 1990).

In the transactional model of stress, coping is viewed as a personality moderator variable which may interact with other individual differences to either reduce or increase the impact of the stressful experiences on health (Lazarus, 1991; 1999; Lazarus & Folkman, 1984; Steptoe, 1991a; 1991b). In this sense, it might be expected that *N/NA* might interact with certain coping styles to negatively influence well-being. However, very few studies have attempted to determine such an interaction, and the majority have found only additive effects.

Roger, Jarvis and Najarian (1993) developed a new measure of coping styles, which includes the three traditional coping domains of rational (also commonly called active, action, or problem-solving coping), emotional and avoidance strategies. However, using scenario techniques, a new coping strategy was extracted named *detachment*, which measures the extent to which respondents are able to detach themselves from a potentially stressful situation and not becoming emotionally identified with it. Studies of the interactive effects of these coping styles and emotional control on adaptation have shown that deterioration in health status could be partially explained by low detachment (high emotional coping) and high rehearsal and emotional inhibition (e.g. Roger, 1996; Roger & Najarian, 1997; Roger, Najarian & Jarvis, 1994). Later, Rector and Roger (1996), in a prospective study, found evidence for interaction effects between an emotional style of coping and self-esteem. Using again the CSQ scales, Olason (2000) showed evidence of an interactive effect between the detachment and the NAP scales (negative affect/pessimism) in the prediction of severity of somatic symptoms in undergraduate students. Subsequent median splits revealed that those who were inclined to use emotional strategies to cope, and also scored high on negative affectivity/pessimism, reported the highest incidence of physical symptoms severity. Based on these evidences, a high and positive correlation was expected between NES and the CSQ-Avoidance coping scale; while an

inverse association was hypothesised with the CSQ-detachment scale, as well as with the CSQ-rational scale.

On the other hand, evidence reporting the relationship between measures of empathy and coping styles were not found, nor either their joint impact on health. This suggests that the kind of emotionality described by the new scale of positive sensitivity has not been considered so far as an individual difference with implications on coping or for the stress and health process. In fact, the concurrent validity study (see Chapter 5) showed the independence between the PIPS and the detachment scales, indicating that the four groups of individuals represented by low and high scores on the two scales might show different health status. Data from this study were used precisely to test this hypothesis.

In sum, one of the aims of this study was to determine the possible interactions between the emotional sensitivity dimensions and the coping styles, as well as their joint effect on physical and psychological health.

7.2. Method

7.2.1. Subjects and procedure

Subjects were all first year undergraduates (except psychology students) at the University of York, who agreed to volunteer for research throughout the academic year. Two different samples were used for the analysis in the present study, since they completed quite a diverse set of questionnaires. Descriptions of the samples are as follows:

Sample 1: The original sample comprised 177 students (cohort 2000) who were mailed the first series of questionnaires at the beginning of the term (Time 1 – T1 thereafter) including the revised ESS and health inventories. Specifically, at baseline participants responded to the ESS, the Coping Style Questionnaire (CSQ- Roger, Jarvis and Najarian, 1993), the Hospital Anxiety and Depression scale (HAD - Zigmond & Snaith, 1983), the Cohen and Hoberman Inventory of Physical Symptoms (CHIPS – Cohen & Hoberman, 1983) and the Health Status Checklist (HSC – Meadows, 1989). A total of 137 (77.40 %) responses were

received from 51 males (mean age = 18.92, SD 1.23) and 86 females (mean age = 18.84, SD 1.04).

The second mail-out (Time 2 – T2 thereafter) was performed six weeks later, and a pack containing only the CHIPS and the HSC questionnaires was sent. The rate of response was quite low for this follow-up, with only 61 questionnaires (44.52%) returned, 27 from males (mean age = 18.96, SD 1.22) and 34 from females (mean age = 19.08, SD 1.33).

Sample 2: The entire subject panel of 198 first year undergraduates for the academic period 2001-2002 (cohort 2001) were mailed at the beginning of the academic year. The set of questionnaires for this sample included the ESS, the Perceived Stress Scale (PSS – Cohen, Kamarck & Mermelstein, 1983), the rumination and emotional Inhibition scales from the Emotional Style Questionnaire (ESQ – Roger, et al., 2000), the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS - Cohen & Hoberman, 1983) and the Health Status Checklist (HSC – Meadows, 1989). A total of 152 (76,76%) responses were received from 55 males (mean age = 18.87, SD 3.25), and 95 females (mean age = 18.74, SD 1.27). Two of the subjects did not report their gender.

This sample was tested again four months later on different questionnaires, including the Beck Depression Inventory (BDI – Beck et al., 1961), and the State-Trait Anxiety Inventory (STAI - Spielberger et al., 1983). From the 152 questionnaires mailed, 74 (48.68%) were received from 19 males (mean age = 18.84, SD .60), and 55 females (mean age = 19.09, SD 1,16). Scores of these questionnaires were correlated with the scores of the ESS scales in order to perform subsidiary analyses.

7.2.2. Materials

1. ***Coping Styles Questionnaire*** (CSQ – Roger, Jarvis and Najarian, 1993; see chapter 3 for a detailed description). The relationship between the CSQ scales and the original ESS has already been established (Chapter 3), as well as the association between the revised scales and the detachment index (Chapter 5). However, an exploration of the relationship between the rational and avoidance scales with the revised ES scales was considered necessary,

as well as a further analysis of these scales as moderators in the relationship between emotional sensitivity and health.

2. ***The Hospital Anxiety and Depression scale*** (HAD - Zigmond & Snaith, 1983). This is a 14-item index that measures the frequency of anxiety and depression symptoms. The scale was developed to facilitate the assessment and management of hospital outpatients with emotional disorders in the context of medical and surgical departments. Items are rated on a four-point scale from A "Always" to N "Never".

3. ***The Cohen and Hoberman Inventory of Physical Symptoms*** (CHIPS – Cohen & Hoberman, 1983). The CHIPS is a list of 33 common physical symptoms, which were selected carefully by the authors so as to exclude symptoms of an obviously psychological nature (e.g. felt nervous or depressed). The scale does, however, include many physical symptoms that have been traditionally viewed as psychosomatic (e.g. headache, weight loss). Each item was rated for how much that problem bothered or distressed the individual during the past 5 weeks at Time 1 (T1), and during the past 2 weeks at Time 2 (T2). Items were rated on a 5-point scale from "not at all" to "extremely".

4. ***The Health Status Checklist*** (HSC - Meadows, 1989). The Health Status Checklist is a 30-item checklist of symptoms that was developed from an extensive General Practitioner Survey, intended to measure the most frequently reported symptoms of regular patients. The final list included also three items measuring anxiety, depression and insomnia. At T1, the subjects answered questions regarding their health within the past 2 weeks, and at T2 they answered questions regarding their health within the past 6 weeks, using a scale from 0 "*Don't suffer/never suffered from*", to 6 "*Very much worse*". In an attempt to categorise the symptoms into smaller units of related items, the scale was factor-analysed by Forbes (1999). Principal-axis factoring showed the scale to be formed by three distinct factors: psychological illness (9 items), acute illness (5 items) and chronic illness (4 items). Psychological illness (HSC-PSY onwards) was composed of items such as depression, insomnia and lethargy, items that clearly indicated psychosomatic symptoms.

Acute illness (HSC-ACU) comprised symptoms such as throat infection and cold/flu, which described illness of rapid onset and a short course, and the third factor, chronic illness (HSC-CHR), comprised items such as eczema and allergies, which are long-term or frequently recurring symptoms.

5. ***The Perceived Stress Scale*** (PSS; Cohen, Kamarck & Mermelstein, 1983). It is a 10-item measure of self-appraised life stress, measuring the degree to which situations in one's life are appraised as stressful. In this study, respondents were asked to rate the extent of their agreement to the items for the last month, and higher scores reflected greater perceived stress over that time period.

6. ***The Rumination and Emotional Inhibition scales*** (ESQ – Roger et al., 2000; see chapter 5 for a description).

7. ***The Beck Depression Inventory*** (BDI - Beck, Ward, Mendelson, & Erlbaugh, 1961). This inventory was selected as a measure of psychological health and comprises 21 items measuring the intensity of depressive symptoms. Respondents were asked to rate the extent to which they had experienced specific depressive symptoms using a four point Likert scale (1= *I do not feel sad*; 4= *I feel so sad I can't stand it*).

8. ***The State/Trait Anxiety Inventory*** (STAI - Spielberger et al., 1983). This widely used index of anxiety comprises two 20-item scales, one measuring state anxiety and the other trait anxiety. The State Inventory statements describe feelings of the respondents at the time of completing the scale, e.g. "I feel calm", "I feel upset", and they are rated on a four-point Likert scale, ranged from 1 (not at all) to 4 (very much so). The Trait measure requires the respondents to assess their *general* feelings, and items are rated from 1 (almost never) to 4 (almost always).

7.2.3. Statistical Analyses

Data from the two samples were used to perform correlations and regression analyses, using the health measures as dependent variables. Specific analyses were carried out with the variables tested in each sample, however, in order to

increase the reliability of the results when possible, the samples were merged. Analyses were performed using the Statistical Package for Social Sciences, V. 10 (SPSS – V.10).

7.3. Results

7.3.1. Analyses for Time 1

7.3.1.1. Merged Sample

In order to have more reliable results by increasing the size of the sample, samples 1 and 2 were merged for the analysis of correlations between the ES dimensions and the CHIPS and HSC scales. The combined sample grouped 289 participants, although the valid data were available only for 284 subjects, 104 males (mean age = 18.91, SD = 2.50) and 180 females (mean age = 18.80, SD = 1.17). Data for these analyses corresponded to the assessment at T1 of both samples and procedures to gather them were identical for the two groups. Table 7.1. presents the correlations between the ESS and the health indices at T1, for the whole sample and by gender.

Table 7.1. Simple correlations, means and standard deviations of the ESS dimensions and health indices for the merged sample

	Negative Egocentric Sensitivity	***Positive Interpersonal Sensitivity***	***Mean (SD)***
CHIPS	.438**	.061	25.05 (15.39)
Males	.408**	.034	22.00 (12.39)
Females	.454**	.027	26.37 (17.22)
HSC-PSY	.506**	.079	11.41 (9.08)
Males	.472**	.015	10.03 (8.94)
Females	.526**	.072	12.13 (9.11)
HSC-CHR	.207**	.023	1.58 (2.91)
Males	.215*	.073	1.15 (2.70)
Females	.200**	-.044	1.82 (3.00)
HSC-ACU	.101	.021	5.07 (4.44)
Males	.175	-.044	4.50 (4.09)
Females	.065	.016	5.41 (4.63)

** p< 0.001. *p< 0.05. CHIPS = Cohen -Hoberman Inventory of Physical Symptoms; HSC-PSY = Health Status Checklist – Psychological Symptoms; HSC-CHR = Health Status Checklist – Chronic Symptoms; HSC-ACU= Health Status Checklist-Acute Symptoms.

Results showed, as expected, that NES correlated highly positively with indices of deteriorated hêalth as early as at the first assessment (T1), especially with the

report of psychological complaints. The correlation between NES and chronic symptoms was also significant, but to a lesser extent. No correlation was found between NES and the report of acute symptoms. On the other hand, correlations between PIPS and indices of health resulted non- significant, as expected. The pattern of correlations for genders was almost identical as with the whole sample. Descriptives showed women reporting more physical complaints than men at T1 ($t = -2,16$, $p < 0.05$)

7.3.1.2. Sample 1 assessed at T1.

As described in the previous section, sample 1 was assessed in the first term of the academic period 2000-2001, and the final group comprised 137 subjects. This sample was assessed using the Coping Style Questionnaire (CSQ- Roger, Jarvis and Najarian, 1993), the Hospital Anxiety and Depression scale (HAD - Zigmond & Snaith,1983), the Cohen and Hoberman Inventory of Physical Symptoms (CHIPS – Cohen & Hoberman, 1983) and the Health Status Checklist (HSC – Meadows, 1989). Results for the CHIPS and the HSC indices will be given only in the last part of this section, when the results for the analysis of the moderating effects of the coping styles in the relationship between emotional sensitivity and health will be described.

a. *Descriptives and Correlations*

Table 7.2 presents the correlations between the ESS scales, the CSQ scales and the depression and anxiety indices for sample 1 at T1.

Table 7.2. Correlations among the ESS dimensions and the HAD and CSQ scales for sample 1 at T1

	Negative Egocentric Sensitivity	***Positive Interpersonal Sensitivity***	***Mean (SD)***
ANXIETY	.693**	.153	8.16 (3.49)
DEPRESSION	.506**	-.214*	5.95 (2.59)
CSQ-R	-.425**	.100	14.73 (4.48)
CSQ-A	.316**	-.081	12.09 (4.52)
CSQ-D	-.769**	-.052	33.53 (9.10)

** $p < 0.001$. *$p < 0.05$. CSQ-R = Rational Coping; CSQ-A = Avoidance Coping; CSQ-D = Detachment Coping.

As expected, NES correlated highly positively with the indices of anxiety, depression and avoidance coping, while it correlated inversely with rational and detachment coping. On the other hand, PIPS showed a significant but inverse association with the depression scale, while the rest of the correlations resulted non-significant.

b. Assessing the importance of the emotional sensitivity in predicting anxiety and depression symptoms at T1.

To further explore the relationship between the ES dimensions and the anxiety and depression indices from the HAD at T1, data were used to perform a series of stepwise regression analyses. The data were entered into the regressions, using the scores of the Anxiety and Depression scales as dependent variables, and the ES scales as independent variables. Table 7.3. shows the results for the regression on the Anxiety scores.

Table 7.3. Variables entered into the stepwise regression analysis for the Anxiety scale at T1 for sample 1.

	Beta	T	p	R^2	F	Df
Variables in the equation						
Model 1				.481	122.22**	1,132
NES	.693	11.056	.0001			
Model 2				.508	7.23*	1,131
NES	.696	11.356	.0001			
PIPS	.165	2.689	.008			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity.

The stepwise regression analysis produced two models, where NES emerged in the first model, and PIPS entered along with NES in the second, contributing a significant 3% to the variance in the anxiety index. Unexpectedly, the contribution of PIPS to the unique variance of the anxiety index was toward higher scores. In order to explore whether the difference could be attributable to a gender effect, the regression analyses were performed separately for men and women, and results showed only the NES dimension entering into the equation models, while PIPS remained excluded. The gender effect was, then, rejected.

Even though the effect of PIPS was of low magnitude, it deserved further investigation, since this dimension was expected to act as a protective variable on health. Accordingly, a deeper exploration of the high PIPS group on their mean scores on anxiety, when divided by high and low levels of detachment yielded an evident difference, as shown in table 7.4.

Table 7.4. Scores on the Anxiety index of High PIPS subjects

	Min.	Max.	Mean	SD
High PIPS & High Detach. (N= 30)	4	13	7.566	2.737
High PIPS & Low Detach.(N= 28)	5	18	10.285	3.17

PIPS = Positive Interpersonal Sensitivity

As expected, results showed that high PIPS subjects scored differently on the anxiety scale depending on their level of detachment, so high PIPS but low detached individuals experienced higher levels of anxiety, compared to their counterparts who detached themselves from the stressful events.

Table 7.5. shows the results for the regression analysis carried out on the scores of the depression index.

Table 7.5. Variables entered into the stepwise regression for the Depression scale at T1 for sample 1.

	Beta	T	p	R^2	F	Df
Variables in the equation						
Model 1				.256	45.129**	1,131
NES	.506	6.718	.0001			
Model 2				.299	7.85*	1,130
NES	.503	6.842	.0001			
PIPS	-.206	-2.802	.006			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity.

The regression analysis produced two models, where NES emerged in the first model, while PIPS entered along with NES in the second, contributing a

significant 4% to the variance in the depression index. As expected, PIPS related inversely with depression, so a high score on NES combined with a low score on PIPS explained around 30 % of the total variance in depression.

c. Assessing the moderating effects of Coping Styles in the relationship between Emotional Sensitivity and Health

Baron and Kenny (1986) suggested that moderating effects of continuous variables could be examined by using hierarchical regression analyses. In such analyses, the standardised predictor is entered in the first step, followed by the standardised moderator at the second. At the last step, the interaction terms between the predictor and moderator are entered. Evidence for moderating effects are present when the interaction term between the predictor and moderator is significant (Baron & Kenny, 1986). Following these guidelines, the data were entered into a series of hierarchical regression analyses using the CHIPS, HSC dimensions, and depression and anxiety indices as dependent variables in sample 1 at T1.

The negative and positive sensitivity dimensions were used in these analyses as the predictor variables, considering the results of the previous sections where both dimensions, specially the NES factor, was shown to correlate significantly the report of symptoms at T1. The scores on rational, avoidance and detachment coping from the CSQ were used as moderator factors in the equation model. Following the empirical and theoretical support presented earlier, it was expected that the emotional sensitivity styles would interact with the coping styles to predict the health status of the students. Specifically, NES would interact with avoidance and emotional coping (low scores on Detachment) to predict a worse health status, while PIPS would interact with rational and detachment coping to predict better health.

c. I. Hierarchical Regression analysis for physical symptoms at T1

In the first analysis, the scores on CHIPS were used as the dependent variable. The data were entered into the hierarchical regression analysis and the independent variables were entered in the following order: at step 1 gender was entered, at step 2 the ESS dimensions (NES and PIPS) were entered, at step 3, the CSQ styles (rational, avoidance and detachment) were entered, and at step

4, the cross-products of the standardised terms of each ESS scale with the standardised terms of the CSQ were entered. Table 7.6. shows the summary of the regression analysis.

Table 7.6. Summary of hierarchical regression analysis using NES and PIPS as predictors for T1 CHIPS

Variables	Beta	T	p	R^2 Change	F Change	Df
Step 1				.043	4.485*	1,101
Gender	.206	2.118	.037			
Step 2				.150	9.188**	2,99
NES	.388	4.241	.0001			
PIPS	.051	.545	.587			
Step 3				.066	2.837*	3,96
CSQ-R	-.188	-1.782	.078			
CSQ-A	.135	1.430	.156			
CSQ-D	-.132	-.878	.382			
Step 4				.054	1.177	6,90
NESxCSQ-R	-.306	-.848	.399			
NESxCSQ-A	.241	.578	.564			
NESxCSQ-D	-.317	-1.054	.295			
PIPSxCSQ-R	.457	.878	.382			
PIPSxCSQ-A	.310	.844	.401			
PIPSxCSQ-D	-.272	-.564	.574			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity. CHIPS= Cohen-Hoberman Inventory for Physical symptoms. CSQ-R = Rational Coping; CSQ-A = Avoidance Coping; CSQ-D = Detachment Coping.

Results showed that the model of prediction was significant (F[12,102]= 3.404, p< .0001) and explained a 31.2% of the total variance. Gender accounted for a significant amount of the unique variance, explaining 4% of the variance of the scores on CHIPS, with females scoring higher than males. After controlling for gender, NES accounted significantly for the variance, explaining a total of 15% of it. The CSQ dimensions also accounted significantly for the model, although together only explained around 7% of the variance on CHIPS. Finally, the interaction terms did not produce a significant result, thus rejecting the hypothesis of moderation effects for CHIPS.

The following analysis was performed using the scores of the HSC-CHR index as the dependent variable. The data were entered in the same order as the previous equation, so gender was entered at step1, the ESS dimensions were entered at

step2, the CSQ scores at step 3, and finally the cross-product terms of ESS and CSQ were entered at step 4. Table 7.7. sets out the summary of the results.

Table 7.7. Summary of hierarchical regression analysis using NES and PIPS as predictors for T1 HSC-CHR

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.001	.055	1,106
Gender	.023	.234	.816			
Step 2				.088	5.021*	2,104
NES	.287	3.034	.003			
PIPS	-.087	-.895	.373			
Step 3				.017	.628	3,101
CSQ-R	-.044	-.391	.697			
CSQ-A	.013	.124	.902			
CSQ-D	-.182	-1.140	.257			
Step 4				.040	.733	6,95
NESxCSQ-R	.050	.130	.897			
NESxCSQ-A	.238	.540	.590			
NESxCSQ-D	-.074	-.241	.810			
PIPSxCSQ-R	.079	.138	.890			
PIPSxCSQ-A	.046	.114	.910			
PIPSxCSQ-D	.799	1.600	.113			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity. HSC-CHR= Health Status Checklist- Chronic symptoms. CSQ-R = Rational Coping; CSQ-A = Avoidance Coping; CSQ-D = Detachment Coping.

The model of prediction for Chronic symptoms did not produce a significant result (F[12,107] = 1.341, p= .209), and only explained 14.5% of the variance. The variable that accounted for most of the variance on chronic symptoms was NES (Beta = .287, p = .003). Thus, neither the CSQ scales nor the interaction terms resulted in anything significant in this model, suggesting no moderating effects between emotional sensitivity and coping styles.

Finally, a hierarchical regression on the acute symptoms from the HSC (HSC-ACU) was performed using the same predictor and moderator variables. Variables were entered in the identical order as in the previous analyses, and results are presented in table 7.8.

Table 7.8. Summary of hierarchical regression analysis using NES and PIPS as predictors for T1 HSC-ACU

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.009	.937	1,106
Gender	.094	.968	.335			
Step 2				.018	.973	2,104
NES	.106	1.087	.280			
PIPS	-.087	-.868	.387			
Step 3				.016	.580	3,101
CSQ-R	-.112	-.954	.342			
CSQ-A	.010	.098	.922			
CSQ-D	-.093	-.564	.574			
Step 4				.019	.325	6,95
NESxCSQ-R	-.086	-.212	.833			
NESxCSQ-A	-.452	-.982	.329			
NESxCSQ-D	-.227	-.703	.484			
PIPSxCSQ-R	.303	.510	.612			
PIPSxCSQ-A	.313	.735	.464			
PIPSxCSQ-D	.055	.010	.992			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity. HSC-ACU= Health Status Checklist-Acute symptoms. CSQ-R = Rational Coping; CSQ-A = Avoidance Coping; CSQ-D = Detachment Coping.

The model resulted non-significant (F[12,107] = .530, p = .890) and explained only 6.3% of the variance of the HSC-Acute symptoms. No significant main effects or significant interactions resulted either.

Overall, the models for predicting physical symptoms using the coping styles as moderator variables were very weak, and only a small proportion of the variance could be explained. This suggests that the moderating effect of the coping styles in the relationship between emotional sensitivity and physical symptoms cannot be assumed. However, NES did show a main effect on CHIPS and on the chronic symptoms scores.

c.2. Hierarchical Regression analysis for psychological symptoms at T1

The following set of hierarchical regressions was performed using the psychological health indices as dependent variables. Thus, the moderating effects of the coping styles in the relationship between emotional sensitivity and psychological health were tested in sample 1, using the same method described

in the previous section. In the first regression, the psychological symptoms index from the HSC (HSC-PSY) was used as dependent variable, and the independent variables were entered as follows: at step 1, gender was entered, at step 2, the ESS dimensions were entered, at step 3, the CSQ scales were entered, and finally at step 4, the cross-products of the standardised terms of each ESS scale with the standardised terms of the CSQ were entered. Table 7.9. sets out the summary of the regression analysis.

Table 7.9. Summary of hierarchical regression analysis using NES and PIPS as predictors for T1 HSC-PSY

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.012	1.202	1,103
Gender	.107	1.096	.276			
Step 2				.287	20.700**	2,101
NES	.533	6.353	.0001			
PIPS	.084	.962	.338			
Step 3				.043	2.117	3,98
CSQ-R	-.032	-.325	.746			
CSQ-A	.101	1.151	.253			
CSQ-D	-.277	-1.995	.049			
Step 4				.062	1.590	6,92
NESxCSQ-R	-.444	-1.379	.171			
NESxCSQ-A	-.416	-1.112	.269			
NESxCSQ-D	-.301	-1.164	.247			
PIPSxCSQ-R	.303	.510	.612			
PIPSxCSQ-A	-.402	-.848	.399			
PIPSxCSQ-D	.408	.977	.331			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity. HSC-PSY= Health Status Checklist-Psychological symptoms. CSQ-R = Rational Coping; CSQ-A = Avoidance Coping; CSQ-D = Detachment Coping.

The total model of prediction for psychological symptoms was significant (F[12,104] = 5.185, p< .0001) and explained 40.3% of the variance. After controlling for gender, the variable that accounted for most of the variance was NES (Beta = .533, p< .0001), and to a much lesser extent the CSQ-detachment scale (Beta = -.277, p= .049). The model of interaction did not produce a significant result, suggesting no moderating effect for the CSQ dimensions. Thus, only the main effect of NES accounted significantly for the variance of the psychological symptoms at T1.

The following regression analysis was carried out using the anxiety scores from the HAD (Zigmond & Snaith, 1983) as dependent variable. The independent variables were entered in the same order as for the previous tests. Table 7. 10. presents the results for the regression.

Table 7.10. Summary of hierarchical regression analysis using NES and PIPS as predictors for T1 Anxiety symptoms

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.028	3.135	1,107
Gender	.169	1.770	.079			
Step 2				.479	51.139**	2,105
NES	.683	9.868	.0001			
PIPS	.157	2.217	.029			
Step 3				.005	.345	3,102
CSQ-R	-.076	-.908	.366			
CSQ-A	.020	.269	.789			
CSQ-D	.020	.167	.867			
Step 4				.007	.239	6,96
NESxCSQ-R	-.192	-.664	.508			
NESxCSQ-A	-.135	-.412	.682			
NESxCSQ-D	-.015	-.065	.949			
PIPSxCSQ-R	-.181	-.427	.670			
PIPSxCSQ-A	-.048	-.160	.873			
PIPSxCSQ-D	.235	.630	.530			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity. CSQ-R = Rational Coping; CSQ-A = Avoidance Coping; CSQ-D = Detachment Coping.

The total model of prediction was highly significant (F[12,108] = 8.665, p< .0001) and explained 52% of the total variance. Gender did not account for unique variance, but NES resulted the strongest predictor (Beta = .683, p< .0001), while PIPS also predicted but to a much lesser extent (Beta = .157, p = .029). Neither the CSQ dimensions nor the interaction terms accounted for unique variance for the anxiety index.

Finally, a hierarchical regression was performed using the depression scores from the HAD as dependent variable. The independent variables were entered as described previously, and results are presented in table 7.11.

Table 7.11. Summary of hierarchical regression analysis using NES and PIPS as predictors for T1 Depression symptoms

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.014	1.459	1,106
Gender	-.117	-1.208	.230			
Step 2				.314	24.313**	2,104
NES	.530	6.512	.0001			
PIPS	-.206	-2.470	.015			
Step 3				.065	3.578*	3,101
CSQ-R	-.270	-2.884	.005			
CSQ-A	.077	.924	.358			
CSQ-D	.056	.424	.673			
Step 4				.033	.912	6,95
NESxCSQ-R	-.122	-.387	.699			
NESxCSQ-A	-.123	-.340	.735			
NESxCSQ-D	-.306	-1.198	.234			
PIPSxCSQ-R	-.459	-.986	.327			
PIPSxCSQ-A	.196	.586	.559			
PIPSxCSQ-D	.047	.115	.908			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. PIPS = Positive Interpersonal Sensitivity. CSQ-R = Rational Coping; CSQ-A = Avoidance Coping; CSQ-D = Detachment Coping.

Results showed that the total model of regression was significant (F[12,107]= 5.864, p< .0001), and the variables explained 42.6% of the variance of the depression index. Gender did not account significantly for unique variance in the depression scores, and the ESS dimensions significantly added 31.4 % in the explanation of the symptoms (Beta for NES = .530, p< .0001, and Beta for PIPS = -.206, p= .015). After ESS was controlled for, the CSQ-Rational dimension still contributed to the unique variance of depression (Beta = -.270, p=.005), however, the interaction model did not produce a significant result.

Overall, the results from the hierarchical regressions on the psychological health indices showed that the moderator effect of the CSQ scales in the relationship between emotional sensitivity and psychological symptoms is not sustainable. Only the NES dimension, and to a much lesser extent the PIPS scale from the ESS had a direct predictive effect on the dependent variables.

7.3.1.3. Sample 2 assessed at T1

As described in section 7.2.1., sample 2 was assessed in the first term of the academic period 2001-2002, and the final group comprised 152 subjects. The students in this sample completed the ESS together with the Perceived Stress Scale (PSS – Cohen, Kamarck & Mermelstein, 1983), the rumination and emotional inhibition scales from the Emotional Style Questionnaire (ESQ – Roger, et al., 2000), the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS - Cohen & Hoberman, 1983) and the Health Status Checklist (HSC – Meadows, 1989).

a. Descriptives and Correlations

Table 7.12 presents the descriptive results of the variables assessed at T1 for this sample, for both the whole sample and by gender. Also, comparative analyses by gender are presented. Descriptives for the CHIPS and HSC inventories are not given in this section, since results were presented in the section of the merged sample.

Table 7.12 Descriptives for the variables assessed in sample 2 at T1

	Mean (Range)	SD	t	df
PSS	16.88 (5-32)	5.58		
Males	16.87	5.53	-.078	147
Females	16.94	5.66		
RUMINATION	8.10 (0-18)	4.48		
Males	8.02	4.68	-.004	148
Females	8.02	4.30		
E-I	8.69 (0-21)	5.86		
Males	10.69	5.29	**3.38****	148
Females	7.49	5.74		

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; PSS= Perceived Stress Scale; E-I = Emotional Inhibition.

Results indicated that PSS and Rumination did not differ by gender, nevertheless, men showed a higher emotional inhibition than women.

Subsequently, a series of correlations were performed between the personality variables and the health indices for this sample, which will support further analyses about the moderating effects of the ESS dimensions in the relationship

between emotional style and health. Table 7.13. sets out the results for the correlations.

Table 7.13. Correlations among the variables tested at T1 in sample 2

	NES	***PIPS***	***RUMINATION***	***EMOTIONAL INHIBITION***
PSS	.683**	.000	.591**	.123
CHIPS	.422**	.026	.409**	.065
HSC-PSY	.504**	.076	.439**	.160*
HSC-CHR	.146	.108	.134	-.020
HSC-ACU	.172*	.025	.054	-.016

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; CHIPS = Cohen-Hoberman Inventory of Physical Symptoms; HSC-PSY = Health Status Checklist – Psychological Symptoms; HSC-CHR = Health Status Checklist – Chronic Symptoms; HSC-ACU= Health Status Checklist-Acute Symptoms.

The results indicated that both NES and rumination were highly and positively correlated with indices of worse health, while PIPS and emotional inhibition were very low and non-significantly related with these indices. To further explore the unique contribution of the NES scale on the health indices, partial correlations controlling for rumination were performed, and all the associations were still high and significant, which made it possible to explore its role as moderator variable in a hierarchical regression.

b. Assessing the moderating effects of the ESS in the relationship between stress and health..

In this section, the results from a series of hierarchical regressions are presented, where the PSS and rumination scores are used as predictor variables of worse health, and the ESS are tested as moderator variables in these relationships.

b.1. Hierarchical Regression analyses for physical symptoms at T1, using PSS as predictor.

In the first set of hierarchical regressions, the index of perceived stress (PSS – Cohen et al., 1983) was used as predictor variable and the physical health indices as dependent variables. The data were entered in the following order: at step 1 gender was entered, at step 2 the PSS index was entered, at step 3, the ESS dimensions (NES and PIPS) were entered, and at step 4, the cross-products of the standardised terms of each ESS scale with the standardised term

of the PSS were entered. Table 7.14. presents the summary of the regression analysis for CHIPS.

Table 7.14. Summary of hierarchical regression analysis using PSS as predictor for T1 CHIPS of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.005	.668	1,143
Gender	.068	.817	.415			
Step 2				.287	57.412**	1,142
PSS	.536	7.577	.0001			
Step 3				.010	1.051	2,140
NES	.138	1.447	.150			
PIPS	-.002	-.032	.974			
Step 4				.039	4.054*	2,138
NESxPSS	.816	2.783	.006			
PIPSxPSS	-.100	-.330	.742			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; PSS= Perceived Stress Scale.

The results indicated that the moderation effect for CHIPS did exist and the total model was significant (F[6,144] = 11.873, p< .0001), explaining 34% of the total variance. No significant main effect was found for gender, but the PSS contributed significantly to the variance in CHIPS. Interestingly, no main effect was found for the ESS, however, the interaction effect of NES and PSS accounted for a significant amount of unique variance (Beta = .816, p = .006), showing the moderator effect of negative sensitivity in the relationship between perceived stress and the report of physical symptoms. To develop a better understanding of this significant interaction, median splits were performed on the total scale scores for both NES and PSS, and the mean scores on CHIPS for all the four groups are presented in table 7.15.

Table 7.15. Mean values for CHIPS by high and low scorers on NES and PSS.

Negative Egocentric Sensitivity	***Perceived Stress***	
	High PSS	Low PSS
High NES	31.91 (15.48)	19.33 (9.34)
Low NES	23.62 (14.71)	17.90 (11.87)

The means values suggested that individuals who were high on NES and high on perceived stress experienced the highest levels of physical symptoms (high scores on CHIPS) at T1.

The following analysis was performed using the scores of the chronic symptoms index (HSC-CHR) as the dependent variable. The data were entered in the same order as the previous equation, and table 7.16. sets out the summary of the results.

Table 7.16. Summary of hierarchical regression analysis using PSS as predictor for T1 HSC-CHR of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.029	4.351*	1,148
Gender	.169	2.086	.039			
Step 2				.058	9.275*	1,147
PSS	.240	3.046	.003			
Step 3				.006	.476	2,145
NES	-.015	-.137	.891			
PIPS	.080	.974	.332			
Step 4						
NESxPSS	.082	.246	.806	.029	2.325	2,143
PIPSxPSS	.733	2.154	.033			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; HCS-CHR = Health Status Checklist – Chronic symptoms; PSS= Perceived Stress Scale.

The model of prediction produced a significant result (F[6,149] = 3.274, p = .005) and the variables explained 12.1% of the variance in chronic symptoms. Gender significantly accounted for 3% of the variance, and after controlling for it, scores on PSS contributed significantly with an additional 6% on the variance of HSC-CHR. The ESS did not show a main effect on HSC-CHR scores, and the interaction effect only produced a significant result for the term PIPSxPSS. Interestingly, this latter result was inconsistent with those observed in the correlation matrix, where no basic association was found between PIPS and PSS, or between PIPS and chronic symptoms.

To further explore this inconsistency, an additional hierarchical regression using only the PIPS dimension as moderator and the PSS as predictor was performed.

Results were almost identical to the previous analysis, where gender and perceived stress showed a main effect on chronic symptoms. Furthermore, the model of interaction in this analysis produced a significant result (Sig. F change = .035), which means that the moderation effect of PIPS in the relationship between perceived stress and chronic symptoms does exist, which was contrary to the expectations. In order to develop further insight into this interaction, median splits were performed on the total scale scores for both PIPS and PSS, and the mean scores on HSC-CHR for the four groups are presented in table 7.17.

Table 7.17. Mean values for HSC-CHR by high and low scorers on PIPS and PSS.

Positive Interpersonal Sensitivity	***Perceived Stress***	
	High PSS	Low PSS
High PIPS	2.61 (4.29)	1.11 (2.16)
Low PIPS	1.44 (2.31)	.909 (2.05)

HSC-CHR = Health Status Checklist – Chronic Symptoms.

According to the mean values, individuals with high PSS but also high PIPS were those who scored highest on the chronic symptoms index in this sample, which was contrary to the expectation about the possible protective role of PIPS over health and well-being. This result deserved further investigation, maybe to determine the possible mediation of the detachment coping style in this relationship. Then, the hypothesis stated was that the high PIPS and low detached subjects would be those who, under stress conditions, would report the highest levels of chronic symptoms. To test this, median splits in the total score of the detachment scale were performed for the high PIPS/high PSS group, and the mean scores on chronic symptoms (HSC-CHR) for the low and high sub-groups are presented in table 7.18.

Table 7.18. Mean values for Chronic symptoms by subjects with high and low scores on the Detachment scale with high PIPS/high PSS scores.

	High PIPS/High PSS	
	Mean	**SD**
High Detachment (N= 8)	7.566	2.737
Low Detachment (N= 39)	10.285	3.17

PSS = Perceived Stress scale; PIPS = Positive Interpersonal Sensitivity.

As expected, the significant interaction observed for chronic symptoms was mediated by the level of detachment in individuals with high PIPS and high PSS, which means that those high detached reported less chronic symptoms than their counterparts who do not detach themselves from the stressful experience.

Finally, a hierarchical analysis using the scores on the acute symptoms index (HSC-ACU) as dependent variable was performed. As for the previous analyses, variables were entered in the following order: at step1 gender was entered, the PSS index was entered at step2, the ESS dimensions were entered at step 3, and finally the cross-product terms of ESS and PSS were entered at step 4. Table 7.19. presents the summary of the results.

Table 7.19. Summary of hierarchical regression analysis using PSS as predictor for T1 HSC-ACU of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.003	.470	1,144
Gender	.057	.686	.494			
Step 2				.028	4.113*	1,143
PSS	.167	2.028	.044			
Step 3				.007	.503	2,141
NES	.113	.998	.320			
PIPS	.002	.024	.981			
Step 4						
NESxPSS	.252	.713	.477	.013	.984	2,139
PIPSxPSS	-.414	-1.155	.250			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; HCS-ACU = Health Status Checklist – Acute symptoms; PSS= Perceived Stress Scale.

The total model of prediction for acute symptoms did not produce a significant result (F[6,145] = 1.256, p=.282) and the only variable which significantly accounted for the variance was perceived stress (PSS). Thus, neither the ESS scales nor the interaction between them and the PSS scores added any additional amount of explained variance to the model.

b.2. Hierarchical Regression analysis for psychological symptoms at T1, using PSS as predictor.

An additional analysis was performed using the HSC-PSY index (psychological symptoms from the HSC) as dependent variable in a hierarchical equation, where PSS was entered as predictor variable, and the ESS dimensions as moderator variables. The data were then entered in the following order: at step 1 gender was entered, at step 2 the PSS index was entered, at step 3, the ESS dimensions (NES and PIPS) were entered, and at step 4, the cross-products of the standardised terms of each ESS scale with the standardised term of the PSS were entered. Table 7.20. sets out the summary of the regression analysis for HSC-PSY.

Table 7.20. Summary of hierarchical regression analysis using PSS as predictor for T1 HSC-PSY of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.004	.529	1,147
Gender	.060	.727	.468			
Step 2				.333	73.399**	1,146
PSS	.577	8.567	.0001			
Step 3				.028	3.198*	2,144
NES	.215	2.355	.020			
PIPS	. 051	.745	.457			
Step 4						
NESxPSS	.628	2.245	.026	.022	2.533	2,142
PIPSxPSS	.088	.309	.758			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; HCS-PSY = Health Status Checklist – Psychological symptoms; PSS= Perceived Stress Scale.

The total model of prediction for psychological symptoms was significant (F[6,148] = 14.941, p< .0001). Gender did not account for any variance in the dependent variable, and the strongest effect was shown for the predictor (PSS), which alone explained 33.3% of the total variance. After controlling for PSS, NES accounted significantly for the variance of psychological symptoms (Beta=.215, p = .02). Even though the total model of interaction did not produce a significant result, the interaction effect of NES and PSS accounted for a significant amount

of unique variance (Beta = .628, p = .026), showing the moderator effect of negative sensitivity in the relationship between perceived stress and the report of psychological symptoms. To better understand this significant interaction, median splits were calculated on the total scale scores for both NES and PSS, and the mean scores on HSC-PSY for all four groups are presented in table 7.21.

Table 7.21. Mean values for HSC-PSY by high and low scorers on NES and PSS.

Negative Egocentric Sensitivity	***Perceived Stress***	
	High PSS	Low PSS
High NES	16.72 (9.46)	11.33 (7.79)
Low NES	12.32 (6.05)	7.19 (6.61)

HSC-PSY = Health Status Checklist – Psychological Symptoms.

As expected, the results showed that the individuals who were high on PSS and high on NES, experienced the highest levels of psychological symptoms at T1.

b.3. Hierarchical Regression analysis for physical symptoms at T1, using Rumination as predictor.

In the second set of hierarchical regressions, the scores on the rumination scale from the ESQ (ESQ – Roger at el., 2000) were used as predictor variables and the physical health indices as dependent variables. The emotional inhibition scale was not used as predictor variable in these models, considering the low correlations with the health measures in this sample shown in table 7.13. Accordingly, the data were entered in the following order: at step 1 gender was entered, at step 2 the standardised terms for rumination were entered, at step 3, the ESS dimensions (NES and PIPS) were entered, and at step 4, the cross-products of the standardised terms of each ESS scale with the standardised term of the rumination scale were entered. Table 7.22. sets out the summary of the regression analysis for CHIPS.

Table 7.22. Summary of hierarchical regression analysis using Rumination as predictor for T1 CHIPS of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.005	.689	1,144
Gender	.069	.830	.408			
Step 2				.175	30.424**	1,143
Rumination	.419	5.516	.0001			
Step 3				.044	4.033*	2,141
NES	.274	2.761	.007			
PIPS	-.045	-.574	.567			
Step 4						
NESxRum	.545	1.939	.055	.022	1.994	2,139
PIPSxRum	-.067	-.261	.794			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; Rum. = Rumination.

Results showed the total model to be highly significant (F[6,145]= 7.534, p< .0001). As in previous analyses, gender did not account for the variance in CHIPS, and after controlling for it, the rumination index predicted around 18% of the variance in the report of physical symptoms (CHIPS). After the effect of rumination was controlled for, NES still accounted significantly for the total variance of CHIPS (Beta = .274, p = .007). However, the two-way interaction terms did not add significantly to the variance in CHIPS, although the NESxRum term approached significant.

The following analysis was performed using the scores of the chronic symptoms Index (HSC-CHR) as the dependent variable. The data were entered in the same order as the previous equation, and results are presented in table 7.23

Table 7.23. Summary of hierarchical regression analysis using Rumination as predictor for T1 HSC-CHR of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.028	4.215*	1,149
Gender	.166	2.053	.042			
Step 2				.021	3.264	1,148
Rumination	.145	1.807	.073			
Step 3				.010	.784	2,146
NES	.112	1.041	.300			
PIPS	.061	.729	.467			
Step 4						
NESxRum	-.010	-.032	.974	.000	.036	2,144
PIPSxRum	.074	.264	.792			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; HSC-CHR = Health Status Checklist – Chronic symptoms.

Results showed that the model of prediction did not produce a significant result (F[6,150]= 1.507, p=.180), and the only variable which accounted significantly for the variance in chronic symptoms in this sample was gender (Beta = .166, p=.042), explaining a minimal 3% of the variance. A revision of the descriptives for the HSC-CHR index by gender revealed that the female group scored significantly higher than the male group (mean for females = 2.010; mean for males = .854).

Finally, a hierarchical analysis using the scores of the acute symptoms index (HSC-ACU) as dependent variable was performed, while the independent variables were entered in the same order as previously. Table 7.24. presents the summary of the results.

Table 7.24. Summary of hierarchical regression analysis using Rumination as predictor for T1 HSC-ACU of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.004	.515	1,145
Gender	.059	.718	.474			
Step 2				.003	.491	1,144
Rumination	.058	.701	.485			
Step 3				.034	2.488	2,142
NES	.244	2.230	.027			
PIPS	.011	.124	.902			
Step 4						
NESxRum	.029	.089	.929	.001	.094	2,140
PIPSxRum	.123	.430	.668			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; HSC-ACU = Health Status Checklist – Acute symptoms.

The total model of prediction did not produce a significant result for acute symptoms in this sample (F[6,146] = 1.019, p= .416). However, the only variable that significantly accounted for unique variance on the score of acute symptoms was NES (Beta = .244, p = .027).

b.4. Hierarchical Regression analysis for psychological symptoms at T1, using Rumination as predictor.

Finally, the last hierarchical analysis performed for this sample at T1 used the HSC-PSY (psychological symptoms index) as dependent variable, while rumination was introduced as predictor variable. Thus, the data were entered in the following order: at step 1 gender was entered, the rumination index was entered at step2, the ESS dimensions were entered at step 3, and finally the cross-product terms of ESS and rumination were entered at step 4. Table 7.25. sets out the summary of the results.

Table 7.25. Summary of hierarchical regression analysis using Rumination as predictor for T1 HSC-PSY of sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.003	.519	1,148
Gender	.059	.721	.472			
Step 2				.197	36.275**	1,147
Rumination	.444	6.023	.0001			
Step 3				.084	8.502**	2,145
NES	.386	4.123	.0001			
PIPS	.016	.220	.826			
Step 4						
NESxRum	.526	1.962	.052	.020	2.014	2,143
PIPSxRum	.141	.581	.562			

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; HSC-PSY = Health Status Checklist – Psychological symptoms.

The total model of prediction for psychological symptoms produced a significant result (F[6,149] = 10.421, p< .0001). Gender did not account significantly for the variance, while the Rumination explained around 20% of the total variance. After controlling for the effects of the predictor, NES still contributed significantly to the total variance, explaining an additional 8% of it (Beta = .386, p< .0001). However, the interaction terms did not add significantly to the variance of psychological symptoms, even though the NESxRum term approached significant.

In summary, results showed significant moderation effects for the ESS scales in the relationship between stress and health. Specifically, NES was shown to moderate the relationship between stress and indices of physical and psychological symptoms. For PIPS, a significant interaction was found with the perceived stress index in predicting chronic symptoms, although this result was unexpected. A further analysis showed that the pervasive effect of PIPS was evident mainly for subjects who showed low levels of detached coping, while subjects showing high levels of detachment seemed to be less affected by the stress. On the other hand, a clear tendency toward an interactive effect between NES and rumination in the prediction of physical and psychological symptoms was also observed, since the interaction approached significant in both cases.

7.3.2. Analysis for Time 2

7.3.2.1. Sample 1 assessed at T2. Analysis of follow-up measures

As described in section 7.2.1, sample 1 was tested 6 weeks later (Time 2 – T2 thereafter), using the CHIPS and the HSC questionnaires as measures of follow-up. The rate of response was quite low at this stage of the research, since only 61 questionnaires (44.52%) were returned, 27 from males (mean age = 18.96, SD 1.22) and 34 from females (mean age = 19.08, SD 1.33).

a. *Descriptives*

A comparison between the health measures of sample 1 at T1 and T2 was performed in order to determine possible differences in the reporting of health symptoms over time. Table 7.26. presents the mean values for both times and comparative results.

Table 7.26. Health scores at T1 and T2 for sample 1

Health Measures	***Mean***	***t***	***df***
CHIPS T1	20.37		
CHIPS T2	18.30	1.35	56
HSC-PSY T1	10.89		
HSC-PSY T2	8.71	**2.77***	54
HSC-CHR T1	1.32		
HSC-CHR T2	1.41	-.355	58
HSC-ACU T1	4.20		
HSC-ACU T2	4.40	-.405	58

*p< 0.05.; CHIPS = Cohen-Hoberman Inventory of Physical Symptoms; HSC-PSY = Health Status Checklist – Psychological Symptoms; HSC-CHR = Health Status Checklist – Chronic Symptoms; HSC-ACU= Health Status Checklist-Acute Symptoms

Results showed a significant difference only for the psychological symptoms index, although this was in the opposite direction from what was expected, since participants reported less complaints at T2 compared to T1. This indicates a possible adjustment or adaptation of the students to the environmental demands after several weeks at the university, which is contrary to previous results obtained from similar samples.

b. *Assessing the importance of emotional sensitivity in predicting physical and psychological symptoms at T2*

To further explore the predictive value of the personality variables over the six-week period, the data were entered into a series of step-wise regression analyses, regressing the scores of the physical and psychological symptoms indices at T2 on the ESS scales. In order to control for any confounding effects on initial values of the dependent variables, T1 measures were always entered at step 1, followed by the ESS dimensions using a step-wise regression method at step 2. In this way, the relationship between the independent and dependent variables could be assessed, while controlling for initial values of the dependent variables. The analyses were done separately by each of the health measures. Table 7.27 shows a summary of the analysis for CHIPS.

Table 7.27.Summary of the regression analysis on CHIPS scores at T2, taking account of initial values for CHIPS at T1.

	Beta	T	p	R^2 Change	F Change	Df
Variables in the equation						
Step 1				.565	71.457**	1,55
CHIPS-1	.752	8.453	.0001			

** p< 0.001. CHIPS-1 Cohen-Hoberman Inventory score at Time 1

Results showed that the only variable that accounted significantly for variance in the score of CHIPS at T2 was the score on the same inventory at T1. Thus, none of the ESS measured at T1 predicted significantly the report of physical symptoms at T2. Table 7.28. sets out the summary of the regression on chronic symptoms at T2.

Table 7.28. Summary of the regression analysis on HSC-CHR scores at T2, taking account of initial values for HSC-CHR at T1.

	Beta	T	p	R^2 Change	F Change	Df
Variables in the equation						
Step 1				.680	121.247**	1,57
HSC-CHR1	.825	11.011	.0001			

** p< 0.001. HSC-CHR1 = Health Status Checklist-Chronic symptoms at T1

An identical result emerged from the regression analysis on chronic symptoms, where the only variable that significantly accounted for variance was the score on the same variable at T1. Tables 7.29 and 7.30 show the results for the step-wise regressions on acute and psychological symptoms, respectively.

Table 7.29.Summary of the regression analysis on HSC-ACU scores at T2, taking account of initial values for HSC-ACU at T1.

	Beta	T	p	R^2 Change	F Change	Df
Variables in the equation						
Step 1				.370	33.507**	1,57
HSC-ACU1	.608	5.789	.0001			

** p< 0.001. HSC-ACU1 = Health Status Checklist-Acute symptoms at T1

Table 7.30.Summary of the regression analysis on HSC-PSY scores at T2, taking account of initial values for HSC-PSY at T1.

	Beta	T	p	R^2 Change	F Change	Df
Variables in the equation						
Step 1				.656	100.952**	1,53
HSC-PSY1	.810	10.048	.0001			

** p< 0.001. HSC-PSY1 = Health Status Checklist-Psychological symptoms at T1

As observed for CHIPS and chronic symptoms, the ESS did not account for significant amounts of variance in the prediction of acute and psychological symptoms at T2. These results were opposite to those expected, at least for NES, which highly correlated with the report of physical and psychological symptoms at T1.

7.3.2.2. Sample 2 assessed at T2. Subsidiary analyses

Sample 2 assessed at T2 comprised 74 participants, who completed at this stage the Beck Depression Inventory (BDI – Beck et al., 1961) and the State-Trait Anxiety Inventory (STAI - Spielberger et al., 1983). Subsidiary analyses were performed in order to determine the possible moderator effects of the ESS dimensions in the relationship between perceived stress and these two different measures of anxiety and depression, using the scores of the T1-PSS scores as predictors, and the T1-ESS as moderators.

a. *Descriptives and Correlations*

Table 7.31 shows the descriptives of the anxiety and depression inventories and correlations between the T1-ESS and these indices. The analyses were considered appropriate based on the stability of the ESS scores and the reliability of the scales.

Table 7.31 Simple correlations among the ESS and State Anxiety, Trait Anxiety and Depression

	NES	***PIPS***	***Mean (SD)***
STATE-ANX	.479**	-.030	39.63 (10.60)
TRAIT-ANX	.658**	.072	43.00 (9.97)
BDI	.396**	.203	16.42 (10.04)

** p< 0.001. NES= Negative Egocentric Sensitivity; PIPS = Positive Interpersonal Sensitivity; State-Anx = State Anxiety scale; Trait-Anx = Trait Anxiety scale (STAI - Spielberger et al., 1983); BDI = Beck Depression Inventory (Beck et al., 1961).

Results for NES were in the expected direction since they correlated highly positively with the indices of state and trait anxiety, and with depression. Interestingly, the correlation with the trait scale was even higher than with the state scale, thus supporting the notion of NES as a personality trait. Contrarily, correlations with PIPS resulted in non-significant data, although the association with the index of depression moved in the opposite direction, compared with the one obtained for sample 1 using the HAD questionnaire (see section 7.3.1.2. for details).

b. Assessing the moderating effect of the Negative Egocentric Sensitivity dimension.

In this section, the results from a series of hierarchical regressions are presented, where the indices of Anxiety (State and Trait) and depression were used as dependent variables, and the T1 perceived stress scores were used as predictor. Considering the results of the correlations with these indices of psychological health, and the results of the previous hierarchical and stepwise regressions, in which PIPS did not account for any significant amount of variance, the following analyses were performed using only NES as a possible moderator variable. For all the regressions, the data were entered in the following order: at step 1 gender was entered, at step 2 the PSS index was entered, at step 3, the NES dimension

was entered, and at step 4, the cross-product of the standardised term of the NES scale with the standardised term of the PSS was entered. Table 7.32. sets out the summary of the regression analysis for the State-Anxiety index.

Table 7.32. Summary of hierarchical regression analysis using PSS as predictor of State-Anx. scores in sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.024	1.730	1,71
Gender	-.154	-1.315	.193			
Step 2				.268	25.502**	1,70
PSS	.519	5.148	.0001			
Step 3				.016	1.582	1,69
NES	.185	1.258	.213			
Step 4						
NESxPSS	.115	.272	.786	.001	.074	1,68

** p< 0.001. NES= Negative Egocentric Sensitivity; State-Anx = State Anxiety scale.

Results showed the total model to be highly significant (F[4,72]= 7.585, p< .0001), however, after controlling for the effects of gender, only the perceived stress significantly accounted for the total variance of state-anxiety scores. Table 7.33 shows the results for the hierarchical regression on the Trait-Anxiety scores.

Table 7.33. Summary of hierarchical regression analysis using PSS as predictor of Trait-Anxiety scores in sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.000	.003	1,69
Gender	-.007	-.054	.957			
Step 2				.500	68.060**	1,68
PSS	.707	8.250	.0001			
Step 3				.047	6.895*	1,67
NES	.319	2.626	.011			
Step 4						
NESxPSS	.309	.923	.359	.006	.853	1,66

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; Trait-Anx = State Anxiety scale.

The total model of prediction for the trait-anxiety scores produced a significant result (F[4,70]= 20.384, p< 0.0001), and the variables that accounted significantly for the total variance after controlling for the effects of gender were the Perceived Stress scale (Beta = .707, p< .0001), and NES (Beta = .319, p = .01). However, the interaction produced a non-significant result suggesting no moderating effect on NES. Even though NES did not act as a moderator variable in the relationship between stress and trait-anxiety, the analysis indicated that after controlling for the effect of the perceived stress, NES could still make a unique contribution to the variability of the trait scores.

Finally, a hierarchical regression was performed using the BDI scores as dependent variables. The data were entered in the same order as before, and results are shown in table 7.34.

Table 7.34. Summary of hierarchical regression analysis using PSS as predictor of BDI scores in sample 2

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.009	.639	1,71
Gender	.094	.800	.427			
Step 2				.243	22.710**	1,70
PSS	.493	4.765	.0001			
Step 3				.007	.658	1,69
NES	.123	.811	.420			
Step 4						
NESxPSS	.279	.639	.525	.004	.409	1,68

** p< 0.001. *p< 0.05. NES= Negative Egocentric Sensitivity; BDI = Beck Depression Inventory.

Results showed the total model of regression to be significant (F[4,72] = 6.072, p< .0001), even though the only variable that showed a main effect was PSS.

Overall, the results of the last series of hierarchical regressions in the second sub-sample showed that the moderation effect on NES after a long follow-up period is unsustainable, and just for the trait-anxiety index a main effect was found to be significant.

7.4. Discussion

The present chapter presented the results of several studies where the ESS dimensions were tested in their moderating role to predict psychological and physical health at two different times over a period of adaptation. Specifically, the ESS scales were hypothesised to moderate the effects of perceived stress on health, as well as to interact with the rumination and emotional inhibition dimensions to predict a deterioration in health. The interactive effects of the ESS dimensions with coping styles were also studied, with the aim of predicting specific impacts on the individual's well-being. Along with the moderating effects, the direct effects of the ESS on health were also examined, in order to fully understand the diverse implications of these individual differences on health and illness. In order to achieve this, two different samples of undergraduates were administered the set of questionnaires measuring the personality variables and health indices at two different times of a period of adaptation, at the beginning of the college year and several weeks later. Descriptives, correlations and multiple regression analyses were performed on the data and results are discussed considering the main hypotheses of the study.

7.4.1. Emotional Sensitivity and physical and psychological health.

Descriptives showed that at the entrance to college, females reported significantly more physical symptoms than males (CHIPS), although no significant differences were observed between genders for the rest of the indices. Comparisons of the health indices at T1 and T2 indicated that only the psychological symptoms index from the HSC changed significantly over time, although in the opposite direction. This finding might suggest that the students might have adopted some coping strategies to deal with the demands during the period of adaptation, which produced effective results in reducing the psychological strain after several weeks in the university.

As expected, the scores on NES in both samples correlated significantly positively with almost all the indices of deteriorated health at Time 1, except with the acute symptoms index from the HSC. Thus, high NES individuals tended to report more physical symptoms (CHIPS), as well as more chronic symptoms,

together with psychological complaints, and higher levels of depression and anxiety. These results, together with the experimental findings described in Chapter 6, in which high NES individuals showed a higher cardiovascular reactivity under stressful tasks, clearly indicate the pervasive effect of the negative egocentric sensitivity over health. However, to fully understand the pathways in which NES affects the health status, further investigation is needed using more objective measures of health, e.g. immunologic and neuroendocrine indices.

Despite these significant results at T1, stepwise regressions with follow-up data indicated that after controlling for the initial values of the health variables, the ESS did not contribute to the prediction of the health outcomes at T2. One possible explanation of these results might be that the lack of variation of the health scores from T1 to T2 made very difficult for a statistical contribution of other variables to emerge. In fact, descriptive results for this sample (sample 1) showed that the students reported almost no changes in their health status from T1 to T2, suggesting that the new environmental demands played no significant role in their well-being, as was observed with other students in similar conditions. Furthermore, the small size of the sample at T2 might also make difficult to find significant results for the ESS. These elements should be considered as limitations of the follow-up study, so conclusions about the longitudinal effects of the emotional sensitivity on health indices should be regarded as preliminary. Further investigation of the ESS using more controlled longitudinal designs is necessary.

For the PIPS dimension, results generally supported the hypothesis that a direct relationship with health indices was unlikely to exist. The only significant inverse correlation was with the depression scale from the HAD, which indicates that high PIPS participants tend to report significantly less depression symptoms than their low counterparts. This might indicate that high PIPS subjects, who are more sympathetic and sensitive about others' emotions, tend to feel more cheerful and enjoy their activities more, since they are more involved in interpersonal activities and settings, thus strengthening their social networks.

In the case of the anxiety indices, an interesting result also emerged with respect to the Anxiety scale from the HAD. Despite the correlation between PIPS and this scale produced a non-significant result, the positive sensitivity dimension did enter into the equation predicting the anxiety scores in the positive direction, which means that high positive sensitivity contributed significantly to an explanation of why there are higher scores on the anxiety scale. Considering this as an unexpected result, a further analysis taking into account the scores on the detachment scale showed that only the individuals who were high positive, but at the same time low detached, scored higher on the anxiety scale. Meanwhile, their counterparts who managed to keep themselves detached from the stressful situations and perhaps from the emotions of others, were those that kept their levels of anxiety at a minimum. This interesting result supports the hypothesis stated in the frame of the emotional control model (e.g. Roger et al., 2000), where high positive sensitivity people who are also able to cope with the situations in a detached way tend to feel less distress, and are subsequently less physically and psychologically affected. But again, this finding requires more investigation, since the analysis using the anxiety scales from the STAI (Spielberger et al., 1983) yielded different results.

Overall, a general pattern of direct relationships between the ES scales and health indices were found in this study, suggesting that there is a direct impact of the emotional sensitivity dimensions on health, mainly pervasive effects from NES. However, even though the results of the health study were in the expected direction and high NES subjects reported significantly more physical and psychological symptoms than low NES, some limitations of these analyses should be considered. For instance, data were submitted to a great number of analyses (several ANOVAs and multiple regressions), thus increasing the probability for Type I errors. Therefore, the Bonferroni correction should have been an adequate test to perform in order to reduce the error. Likewise, even though some of the analyses were accepted as significant using the .01 criterion, other results were accepted using a less conservative value (.05), which should also be taken into account as a source of error. These considerations should be addressed to future studies using the ESS, in order to increase the validity of results and support of the hypotheses.

Finally, the main purpose of the present study and this whole research was to determine the moderating role of the emotional sensitivity, as an individual difference, in the relationship between stress and illness. The next section discusses the results of this investigation.

7.4.2. Emotional Sensitivity, stress and health.

One of the most important objectives of the present study has been to determine the moderating role of the ES scales in the relationship between stress and illness. To do so, the Perceived Stress Scale (PSS - Cohen, Kamarck & Mermelstein, 1983) was used together with the ESS to perform hierarchical regression analyses, predicting the health indices of the students during a period of adaptation.

Descriptive data showed that a non significant difference exists in the report of perceived stress between males and females, which is contrary to what has been generally reported in the literature about women feeling more stressed than men (Kessler, Price & Wortman, 1985; Piccinelli & Simon, 1997). On the other hand, NES correlated highly positively with perceived stress, indicating that high negative egocentric individuals tend to perceive the world in a more stressful and demanding way, with feelings of threat and inability to control the surrounding situations. This result strongly supports the general findings about the positive relation between *N/NA* and stress (Bolger & Schilling, 1991; Bull & Nethercott, 1972; Costa & McCrae, 1987; Holden & Barlow, 1986; Infrasca, 1997; McCrae, 1990; Vogeltanz & Hecker, 1999; Watson & Clark, 1984), despite the limitations already identified for the N and stress measures. On the contrary, PIPS was shown to be completely independent from the perception of stress, suggesting that being more sensitive and emotionally empathic toward others does not have a direct effect on the stress experienced.

Regarding the study of the moderating effects of the ES dimensions, results indicated as expected that NES moderates the relationship between perceived stress and both the report of physical symptoms (CHIPS), and psychological symptoms (PSY-HSC) at T1. This means that high NES students, who also perceive high levels of stress, report the highest intensity of physical and

psychological symptoms during their first weeks at the university. Thus, it may be assumed that the negative sensitivity is a personality variable that predisposes individuals to react more negatively and intensively to the environmental demands, affecting as a result their physical and psychological well-being.

However, the moderating effect is not sustained over time, since the interaction between perceived stress and NES to predict the anxiety (STAI) and depression (BDI) scores of sample 2 at T2 produced a non-significant result. So, despite the high correlations between NES and scores on the STAI and BDI inventories at follow-up, the moderating role is not strong enough to predict the health outcomes after 4 months, and only main effects of NES could be found in the prediction of trait-anxiety. One explanation of this result might be that the index of perceived stress used for the analysis did not reflect the current perception of stress at T2, since the variable had been measured 4 months earlier. So, even though the NES scores are supposed to be stable over time, the same cannot be expected for the PSS scores, as has been expressed by the authors (Cohen, Kamarck & Mermelstein, 1983). Thus, the resulting interaction between the two variables might not be reflecting the real interaction in predicting the health outcomes at T2. Furthermore, the fact that the health measures at T2 were taken at the beginning of the term, when the students were returning from a holiday period rather than assessing their regular experience during the term can be considered a limitation of the last analyses. Finally, another possible explanation for the lack of significant results in the hierarchical regressions, could be attributable to the size of the sample (sample 2) at T2, which was quite small and clear effects could be difficult to establish. Overall, the results regarding the moderating effect of NES in the relationship between stress and health at a follow-up period, have to be taken as preliminary, until further investigation addressing the mentioned shortcomings is carried out.

Regarding the exploration of the moderating role of PIPS in the relationship between stress and health outcomes, the interaction between PSS and PIPS produced a significant result in the prediction of CHR-HSC (chronic symptoms) at T1. Thus, the result indicated that high PIPS subjects who experienced high levels of stress were those that reported the highest frequency of chronic symptoms. However, this finding resulted in controversy since PIPS was

expected to act as a protective variable, or at least not having any direct effect on health. So, taking into account the model of emotional control and its impact over health (Roger et al., 2000), as well as the reported findings about the possible pervasive role of emotional empathy on health (Gawronski & Privette, 1997; Schieman & Turner, 2001), a further exploration of the meaning of this interaction considering the role of the detachment coping was performed. Accordingly, when the mean values for the high PIPS/high detached and high PIPS/low detached groups reporting high levels of stress were analysed for their CHR scores, the latter group showed to be the most affected. Then, this result provided additional support to the hypothesis stated within the model of emotional control mentioned earlier (e.g. Roger et al., 2000), in which the interaction between positive interpersonal sensitivity and detachment coping style seems to have a protective effect against the stress. At the same time, this result supports previous findings about the negative impact of empathy over health, when personal resources such as self-esteem or locus of control, among others, are not playing an interactive role in protecting individuals against an over-involvement in the distress of others (Bonino & Giordanengo, 1993; Schieman & Turner, 2001)

7.4.3. Emotional Sensitivity, coping styles and health.

The correlations between the ES scales and coping styles came up with results that were expected. Specifically, high NES subjects used significantly more avoidance coping, while they were less prone to use rational or detached coping. These results support previous findings about the maladaptive ways of coping generally shown by high *N/NA* individuals (Bolger, 1990; Deary et al., 1996; Endler & Parker, 1990; Kardum & Krapić, 2001; McCrae & Costa, 1986; Parkes, 1986, 1990). On the other hand, no evidence of any relationship was found between the PIPS scale and coping styles, thus indicating that the individuals with high positive sensitivity are not characterised by any specific way of dealing with the stressful demands.

When the coping styles were analysed in their possible moderating role in the relationship between emotional sensitivity and health, results were not terribly encouraging. For instance, only main effects for the CSQ scales were obtained when predicting the scores on CHIPS, on the HSC-PSY, and on the depression scale from the HAD, after controlling the effects of ESS. However, the coping

styles did not moderate the effects of ESS over the health indices, since none of the interaction terms produced a significant result. These results support some previous findings about the main effects of coping in the relationship between stress and health (Cohen & Edwards, 1989 for a review; Rector & Roger, 1996; Roger, 1995), although they don't support a more wide model of stress and health where the coping styles are supposed to interact with other personality variables to predict specific health outcomes (e.g. Cox & Ferguson, 1991; Steptoe, 1991a; 1991b). Despite the non-significant results in relation to the moderating effects of coping styles, they do seem to have direct effects on the overall health of students, considering the magnitudes of the correlations.

7.4.4. Emotional Sensitivity and Emotional Style. Additive or interactive effects?

Finally, an investigation of the possible interactive effects between the ESS and the rumination and emotional inhibition scales in the prediction of health was performed in this study. Considering the very low and non-significant correlations between emotional inhibition and the health indices, hierarchical regression analyses were performed using only rumination as predictor variable. Results showed that the NESxRum interaction approached significant in the prediction of the CHIPS and PSY-HSC scores, while no interactive effects were found for PIPS and rumination. However, for these same dependent variables, the additive effects of NES, after taking into account the rumination scores, were clearly significant. So, it seems from these results that the joint effect of NES and rumination, as expressions of negative emotionality, is not strong enough to contribute significantly to the variance of the indices of worse health, while their independent impact on some health indices was more evident. This finally means that the report of worse health status is mainly affected by the tendency to ruminate, as has been previously reported (Roger, 1988; 1995; Roger & Jamieson, 1988; Roger & Najarian, 1998), and to a lesser extent by the negative sensitivity of the individuals.

7.5. Conclusions

The present study has presented clear evidence about the impact of the emotional sensitivity on health. Specifically, NES strongly predicts a deteriorated physical and psychological health in students undergoing a process of adaptation to the university, not only impacting directly on their health status, but also interacting with the levels of perceived stress to create a more pervasive effect. On the other hand, PIPS does not seem to have a direct impact on health, however, its influence can be protective when the individuals also use a detached coping style, when dealing with stressful circumstances.

All these effects were highly significant at T1, nonetheless, they were not sustained in a follow-up assessment, and more longitudinal studies are required to test the long-term influence of the emotional sensitivity dimensions.

CHAPTER 8

THE EMOTIONAL SENSITIVITY SCALE IN A VENEZUELAN SAMPLE.

Study I: Factor Analysis and Confirmatory Factor Analysis.

Study II: Concurrent Validity Study

Study III: Emotional Sensitivity and Health in Venezuelan college students

The current chapter presents a comprehensive analysis of the Spanish version of the Emotional Sensitivity scale administered to a sample of Venezuelan college students. The first part of the chapter describes the psychometric analysis of the Spanish version of the scale, including results from the exploratory factor analysis, reliability, and confirmatory factor analysis. The second part of the chapter describes the concurrent validation study, where the Spanish version was tested in its relationship with other scales measuring similar constructs. Finally, the third part of the chapter presents the study of the relationships between the dimensions of the Spanish ESS and several health indices in the sample of Venezuelan college students, undergoing a period of adaptation.

Study I: Factor Analysis and Confirmatory Factor Analysis.

Factor Analysis

8.1 Introduction

This first section of the chapter describes the psychometric analysis of the Spanish version of the Emotional Sensitivity Scale, as the first step of the following cross-cultural study aimed at comparing these dimensions of emotional style between British and Venezuelan college students. The main purpose of the present study was to analyse the factorial structure of the Spanish ESS and to determine whether or not the two-factors structure obtained amongst English subjects would replicate in a sample drawn from a different culture. This procedure would allow us to make comparisons between structures of the scales,

rather than comparing mean scores derived from a single and culturally homogeneous sample. Moreover, in order to fully explore the structure of the Spanish version of the ESS, the exploratory factor analysis was followed by a confirmatory factor analysis (CFA), as was also performed for the English ESS.

The method of performing and analysing particular factorial structures when personality questionnaires are being used for cross-cultural comparisons, is considered highly appropriate (Church, 2000; 2001; Costa, Terracciano and McCrae, 2001; Eysenck and Eysenck, 1983; 1985; McCrae, 2001;), although not exhaustively complete (for a review, see Chuch, 2001, McCrae, 2001; Van de Vijver & Leung, 1997). According to McCrae (2000; 2001), intercultural comparisons of personality can be performed at three levels, and one of them is the *transcultural level,* which addresses precisely questions about universality and the possibility to find the same traits in different cultures, which are called *universals* and are supposed to transcend culture. These universals can only be found if factors replicate identically or closely resemble each other across cultures (McCrae, 2001; Eysenck, 1983, 1985;).

Perhaps the most ambitious attempt to date to make intercultural comparisons in personality examined the Eysenck Personality Questionnaire (EPQ – Eysenck and Eysenck, 1975) scales. Factor analyses of translated versions were used to compare the structure of the questionnaire in 25 different countries, and to allow a better comparison the items that did not work well in translation were eliminated, and mean scores were then prorated to equal item lengths (Eysenck and Eysenck, 1983, 1985). Results from these studies showed that the same dimensions of personality emerged from factor analysis, embracing not only European cultural groups but also many quite different types of nations. Barrett and S. Eysenck (1984) also reported prorated means for men and women in 25 countries, and Lynn and Martin (1995) extended their list to 37. Both studies found that personality profiles appeared to be similar for men and women.

The other personality questionnaire that has been largely studied and has received a lot of attention in cross-cultural settings has been the NEO-PI-R, which has been compared across 26 cultures (Costa, Terracciano and McCrae, 2001; McCrae, 2001 for a review). Results from this analysis yielded several

conclusions: that age and gender differences resembled those found in American samples; that different sub-samples from each culture showed similar levels of personality traits, that intercultural factor analysis yielded a close approximation to the Five Factor Model, and that factor scores were meaningfully related to other culture-level variables.

In the specific case of the Neuroticism scale, results from these intercultural comparisons were significantly strong; suggesting the transcendence of this personality dimension in the spectrum of the personality structure of individuals, regardless of their cultural and social background (McCrae, 2001; Eysenck and Eysenck, 1985). Thus, according to these personality theorists, the tendency to experience high levels of negative emotions and to overreact negatively when dealing with internal and external demands seems to reflect a dispositional characteristic of some human beings, which relies on biological structures that govern the emotional responsiveness and act beyond the culture and social environments. This statement has been set up to reject criticism made by cultural psychologists, who claim that personality constructs are merely inventions of Western Psychology, which can be used to better understand and explain individualistic societies, rather than more collectivist cultures (Church, 2000; 2001; Markus and Kitayama, 1998).

Other studies that have reported cross-cultural comparisons of personality measures are, for instance, Roger, Garcia de la Banda, Lee and Olason (2001), who compared the factorial structure of the ECQ using British, Spanish and Korean samples. Results showed that two of the four dimensions: rumination and emotional inhibition, displayed very similar structures across the different samples, and confirmatory factor analysis indicated a good fit for this two-factor model of the emotional response style (Roger et al., 2001). Earlier attempts were also made to compare personality profiles across cultures using the Cattell's 16PF, which was translated into 19 languages (Cattell, Schmidt & Pavlik, 1973,) and the MMPI-2 which has been consistently used in foreign languages (for a review, Butcher, 1996).

Despite the high congruence among the factorial structures of some personality questionnaires tested cross-culturally, the fact that the expression of these

personality features might be different from one culture to another is also acknowledged. Thus, new dimensions that are culture-specific might emerge from universals or higher-order factors (Church, 2001; Markus and Kitayama, 1998), mainly when these factors are measuring expressions of emotions (e.g. Eid and Diener, 2001; McConatha, Lightner and Deaner, 1994; Oatley and Jenkins, 1996).

Regarding the construct of empathy, there are very few studies reporting the psychometric properties of foreign versions of the existing scales. For instance, Kullich & Bengtsson (c.f. Cliffordson, 2002) reported the properties of the Swedish version of the IRI scale (Davis, 1980), and found that the alpha reliability of the four sub-scales was acceptable and similar to the reliabilities reported for the original scale (Davis, 1983, 1996). Later, Cliffordson (2002) carried out a confirmatory factor analysis of this Swedish version, and found that the IRI was hierarchically organised with one general dimension -empathic concern- at the apex. This finding indicated that this general dimension constitutes an integrated entirety whose main emphasis is on emotional reactivity that also involves cognitive processes (Cliffordson, 2002).

On the other hand, some cross-cultural studies about empathy and pro-social behaviour have been carried out (for a review Eisenberg and Fabes, 1998), and an exhaustive theory about the socialization of the socio-emotional competence has been described (Eisenberg, 1998; Eisenberg and Fabes, 1992), indicating that the cultural factors are key determinants in the expression of empathy. Thus, the investigation of the cross-cultural equivalence of a factor measuring an empathy-related construct, such as the Positive Interpersonal Sensitivity scale, might yield some important insights about the stability of this personality dimension across cultures.

8.2. Method

8.2.1. Subjects

The sample comprised 419 first year college students from the Simón Bolivar University (Venezuela), who agreed to participate in the study. 133 (32.2%) were females (mean age = 17.42, SD= 1.28) and 280 (67.8%) were males (mean age=

17.64, SD= 1.47). 6 of the participants did not report their age and gender, so the valid sample finally comprised 413 subjects.

8.2.2. Procedure

The 81-item version of the ESS (see chapter 5) was translated into Spanish and adapted to the Venezuelan idiomatic characteristics. Later, the items were back translated for two completely bilingual Venezuelan psychologists, who had no previous information about the scale, and inconsistencies were resolved by agreement. The scale used a forced-choice format (true – false) for answering, as the English version.

In order to perform the concurrent validation study, other scales were translated into Spanish and then back translated into English for revision. They were the *empathic concern and personal distress scales from the Interpersonal Reactivity* Index (IRI – Davis, 1980), the rumination and emotional inhibition scales from the Emotional Style Questionnaire (ESQ – Roger, Guarino and Olason, 2000), the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS – Cohen & Hoberman, 1983), and the Health Status Checklist (HSC – Meadows, 1989).

8.3. Factor Analysis. Results

An analysis of the items' response frequencies was performed, and 18 highly skewed items based on an 80/20 response criterion were removed prior to the factor analysis. The skewed items were mainly referred to the display of helping behaviours and to reactions of sympathy toward people in extremely difficult or dangerous situations, similar to the skewed items removed from the English ESS.

The remaining 63 items were factor analysed using Principal Axis Factoring from the Statistical Package for the Social Sciences (SPSS – Norusis, 1997). The Scree Test (Cattell, 1966) showed a slightly different structure for this questionnaire compared to the English version (see Figure 8.1). Specifically, two main factors with another two smaller ones were observed. Then, using Varimax orthogonal rotation and .30 as criteria for significant loading, two, three and four factor terminal solutions were performed and analysed.

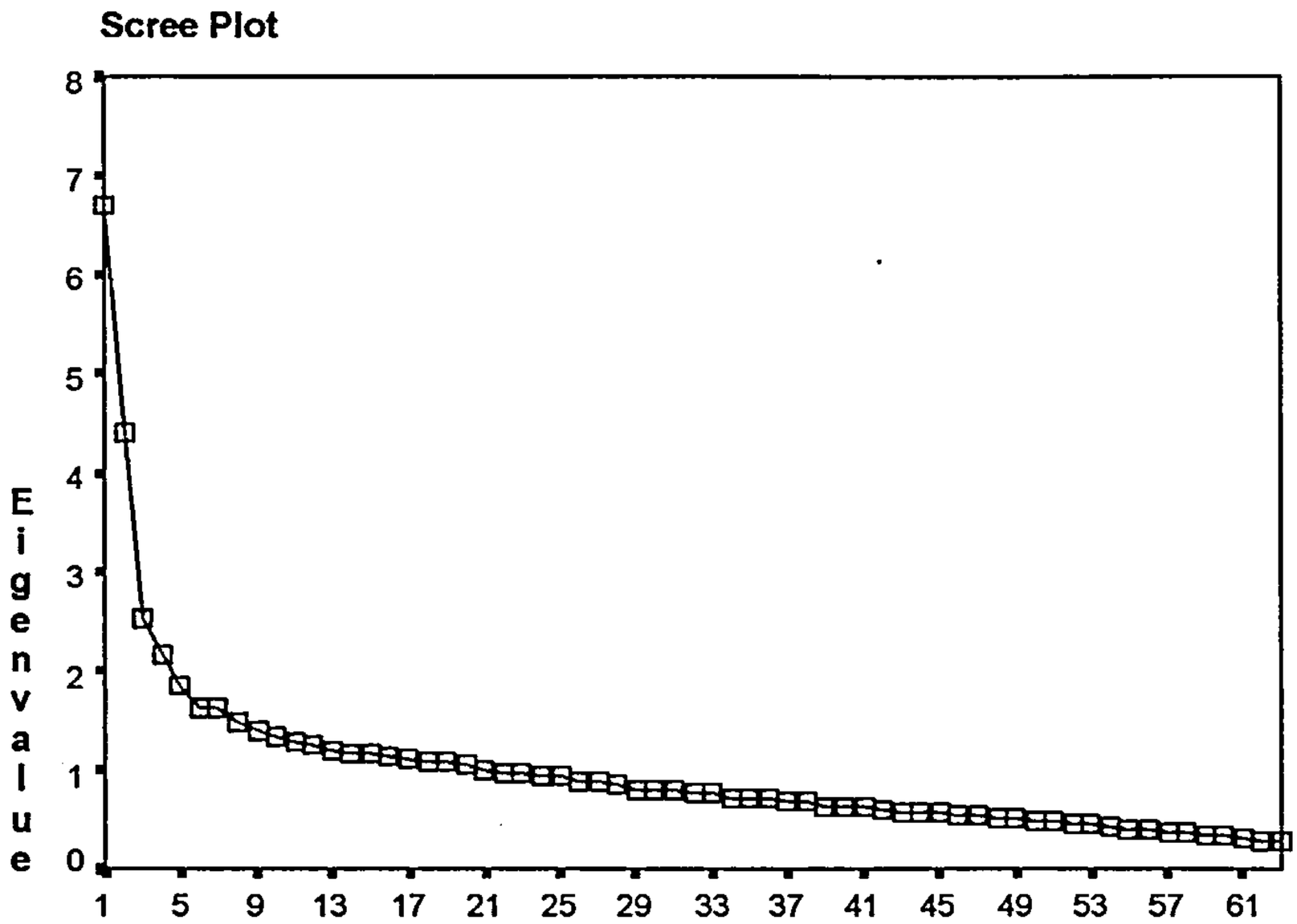


Figure 8.1. Scree Test for the Spanish ESS

Results from the two-factor terminal solution showed 39 items loading on both factors, with 4 items double-loading and explaining together 15 % of the total variance. The first factor comprised 25 items, with the highest loading on item 43 "I often feel despair when facing difficult situations" (.58); while the second factor comprised 14 items, with the highest loading on item 50 "I try to detach myself from other people's difficult situations, in order to not get involved" (.60). Thus, while the first factor replicated almost identically the NES dimension of the English ESS, the second factor showed a new and different profile, with items describing an avoiding and distancing behaviour from others' emotional reactions. A further factor analysis to a two-terminal solution removing the double-loading items revealed a clearer structure, with the first factor comprising 23 items and the second one 14 items. Oblique rotation to the two-factor terminal solution using the Direct Oblimin method was also conducted, but no difference emerged and the factorial structure remained identical.

The three-factor terminal solution was then performed, in order to determine the presence of a third factor. Using Varimax orthogonal rotation and .30 as criteria for extraction, the three factors extracted explained 18% of the total variance. Results showed the first factor comprising 24 items, with the highest loading

again on item 43 "I often feel despair when facing difficult situations" (.64), and the second highest loading on item 36 "I am easily frustrated". Two items (55 and 34, respectively) double-loaded also on the second and third factor with similar magnitudes. The rest of the items were all referred to self-oriented negative feelings and emotions, thus replicating very closely the negative egocentric sensitivity factor (NES) already described in the English version.

The second factor comprised 10 items, with item 50 (I try to detach myself from other people's difficult situations, in order to not get involved) double-loading inversely on the third factor, but in a lesser magnitude. The rest of the items loaded positively on this factor, with the highest loading on item 78 "I think the best way to avoid problems is to not get involved with others' personal lives" (.56), and the second highest loading on item 79 "I like to stay away from others' emotional reactions" (.55). All the items in this factor described a tendency to avoid and keep a distance from others' emotional reactions, as well as a tendency to not involve themselves with the negative emotions of others.

Finally, the third factor comprised 13 items, with no double-loadings. The highest loaded item in this factor was item 32 "I find it easy to recognise the feelings and moods of people around me, even if they try to hide them" (.48), and the second highest load on item 70 "I get upset when other people are having a hard time" (.43). The rest of the items all referred to the ability to perceive and recognise the emotional states of others, as well as to show concern and sympathy for others in difficult situations, replicating very closely the structure of the positive interpersonal sensitivity factor (PIPS) described in the English version.

Oblique rotation to a three-factor terminal solution using the Direct Oblimin method was also conducted, and a very slight difference emerged for factor one compared to the structure produced by the Varimax method. Specifically, one new item loaded into the factor, while another previously in was no longer included. On the other hand, no differences emerged for factors two and three, and the factorial structure remained identical.

The four-factor terminal solution showed that four factors explained 20.34 % of the variance and the differences emerged only for factor three, while factors one

and two remained almost unchangeable compared with the three-factor solution. Specifically, factor four was constituted only for 4 items, all migrated from factor three, for example: item 32 " I find it easy to recognise the feelings and mood of people around me, even if they try to hide them" (.69), and item 54 " It's quite difficult for me to know the feelings and moods of people around me" (-.61). As can be seen, the kind of items loaded in factor four describe the ability of individuals to recognise feelings and emotions in others, which was an essential feature of the empathy construct. So, considering the theoretical assumptions of the empathic concern construct and the described positive interpersonal sensitivity dimension of the English ESS version, in addition to the constraints of the size of the factor with only 4 items; this 4-factor solution was not accepted as the best for the scale.

Finally, a 1-factor solution was also performed. Results showed that a single factor comprised 27 items, with the highest loading on item 43 "I often feel despair when facing difficult situations" (.57), and the second highest loading on item 26 " When I feel miserable, the worst thing is to hear other people laughing and having fun". (.48). All the rest of the items referred to the tendency to feel negative emotions about the self and to negatively overreact in front of difficult situations. In fact, 22 of the total pool of items in this factor constituted the negative sensitivity factor observed in the three-factor solution, and the other 5 items were referred to behaviours of avoidance and distancing from others' emotional reactions. The high proportion of items describing mainly the negative sensitivity construct in this factor strongly indicated the independence of this structure from other possible dimensions comprised in this scale.

In summary, four factor analyses with different solutions were performed for the Spanish version of the ESS, following the Scree Test which suggested the presence of 4 factors. After checking the results, the three-factor terminal solution seemed to be psychometrically the most adequate and consistent. Therefore, the three factors comprised in the Spanish version were:

- Factor one, with 22 items (2 double-loading items removed) describing a tendency to be over-involved in negative emotions and to react negatively to environmental changes. This factor appeared to be highly similar to factor

one described in the English version, so it was also labelled *Negative Egocentric Sensitivity- NES* (Sensibilidad Egocéntrica Negativa).

- Factor two, comprising 10 items referred to tendencies to not being involved with others' emotionality, as well as to keep a distance from others in difficult situations or reacting negatively. This dimension was labelled *Emotional Distancing* – EMDI (Distanciamiento Emocional).
- Factor three, comprising 13 items which described a tendency to be emotionally other-oriented and the ability to recognise, concern and sympathise with others' emotions. Due to the similarities of this factor to the positive dimension of the English version, the scale was also labelled *Positive Interpersonal Sensitivity- PIPS* (Sensibilidad Interpersonal Positiva).

In sum, the Spanish ESS comprised 45 items, grouped in three dimensions or scales, namely NES (Negative Egocentric Sensitivity), EMDI (Emotional Distancing) and PIPS (Positive Interpersonal Sensitivity). Table 8.1 shows a sample of the items loading in each factor (only the items in English), and Appendix O presents the translated items loaded in the whole scale (with their English versions). The final scale is presented in Appendix P.

Table 8.1. : Item loading for the rotated factors of the Spanish ESS

Number of item	Item content	Item loading
Factor 1 (NES)		
Item 36	I am easily frustrated.	.58
Item 71	I feel very put out if people don't pick up on how I feel.	.46
Item 1	I often get the feeling that I just want to give up altogether.	.40
Factor 2 (EMDI)		
Item 78	I think the best way to avoid problems is to not get involved with other's personal lives.	.56
Item 20	I try not to get emotionally involved with people experiencing difficult situations.	.46
Item 48	Whenever I'm helping people cope with their problems, I worry whether I'm involving myself too much.	.35
Factor 3 (PIPS)		
Item 32	I find it easy to recognise the feelings and moods of people around me, even if they try to hide them.	.48
Item 65	Whenever I see someone in trouble, I feel it's my responsibility to help and give support.	.42
Item 54	It's quite difficult for me to know the feelings and moods of people around me.	-.38

NES = Negative Egocentric Sensitivity. EMDI= Emotional Distancing. PIPS= Positive Interpersonal Sensitivity.

Factor analyses for gender were also performed, in order to check possible differences in the structure of the scale. A three-factor terminal solution using Varimax orthogonal rotation for each analysis resulted in a quite dissimilar pattern. Specifically, the rotated factor matrix for males was shown to be almost identical to the matrix for the whole sample, comprising the three factors in the same order. However, the factor matrix for females showed that the items comprising the positive dimension loaded in the second factor instead of in the third, while the items of the EMDI factor loaded in the third factor. Despite this, the explained variance for each factor on both matrixes did not suffer any change. One possible explanation for this difference might have been the different sample size for males and females (67% males – 32% females). It could be also possible that, for the female group, the positive sensitivity appears as a

salient factor rather than the emotional distancing factor, which could have some support in the empathy literature. Overall, this is an issue that deserved further investigation and the analysis of the descriptive statistics of the next section intended to highlight some explanations.

8.4. Reliability analysis and inter-correlations

8.4.1. Internal Consistency

Alpha coefficients for the three factors were acceptable, showing high internal consistency in each case, although for NES it was of a higher magnitude (see Table 8.2.).

8.4.2. Test-retest Reliability

After an inter-test interval of 8 weeks, the Spanish ESS was again completed by a sub-sample of 237 subjects representing 56.56% of the original sample (valid data 235). This sample comprised 159 males (67.7%; mean age = 17.65, SD = 1.33) and 76 females (32.2%; mean age = 17.41, SD = 1.40). The test-retest coefficients were highly acceptable, indicating that the ESS measures stable personality dispositions (Table 8.2).

Table 8.2. Test-retest correlations and Alpha Coefficients for the Spanish ESS dimensions

Factor	***Test-retest correlation (N= 235)***	***Alpha Coefficients***
Negative Egocentric Sensitivity (NES)	.718**	.824 (N = 395)
Emotional Distancing (EMDI)	.666**	.742 (N= 406)
Positive Interpersonal Sensitivity	.648**	.710 (N = 400)

** p< 0.0001

8.4.3. Inter-correlation and descriptive Statistics

Table 8.3. sets out the correlations among the factors for the whole sample and by gender. Results showed the positive (PIPS) and negative (NES) dimensions of the Spanish ESS to be independent, replicating the results of the English version. Nonetheless, EMDI produced results positively correlated with the negative dimension, while an inverse relationship was found with the positive dimension.

A quite different pattern emerged for gender, since for females results showed a non-significant relationship between NES and EMDI, while results for males replicated almost identically those of the whole sample.

Table 8.3 Correlations among the Spanish ESS dimensions

	Negative Egocentric Sensitivity	***Emotional Distancing***	***Positive Interpersonal Sensitivity***
Total (N= 413)			
NES		.316**	.002
EMDI			-.254**
Males (N= 280)			
NES		.365**	.009
EMDI			-.231**
Females (N= 133)			
NES		.165	.048
EMDI			-.190*

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed). NES= Negative Egocentric Sensitivity. EMDI= Emotional Distancing.

Descriptives showed males reporting higher negative sensitivity than females, although this difference was not significant (t (411) = 1.65, p =.10). However, males displayed significantly more emotional distancing than females (t(411) = 5.09, p < .0001), as well as showed less positive sensitivity (t (411) = -4.32, p< .0001). Results are shown in Table 8.4 .

Table 8.4. Descriptives Statistics for the Spanish ESS dimensions

	Negative Emotional Sensitivity	Emotional Sensitivity	Positive Emotional Sensitivity
	Mean Scores (SD)		
Whole Sample (N= 1000)	8.73 (4.86)	4.38 (2.65)	6.56 (2.80)
Females (N= 763)	7.90 (4.63)	3.01 (2.35)	7.56 (2.76)
Males (N= 237)	8.44 (4.77)	3.96 (2.63)	6.12 (2.57)
Possible Range	0 -22	0 -10	0 - 13
Whole Sample (N= 1000)	0 -22	0 – 10	0 – 13
Females (N= 763)	0 - 21	0 - 10	1- 13

Confirmatory factor analysis

8.5. Introduction

A description of the CFA method was already presented in chapter 5, so it was not replicated in this section. However, it is deemed necessary to present the aims of this analysis as part of the study of the psychometrical properties of the Spanish version of the ESS.

In the first part of this study, the factor structure from the exploratory factor analysis of the Spanish ESS showed the scale comprising three dimensions of emotional sensitivity, with two of them being orthogonal. Then, the aim of the present analysis was to test the goodness of fit of the Spanish ESS using both individual items and parcels of items. The three-factor model of the Spanish-ESS was compared to a more restricted one-factor model, trying to represent the structure of the English-ESS. In the two-factor model, the ENDI and PIPS dimensions were hypothesised to be measuring the same latent factor (emotional sensitivity in general).

Despite the importance of this statistical tool, it was acknowledged as a limitation of the present study that the specifications of the procedure to perform a CFA were not fulfilled completely (Anderson & Gerbing, 1988), since a real sample of

subjects was not available to test the factorial structure of the scale, and the same original data were used to carry out the analysis.

8.6. Method

8.6.1. Subjects

The whole original sample of 419 Venezuelan college students was used for this analysis regardless of the age and gender of participants, since these variables were not incorporated into it. Section 8.2.1. sets out details of the sample.

8.6.2. Statistical Analysis

As with the English version of the ESS, the models in this study were analysed using the maximum likelihood method (ML), which is the most commonly used approach in Structural Equation Modelling. Results were analysed using different parameters of goodness of fit, such as the chi-square, the Comparative Fit Index (CFI), the NonNormed Fit Index (NNFI), the Goodness of Fit (GFI) and the Adjusted Goodness of Fit (AGFI) indices, and the Root Mean Square Error of Approximation (RMSEA) (see chapter 5 for details).

8.7. Results

The data were first subjected to a by-item confirmatory factor analysis, testing both two and three factor models. For the two-factor model, items measuring Emotional Distancing (EMDI) and Positive Interpersonal Sensitivity (PIPS) were constrained to load on the same factor, resembling a wide bipolar dimension of emotional sensitivity to others (with resulting behaviours of approach and avoidance). The factors for the two and three factor models were allowed to correlate freely. The data were analysed using the EQS procedure (Bentler, 1995), and the models tested were covariance structure models. The three-factor model provided a significantly better fit than the two-factor model (for example a CFI of .742 for three factors and .653 for two factors), but as had been anticipated, none of the fit indices were acceptable for the analysis by items.

For the next analysis, and following the guidelines from Kishton and Widaman (1994), the 45 items of the Spanish ESS were grouped randomly into four parcels

for NES, two parcels for EMDI and three parcels for PIPS. Table 8.5. sets out the numbers of items and reliabilities for each parcel.

Table 8.5. Number of items and reliabilities for a priori randomly constructed parcels for the three factors of the Spanish ESS

Parcel	***Number of items***	***Reliability (Alpha)***
NESPAR1	5	.5758
NESPAR2	5	.5534
NESPAR3	6	.5764
NESPAR4	6	.5499
EMDIPAR1	5	.5497
EMDIPAR2	5	.6618
PIPSPAR1	5	.4455
PIPSPAR2	4	.3526
PIPSPAR3	4	.4312

NES= Negative Egocentric Sensitivity; EMDI= Emotional Distancing;
PIPS= Positive Interpersonal Sensitivity

The parcels were all constructed grouping a similar number of items, and although the parcels for PIPS fell below 0.50, the alpha reliabilities were generally in the acceptable range. The data from the 9 parcels were entered into CFA and comparisons between the two and the three factor models were performed again. For the two-factor model, parcels measuring EMDI and PIPS were constrained to load on the same factor, as previously. The factors for the two and three factor models were allowed to correlate freely. Results are shown in table 8.6.

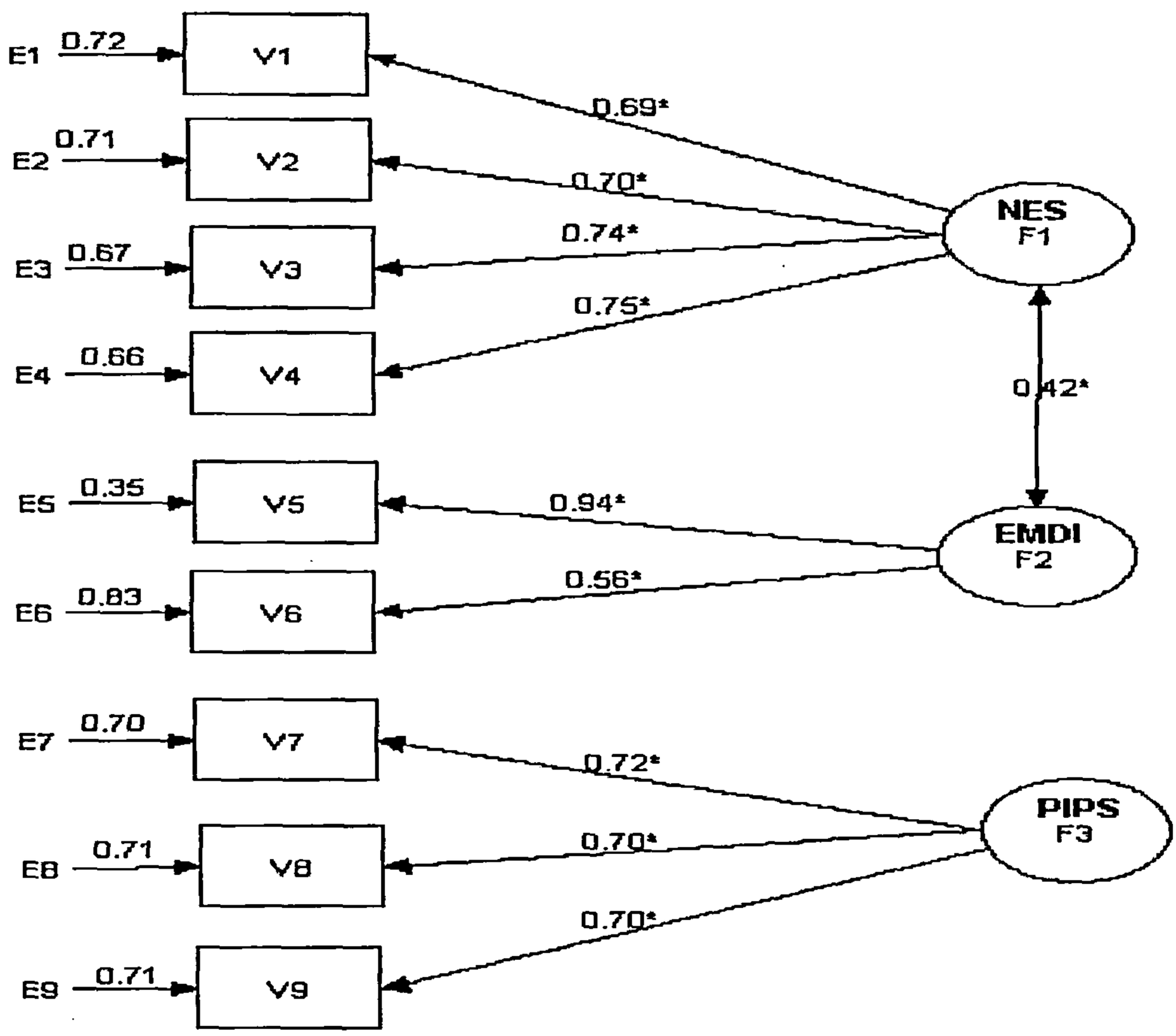
Table 8.6. Goodness of Fit indicators for two and three-factor structure of the Spanish ESS: Parcel Analysis

	Models tested	
	Three factor	**Two Factor**
χ^2	83.214*** (df = 26)	228.458*** (df = 25)
CFI	0.947	0.817
NNFI	0.927	0.736
GFI	0.958	0.891
AGFI	0.927	0.805
RMSEA[a]	0.072 (0.054 – 0.089)	0.136 (0.120 – 0.153)

N= 419; *** p≤ 0.001 level. χ^2 = Chi-square; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; GFI = Goodness of Fit Index; AGFI = Adjusted Goodness of Fit Index; RMSEA = Root Mean Squared Error of Approximation. [a] The values in the brackets are 90% population confidence interval for RMSEA.

The Goodness of Fit indices clearly showed that the three-factor model did fit the data very much better than the two-factor model, and the indices supported the existence of three factors or dimensions for the Spanish ESS, rather than two factors. The difference in the chi-square statistic also showed that the three-factor model was of a significantly better fit than the two-factor model ($\Delta\chi^2_{(1)} = 145.244\ p \leq 0.001$). The final three-factor model is presented in Figure 8.2.

Fig. 8.2. The confirmatory model of the three-factor structure for the Spanish ESS showing standardised Maximum likelihood coefficients for the model. (Note: All coefficients were statistically significant).



Examination of the standardised coefficients for this model indicated that they were all statistically significant, and as can be seen in Fig. 8.2., all factor loadings

but one were over 0.60 (The ML-coefficients are commonly regarded as equivalent to factor loadings in factor analysis, as they are regression coefficients representing the linear influence of common factor on measured variables – MacCallum, 1995).

STUDY II: CONCURRENT VALIDITY STUDY

8.8. Introduction

The concurrent validation study was aimed primarily at confirming the factorial structure of the Spanish version of the ESS, by assessing the relationships of its three dimensions with questionnaires measuring related constructs.

For this study, similar results to those obtained for the English version were expected, with NES correlating positively high with measures of negative emotionality, while PIPS was expected to correlate with measures of empathic concern, other-oriented emotionality and emotional expression. Finally, EMDI was expected to correlate with measures of negative emotionality and emotional inhibition.

In order to carry out this study, the scales measuring personality variables were translated into Spanish, since Spanish versions were not available at the moment. Details are given in the next section.

8.9. The criterion variables.

1. ***The Rumination and Emotional Inhibition scales from the Emotional Style Questionnaire*** **(ESQ – Roger et al., 2000; see Chapter 5 for details of the English version)**. The 39 items were translated into Spanish and back-translated into English for revision of equivalence using the same method as the ESS, and were presented with a forced-choice format (true – false) for answering.

Data of the Venezuelan sample for this scale were factor analysed using Varimax Orthogonal rotation, and results showed the structure of the questionnaire to be

nearly identical to the English version. Then, the same scoring key of the English ESS was used to score the factors for the Venezuelan sample. Alpha coefficients resulted highly consistent for both scales (Rumination α = .82; Emotional Inhibition α = .85).

2. ***The Empathic Concern and Personal Distress scales from the Interpersonal Reactivity Index*** **(IRI – Davis, 1980; see chapter 5 for details).** A factor analysis of the 14 items was performed in order to compare the structures of the Spanish and English versions, and results showed both to be almost identical, with scales measuring two different spheres of empathy. Items were then scored using the same scoring key of the English version. Alpha coefficients for these two scales were highly acceptable (Empathic Concern α = .69 and Personal Distress α = .72; N = 413) and values reached the same range reported for the original scales (Davis, 1980; see chapter 5 for details).

8.10. Method

Subjects and procedure

Details of the sample were given in section 8.2.1. Subjects completed the ESQ and the empathy scales together with the Spanish ESS.

8.11. Results

Table 8.7. shows the results for the concurrent exercise of the Spanish version of the ESS.

Table 8.7. Intercorrelations among the Spanish ESS dimensions and related scales

	Negative Egocentric Sensitivity	***Emotional Distancing***	***Positive Interpersonal Sensitivity***
Rumination	.71**	.29**	.03
Emotional Inhibition	.22**	.34**	-.21**
Empathic Concern	.14**	-.23**	.49**
Personal Distress	.53**	.19**	-.05

** Correlation is significant at the 0.01 level (2-tailed)

As expected, NES correlated positively high with rumination and personal distress. The correlations with emotional inhibition and empathic concern were also significant, but in a lesser magnitude.

Correlations between EMDI and the rest of the variables were also as expected. Thus, positive correlations were found with rumination, emotional inhibition and personal distress, while a significantly inverse correlation was found with empathic concern.

Finally and as expected, PIPS showed a very low and non-significant correlation with rumination and personal distress, while it correlated highly positively with empathic concern. On the other hand, an inverse correlation was found with emotional inhibition, as was expected.

STUDY III: EMOTIONAL SENSITIVITY AND HEALTH IN VENEZUELAN COLLEGE STUDENTS

8.12. Introduction

The final study was aimed at testing the relationships between the Spanish ESS and physical and psychological health indices in the Venezuelan sample. Specifically, the Spanish ESS was used to predict the physical and psychological well-being of the students after a follow-up period of 8 weeks, with the special aim of determining the impact of NES. For this purpose, two inventories measuring health symptoms were translated into Spanish and completed by the participants at the beginning and approximately at the end of their first academic period (1st. term of college).

8.13. Method

8.13.1. Subjects and Procedure

The sample in this study was tested on two separate occasions, at the beginning of the academic term (Time 1 – T1 hereafter) and eight weeks later (Time 2 – T2 hereafter). Initially at T1, the pool of 419 subjects (see section 8.2.1.) completed

a set of questionnaires including the Spanish ESS, the Cohen-Hoberman Inventory of Physical Symptoms (CHIPS – Cohen & Hoberman, 1983), and the Health Status Checklist (HSC - Meadows, 1989). At T2, a sub-sample of 237 subjects (56.56% of the whole sample) was again administered the set of questionnaires. Two subjects did not report their age, reducing the valid data to 235 subjects, 159 males (67.7%; mean age = 17.65, SD = 1.33) and 76 females (32.2%; mean age = 17.41, SD = 1.40).

8.13.2. Materials

The health inventories were translated into Spanish and back-translated into English to check for discrepancies.

1. ***Cohen-Hoberman Inventory of Physical Symptoms*** (CHIPS – Cohen & Hoberman, 1983; see chapter 7 for details). Alpha reliability for this scale was highly acceptable (α = 0.88; N= 401).

2. ***The Health Status Checklist*** (HSC - Meadows, 1989; see chapter 7 for details). Following the rationale and suggestions stated by Forbes (1999) related to the necessity of determining the impact of personality variables in a different group of symptoms, the Spanish HSC was factor analysed using the data collected at T1 (N=419). The Scree test showed the scale comprising mainly three factors, so a three factor terminal solution was performed using Varimax rotation and .30 as criteria for loading extraction. Thus, Factor 1 comprised 10 items describing psychological symptoms, such as tiredness, anxiety, insomnia, etc. Factor 2 comprised 7 items linked with physical and acute symptoms, like cold/flu, throat infection, chest infections, etc. Factor 3 grouped only 2 items (cystitis/ vaginal problems and dizziness/fainting). Given the small size of the third factor, this solution was not considered appropriate, so a 2-factor terminal solution was carried out instead using the same method. This solution showed Factor 1 comprising 10 items referred to *psychological symptoms* and some *chronic illnesses*, while Factor 2 grouped 7 items linked with *physical and acute symptoms.* No double-loading items appeared in this solution showing the independence of the two factors, so it was finally adopted as the more consistent for this analysis. Appendix Q shows the item loadings for each factor.

The internal consistency of the two factors was highly acceptable (psychological and chronic illnesses α = .81; and physical and acute symptoms α = .68). Scores for the Physical symptoms' factor were calculated for the whole sample irrespective of gender, while scores for Psychological symptoms and chronic illnesses were calculated separately by gender in order to account for the "menstrual problems" item only for the female group.

8.14. Results

8.14.1 Analysis for Time 1

Table 8.8. presents the descriptives for the health measures at time 1, separately for the whole sample and by genders. Scores on the health scales at the beginning of the term were moderately low, considering the possible range. Significant differences were found between males and females for CHIPS (t (393) = -5.26; p< 0.0001), Physical Symptoms from the HSC (t (396) = -3.55; p< 0.0001), and Psychological Symptoms- HSC (t(385) = -7.78; p< 0.0001), indicating that women reported at this stage more psychological and physical complaints than men.

Table 8.8. Descriptive Statistics for the Spanish version of the Health indices at Time 1

Health Indices	Range	Mean	SD
Total Sample (N = 413)			
CHIPS	0 - 132	18.88	14.23
Physical Symptoms – HSC	0 - 42	4.35	5.26
Males (N = 280)			
CHIPS		16.44	13.30
Physical Symptoms - HSC		3.72	4.62
Psychological Symptoms – HSC	0 - 54	8.38	7.80
Females (N = 133)			
CHIPS		24.24	14.72
Physical Symptoms – HSC		5.69	6.24
Psychological Symptoms - HSC	0 - 60	16.06	11.29

CHIPS = Cohen-Hoberman Inventory of Physical symptoms; HSC = Health Symptoms Checklist

Table 8.9. shows the intercorrelations among the health indices and the three dimensions of the Spanish ESS at T1. Highly positive correlations were found

between NES and all the health scores, for both the whole sample and by genders. These correlations were higher in magnitude for the psychological symptoms, compared with the physical symptoms. However, the correlations between the health indices and EMDI and PIPS were very low and most of them non-significant.

Table 8.9. Correlations among the ESS dimensions and health outcomes at T1

	Negative Egocentric Sensitivity	***Emotional Distancing***	***Positive Interpersonal Sensitivity***
CHIPS (N= 401)	**.37****	.065	**.12***
Physical symptoms - HSC (N= 403)	**.13***	-.02	.09
Psychological Symptoms-HSC (Males)(N=280)	**.41****	.10	.05
Psychological Symptoms-HSC (Females)(N=133)	**.41****	-.07	.08

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed)

8.14.1.1. Assessing the moderating effects of the ESS in a Spanish population.

Baron and Kenny (1986) suggested that moderating effects of continuous variables could be examined by using hierarchical regression analysis. In such analysis, the standardised predictor is entered in the first step, followed by the standardised moderator at the second. At the last step, the interaction terms between the predictor and moderator are entered. Evidence for moderating effects are present when the interaction term between the predictor and moderator is significant (Baron & Kenny, 1986). Following these guidelines, the data were entered into a series of hierarchical regression analysis using the CHIPS and the Physical Symptoms – HSC as indices of physical complaints, and the Psychological Symptoms – HSC as an index of psychological distress in the Venezuelan college students. The rumination and emotional inhibition scales from the ESQ (Roger et al., 2000) were used as the predictor variables, considering previous findings where these two dimensions of emotional style have been found significantly related to health deterioration (e.g. Kaiser, Hinton, Krohne, Stewart & Burton, 1995; Roger & Jamieson, 1988; Roger & Najarian, 1998).

This analysis would extend previous findings where rumination, emotional inhibition and positive sensitivity were tested as a three-factor model of emotionality in moderating the relationship between stress and health in British samples (Roger, et al., 2000; Guarino & Roger, 2001). On the other hand, the specific contribution of the new emotional distancing dimension, together with the ESQ scales in their moderation of the relationship between stress and health in a culturally different sample, had not been tested yet, so the aim of this analysis was to address this issue.

a.- Hierarchical regressions analysis for physical symptoms at T1.

In the first analysis, scores on CHIPS were used into the hierarchical regression analysis as the dependent variable. The independent variables were entered in the following order: at step 1 rumination and emotional inhibition were entered, at step 2, the Spanish ESS scales (NES, EMDI and PIPS) were entered, and at step 3, the cross-products of the standardised terms of each ESS scale with the standardised ESQ scales were entered. Table 8.10. presents a summary of the regression analysis.

Table 8.10. Summary of hierarchical regression analysis using ESQ-R and EI as predictors for T1 CHIPS

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.113	25.282**	2,398
Rumination	.335	6.861	.0001			
Emotional Inhibition	.005	.094	.925			
Step 2				.047	7.370**	3,395
NES	.274	4.006	.0001			
EMDI	-.044	-.837	.403			
PIPS	-.105	2.157	.032			
Step 3				.017	1.352	6,389
NESXR	.074	.400	.689			
EMDIXR	-.196	-1.333	.183			
PIPSXR	-.100	-.615	.539			
NESXEI	-.314	-2.116	.035			
EMDIXEI	.128	.847	.397			
PIPSXEI	.212	1.480	.140			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. EMDI = Emotional Distancing, PIPS = Positive Interpersonal Sensitivity. R = Rumination. EI = Emotional Inhibition

The total model of prediction for CHIPS was significant (F[11,400] = 7.621; p<.0001). A main effect emerged for rumination, which accounted for the highest significant amount of unique variance. After controlling for the ESQ scales effect, both positive and negative sensitivity still contributed significantly to the unique variance of CHIPS, although NES was the strongest predictor. Interestingly, even though the interaction terms did not significantly contribute to the variance in CHIPS, the NES x EI interaction accounted for a significant amount of unique variance (Beta = -.314, p = .035). To explore further the possible meaning of this interaction, median splits were performed on the total scale scores for NES and EI and table 8.11 sets out the mean and standard deviation terms for CHIPS at T1.

Table 8.11. Mean values for CHIPS by high and low scorers on NES and EI.

Negative Egocentric Sensitivity	***Emotional Inhibition***	
	High EI	Low EI
High NES	22.55 (14.35)	24.86 (16.38)
Low NES	17.08 (14.19)	13.58 (10.03)

The means suggested that there was a slight difference between subjects high and low EI who reported high NES, although this difference resulted in the opposite expected direction. Thus, the greatest report of symptoms on the CHIPS inventory occurred in subjects who were high NES but low EI. However, the lowest report of symptoms in this inventory was shown by the low NES low EI group, as expected. This unexpected result might deserve further investigation in order to determine whether emotional inhibition might buffer the pervasive effects of the negative sensitivity.

The following analysis was performed using the report of physical symptoms of the HSC as dependent variable. The data were entered in the same order as the previous analysis. Table 8.12. sets out the summary of the regression analysis.

Table 8.12. Summary of hierarchical regression analysis using ESQ-R and EI as predictors for T1 Physical Symptoms-HSC

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.022	4.528*	2,400
Rumination	.154	3.001	.0003			
Emotional Inhibition	-.051	-1.000	.318			
Step 2				.009	1.254	3,397
NES	.060	.835	.404			
EMDI	-.044	-.776	.438			
PIPS	.072	1.389	.166			
Step 3				.014	.950	6,391
NESXR	.137	.695	.487			
EMDIXR	-.010	-.063	.950			
PIPSXR	-.300	-1.715	.087			
NESXEI	-.218	-1.372	.171			
EMDIXEI	.154	.950	.343			
PIPSXEI	-.024	-.156	.876			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. EMDI = Emotional Distancing, PIPS = Positive Interpersonal Sensitivity. R = Rumination. EI = Emotional Inhibition

The regression model for physical symptoms did not produce significant results (F[11,402] = 1.684; p = .075); however, a significant main effect was again found for rumination (Beta = .154, p= .0003). No main effects were found for the ESS dimensions, or for the interaction with the ESQ scales. This model explained only a minimal proportion of the total variance of physical symptoms (4.5%).

b. Hierarchical regressions analysis for psychological symptoms at T1.

In this analysis, the index of psychological symptoms from the HSC was used as dependent variable, for both genders separately. As in the previous analysis, the data were entered in the following order: at step 1 rumination and emotional inhibition; at step 2, the standardised terms for the three dimensions of the ESS were entered, and finally, at step 3, the cross-products of the standardised terms of each ESS scale with the standardised ESQ scales were entered. Table 8.13 presents the summary of the regression analysis for the male group.

Table 8.13. Summary of hierarchical regression analysis using ESQ-R and EI as predictors for T1 Psychological Symptoms-HSC in males

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.151	23.159**	2,260
Rumination	.354	6.012	.0001			
Emotional Inhibition	.099	1.677	.095			
Step 2				.051	5.520**	3,257
NES	.307	3.821	.0001			
EMDI	-.104	-1.608	.109			
PIPS	.038	.645	.519			
Step 3				.021	1.123	6,251
NESXR	.517	2.403	.017			
EMDIXR	-.212	-1.116	.265			
PIPSXR	-.018	-.099	.921			
NESXEI	-.099	-.542	.588			
EMDIXEI	-.020	-.101	.920			
PIPSXEI	-.121	-.690	.491			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. EMDI = Emotional Distancing, PIPS = Positive Interpersonal Sensitivity. R = Rumination. EI = Emotional Inhibition

Results indicated that the total model of prediction for psychological symptoms in the male group was significant (F[11,262]= 6.566, p< .0001), explaining 22% of the total variance. Rumination was the strongest contributor to the unique variance of psychological symptoms in this sub-sample (Beta = .354, p< .0001). After controlling for the ESQ scales' effect, NES still contributed to the unique variance of the psychological symptoms in males. Although the interaction did not add significantly to the total variance of the model, the NES x R cross product accounted for a marginal amount of unique variance (Beta = .517, p = .017). To better understand the significant interaction, median splits were performed on the total scale scores for both NES and rumination, and the mean scores on psychological symptoms in males for all four groups are presented in table 8.14.

Table 8.14. Mean values for Psychological Symptoms-HSC in males by high and low scorers on NES and R.

Negative Egocentric Sensitivity	***Rumination***	
	High R	Low R
High NES	11.45 (8.72)	10.60 (7.13)
Low NES	7.12 (5.21)	5.31 (6.27)

As expected, subjects high in both NES and rumination were those who reported the highest level of psychological symptoms, thus showing the pervasive effects of these variables acting together.

The final analysis was performed using the psychological symptoms index of the female group as dependent variable. The data were entered in the same order as the previous analysis, and results are presented in table 8.15.

Table 8.15. Summary of hierarchical regression analysis using ESQ-R and EI as predictors for T1 Psychological Symptoms-HSC in females

Variables	Beta	T	p	R^2 Change	F Change	df
Step 1				.180	13.281**	2,121
Rumination	.427	4.959	.0001			
Emotional Inhibition	-.099	-.105	.917			
Step 2				.042	2.122	3,118
NES	.223	1.846	.067			
EMDI	-.132	-1.502	.136			
PIPS	.060	.715	.476			
Step 3				.071	1.866	6,112
NESXR	-.132	-.360	.719			
EMDIXR	-.243	-1.225	.223			
PIPSXR	-.453	-1.389	.168			
NESXEI	-.516	-1.936	.055			
EMDIXEI	.092	.381	.704			
PIPSXEI	.386	1.554	.123			

** p< 0.001. * p< 0.05. NES = Negative Egocentric Sensitivity. EMDI = Emotional Distancing, PIPS = Positive Interpersonal Sensitivity. R = Rumination. EI = Emotional Inhibition

The model of regression was significant (F[11,123] = 4.213; p< .0001), explaining 29% of the total variance of the psychological symptoms in females. Rumination

was the only contributor to the unique variance at step 1; while no main effects for the ESS dimensions were found. The two-way interaction terms did not add significantly to the total variance, however a marginal effect was found for the NES x EI term (Beta = -.516, p= .055) in this group. An inspection of the means for the NES x EI interaction showed the same pattern of results as for the CHIPS inventory, where subjects high in NES but low in EI reported more psychological symptoms than those high in both variables (high NES-low EI = 21.21; high NES-high EI = 17.73).

Overall, results for T1 indicated that the NES was the only ESS dimension significantly associated with the report of physical and psychological symptoms, in both males and females. Thus, neither the Emotional Distancing – EMDI – nor the Positive Interpersonal Sensitivity –PIPS- correlated with health reports at the beginning of the academic period. NES was shown to have a direct effect on both psychological and physical health beyond what could be accounted for by rumination, especially on the male group.

8.14.2 Analysis for Time 2

After eight weeks of T1 assessment, the subjects were tested again in their health indices. Results comparing the scores of the participants between T1 and T2 assessments are presented in table 8.16.

Table 8.16. Comparisons of health measures between T1 and T2

Health Measure	T1	T2	T value (df)	Sig. (2-tailed)
CHIPS	17.46	18.63	-1.46 (215)	.145
Physical Symptoms-HSC	4.00	4.57	-1.66 (220)	.099
Psychological Symptoms-HSC (Females) (N= 70)	13.91	14.59	-.60 (69)	.548
Psychological Symptoms-HSC (Males) (N= 140)	7.53	9.54	**-3.41 (139)**	**.001**

CHIPS = Cohen-Hoberman Inventory of Physical symptoms; HSC = Health Symptoms Checklist. T1 = Time 1; T2 = Time 2

According to the data, significant differences were only found for males on the report of psychological symptoms, whereas no differences were observed for

females neither in the report of physical symptoms nor for the whole sample. This result differed significantly from the one obtained at T1, where females reported significantly higher physical and psychological symptoms than males.

8.14.2.1. Assessing the importance of the emotional sensitivity in predicting physical and psychological symptoms at T2.

To further explore the predictive value of the Spanish ESS dimensions over the eight-week period of adaptation, the data were entered into a series of stepwise regression analyses. Scores on the health measures at T2 were used as dependent variables, while the scores on the ESS dimensions at T1 were used as independent variables. In order to control for any confounding effects of initial values of the dependent variables, T1 health measures were always entered at step 1, followed by the ESS dimensions using a step-wise regression method at step 2. In this way the relationship between the independent and dependent variables could be assessed, while controlling for initial values of the dependent variables. Table 8.17. sets out a summary of the analysis for CHIPS.

Table 8.17. Summary of the regression analysis on CHIPS scores at T2, taking account of initial values for CHIPS at T1.

	Beta	T	p	R^2 Change	F Change	df
Variables in the equation						
Step 1				.491	206.45**	1,214
CHIPS-1	.791	14.368	.0001			
Step 2				.39	5.836**	3,211
CHIPS-1	.712	12.320	.0001			
NES-1	.586	3.259	.001			
EMDI-1	-.606	-1.91	.06			
PIPS-1	.547	1.98	.05			

** p< 0.001. CHIPS-1 Cohen-Hoberman Inventory score at Time 1

Results showed the model to be significant (F[4,215] = 59.489; p< .0001), where the score on the same health scale at T1 accounted for 49% of the total variance of the scores at T2. After controlling for CHIPS at T1, the ESS still contributed to the variance of the CHIPS's scores at T2, specially NES that accounted for a significant amount of unique variance as expected, while PIPS accounted in a lesser magnitude. The effect of EMDI was just marginal (Beta = -.61, p = .06).

The next regression analysis was performed using the scores of the Physical Symptoms' index at T2 as dependent variable, controlling for the scores at T1. Table 8.18. presents the summary of the analysis.

Table 8.18. Summary of the regression analysis on Physical Symptoms - HSC at T2, taking account of initial values at T1.

	Beta	T	p	R^2 Change	F Change	df
Variables in the equation						
Step 1				.270	81.001**	1,219
Phys-1	.520	9.000	.0001			
Step 2				.006	.562	3,216
Phys-1	.510	8.690	.0001			
NES-1	.028	.452	.652			
EMDI-1	.019	.296	.767			
PIPS-1	.0.70	1.16	.245			

** p< 0.001. Phys-1 Physical symptoms of the HSC at Time 1

Results showed that only the scores on the same inventory at T1 contributed significantly to the total variance, explaining 27% of it. The model for the regression of the ESS dimensions was not significant, so the dimensions did not contribute to an explanation of the variance of physical symptoms at T2.

Analyses for the scores on Psychological Symptoms were performed separately by genders, controlling their scores on the same variable at T1. As in the previous analyses, scores on the health measures at T2 were used as dependent variables, while the scores on the ESS dimensions at T1 were used as independent variables. Table 8.19 sets out the summary of the regression analysis for males.

Table 8.19. Summary of the regression analysis on Psychological Symptoms – HSC for males at T2, taking account of initial values at T1.

	Beta	T	p	R^2 Change	F Change	df
Variables in the equation						
Step 1				.487	131.259**	1,138
Psych-1	.698	11.457	.0001			
Step 2				.036	3.350*	3,135
Psych-1	.618	9.464	.0001			
NES-1	.216	3.077	.003			
EMDI-1	-.098	-1.477	.142			
PIPS-1	.018	.299	.766			

** p< 0.001; * p< 0.05. Psych-1 Psychological symptoms of the HSC for males at Time 1

Results indicated that after taking into account the initial values of Psychological symptoms in this group, NES still contributed to the total variance of the DV at T2, explaining an additional 4% (Beta = .216; p< .0001). Finally, table 8.20. presents the summary of the regression analysis for females.

Table 8.20. Summary of the regression analysis on Psychological Symptoms – HSC for females at T2, taking account of initial values at T1.

	Beta	T	p	R^2 Change	F Change	df
Variables in the equation						
Step 1				.447	55.058**	1,68
Psych-1	.669	7.420	.0001			
Step 2				.019	.765	3,65
Psych-1	.635	6.320	.0001			
NES-1	.052	.511	.611			
EMDI-1	-.060	-.635	.528			
PIPS-1	.108	1.168	.247			

** p< 0.001. Psych-1 Psychological symptoms of the HSC for females at Time 1

Results for females showed that after controlling for Psychological symptoms at T1, none of the ESS dimensions accounted for any additional variability in the report of this health index at T2.

Overall, analyses for T2 revealed firstly, that the male group significantly increased the report of psychological symptoms after the eight weeks period of adaptation. Secondly, NES significantly predicted scores on CHIPS and on psychological symptoms in the male group, even after controlling for the initial values. The effect was not significant for the Physical symptoms index, or for females.

8.15. General Discussion

The present chapter reports a comprehensive study of the Emotional Sensitivity Scale in the context of a Venezuelan college students' sample. The study began with the description of the translation and adaptation of the scale to a Venezuelan sample, reporting the results of the exploratory factor analysis and the following confirmatory factor analysis. It was followed by the report of the results from the concurrent validity exercise, in which the dimensions of the scale were compared with scales measuring related constructs. Finally, this chapter reports a study of

the relationships between the Spanish ESS dimensions and health indices, twice during a period of adaptation, at the beginning of the academic period and after an eight-week follow-up.

8.15.1. Factor analysis

Following the methodological rigour established by personality theorists, who state the necessity of determining the factorial structure of translated versions of personality inventories, the ESS was translated into Spanish and factor analysed, as the first step of a subsequent cross-cultural comparison between Venezuelan and British students.

Specifically, the translated ESS was administered to a sample of Venezuelan college students, and different terminal solutions were analysed. Results indicated that the three-factor solution appeared to be the most adequate and consistent for this Spanish version, comprising 45 items in three factors labelled: Negative Egocentric Sensitivity (NES – 22 items), Emotional Distancing (EMDI – 10 items), and Positive Interpersonal Sensitivity (PIPS – 13 items). This means that, apart from the NES and PIPS dimensions initially identified in the English version, a new dimension of emotional responsivity emerged in the Spanish-ESS.

As the original version, NES measures the tendency to be over-involved in negative emotions and to react negatively to environmental changes, comprising 18 items (64,28%) of the 28 from the original version. The PIPS scale assesses the tendency to be emotionally other-oriented and the ability to recognize, concern and sympathise with others' emotions. This Spanish version of the scale contains 11 of the 15 original items of the English PIPS (73%). On the other hand, the new dimension of Emotional Distancing, which emerged from the remaining pool of items, measures the tendency of individuals to restrain themselves from being involved with others' emotionality, as well as to keep a distance from others facing difficult situations or reacting negatively. In fact, this new dimension only shares 1 item with the pool comprised in the original English – PIPS (.06% - *I try not to get emotionally involved with people experiencing difficult situations*), indicating the originality and independence of this new factor.

The present results then suggested a cultural difference in the way British and Venezuelan students experience and express their emotional sensitivity, since for the British population only two dimensions of negative and positive emotional sensitivity were identified, while for the Venezuelans a third and completely new dimension derived from the items. The Emotional Distancing factor reflects a different dimension of emotional responsivity that resembles very closely an avoidance coping style. In fact, it describes a kind of avoidance of others' emotional reactions in order to not get involved with them. At this stage of the research, the nature of this individual difference did not seem to be clear, or the relationship this factor might have with other personality characteristics or psychosocial processes. It just seemed evident from the data available that this new dimension describes an individualistic profile of personality, which contains some elements of negative emotionality, as resulted from the concurrent validation study. Further research into this particular issue is needed in order to explore more deeply the possible implications of emotional distancing on social competence and social adjustment of Venezuelan students. It will be also necessary to analyse the structure of the questionnaire in other populations, such as mature people, social workers, etc., in order to determine whether the original three dimensions replicate in samples with different demographic characteristics.

The existence of cultural differences when analysing personality measures, and mainly when emotional styles and their expressions across cultures are involved, have been reported already (e.g. Eid and Diener, 2001; McConatha, Lightner and Deaner, 1994; Oatley and Jenkins, 1996; Roger et. al, 2001). The fact that the expression of the personality characteristics might be different from one culture to another is acknowledged, and that some new dimensions that are culture-specific might emerge from universals or higher-order factors (Church, 2001; Markus and Kitayama, 1998). According to this statement, it could be assumed that the negative and positive emotional sensitivity dimensions might be higher-order factors of emotionality, while the emotional distancing dimension might be a culture-specific characteristic of the emotionality among the Venezuelans. To test such a hypothesis, it would be necessary to perform additional studies in other Latin American and European countries using the ESS, and determine which of these dimensions represent possible "universals", or culture-specific domains of emotionality.

Comparing the three Spanish- ESS scales by gender, results of this study showed no significant differences for NES, although men scored higher on EMDI and lower on PIPS, compared to women. In fact, men showed a tendency toward higher scores on NES than women, even though this difference was not significant. For this scale, results were quite surprising compared to previous findings where females constantly scored higher than males in scales measuring *negative affectivity* and *N* (Costa, Terraciano & McCrae, 2001; Eysenck & Eysenck, 1978; Eysenck, Eysenck & Barrett, 1985; Heaven & Shochet, 1995; Lynn & Martin, 1997; Martin & Kirkcaldy, 1998, Roberts & Gotlib, 1997), although they replicated the result of the English sample and a similar interpretation can be stated (see chapter 5).

Females in this study showed a higher positive interpersonal sensitivity than males, replicating previous reports about the relationship between empathy-related constructs and gender (Davis, 1980; Lennon & Eisenberg, 1987 for a review; Mehrabian & Epstein, 1972; Hoffman, 1977; Eysenck & Eysenck, 1978; Eysenck, Pearson, Eastig & Allsop, 1985; Martin et al., 1996). On the other hand, results for the EMDI scale were not completely surprising, since males have been found to adopt more avoidance coping styles (Guarino & Feldman, 1995) and to be less emotionally expressive (Matlin, 1993; Malatesta & Kalnok, 1984). Personal distress, as an emotionally negative empathy sub-scale, has also been found to be higher in males than in females (Lennon & Eisenberg, 1987 for a review).

Finally, the intercorrelations among the Spanish-ESS dimensions showed that the negative and positive sensitivity scales were completely independent of one another. However, EMDI correlated positively with NES, and inversely with PIPS. Although the correlations were moderately low, their directions indicated that the EMDI scale shares a small component of negative emotionality, while describing a weak tendency to empathise with others' emotions. The EMDI scale seems then, a specific expression of the emotional sensitivity of the Venezuelans, which reflects a deliberate attempt to get disengaged from the emotions of others.

8.15.2. Confirmatory Factor Analysis

In order to further explore the structure of the Spanish-ESS and to confirm the existence of three factors, a CFA was performed using the same data available from the sample of Venezuelan college students. Two and three-factor models were tested using the EQS program (Bentler, 1995) and comparisons were made using the different parameters of goodness of fit to consider the best model for this version of the scale. For each model, two CFAs were performed, both by items and by parcels.

The item-based confirmatory factor analysis showed that the three-factor model presented a slightly better fit than the two-factor model, although both showed values under the minimum requested for a good fit. In view of these results, and considering the statements of Bentler and Chou (1987) and Floyd and Widaman (1995) about the restrictions of lengthy scales and the recommendations in using item parcels rather than individual items, several parcels were randomly constructed for each factor.

The parcel-based analysis clearly showed a better fit for the three-factor model, compared to the two-factor model (e.g., RMSEA of 0.072 for the three-factor model and 0.136 for the two-factor). This was further confirmed, as the nested three-factor model had a significantly lower chi-square value than the two-factor model.

In summary, a different structure for the new version of the ESS was confirmed, since it was clearly a three-factor questionnaire, instead of a two-factor model as the English version (see Chapter 5). However, further research is needed to confirm the three-factor structure of the Spanish ESS using different Spanish speaking populations.

8.15.3. Concurrent Validity

The concurrent validation study was aimed primarily at confirming the factorial structure of the Spanish ESS, by assessing the relationships of the three dimensions with questionnaires measuring related constructs. Four scales were used for this purpose: the Rumination and Emotional Inhibition scales, from the Emotional Style Questionnaire (ESQ – Roger et al., 2000), and the Empathic

Concern and Personal Distress scales, from the Interpersonal Reactivity Index (IRI – Davis, 1980).

Results showed the correlations in the expected direction for NES and PIPS. Specifically, NES correlated positively with rumination, emotional inhibition, and the personal distress scale, while PIPS correlated significantly highly with the empathic concern scale and negatively with the emotional inhibition scale. In sum, the validity of the positive and negative scales was confirmed through this study.

However, results of the concurrent exercise for the new dimension of the Spanish-ESS deserved special attention, since significantly positive correlations were found in this study between this scale and indices of negative emotionality, such as rumination, emotional inhibition and personal distress. Contrarily, a significantly negative association was found with the empathic concern scale. As described earlier, the EMDI scale measures the tendency of individuals to restrain themselves from being involved with others' emotionality, as well as to keep a distance from others facing difficult situations or reacting negatively. In other words, the scale measures a tendency to *avoid* the emotional reactions of others, either because the individual is trying to avoid getting himself/herself distressed or because he/she feels unable to sympathise and help the others facing difficulties, which would explain the negative correlation with the empathic concern scale and with PIPS. At this stage of the research these might be merely speculations, but what seemed clear is that the EMDI scale measures a kind of avoidance coping style, which describes a sample of specific beliefs and behavioural dispositions adopted by some individuals in front of the emotional reactions of others. To confirm this hypothesis, a study assessing the relationship between EMDI and avoidance coping scales is needed, and should be the topic for future research. In fact, previous findings in support of the positive correlation between avoidance coping styles and personality dimensions related to negative emotionality have been presented (Bolger, 1990; Deary, Blenkin, Agius, Endler, Zealley & Wood, 1996; Endler y Parker, 1990; Kardum & Krapić, 2001; McCrae & Costa, 1986; Parkes, 1986; 1990; Olason and Roger, 2001), as well as the impact of these two variables in increased anxiety, depression and general psychological distress (Lyne & Roger, 2000; Sale, Guppy & El-Sayed, 2000).

8.15.4. Emotional Sensitivity and Health in a Venezuelan sample

The final stage of the study with the Venezuelan sample was the investigation of the relationships between the Spanish-ESS dimensions, specially NES, and the physical and psychological health indices at the entrance to college and at the end of an 8-week period of adaptation.

The overall results for T1 showed, as expected, that only NES accounted for explained variance in predicting health report. Specifically, NES was strongly associated with scores on CHIPS and with the psychological symptoms index, and to a lesser extent with scores on the physical symptoms index from the HSC, for both males and females. Moreover, NES still contributed significantly to the variance in CHIPS, even after controlling for the effects of the ESQ scales (rumination and emotional inhibition). A similar result was observed regarding the psychological symptoms in males, although the effect for females or for physical symptoms was not significant. This result supports the well known finding about the relationship between *neuroticism* or *negative affectivity* and distress symptoms' reports (Clark and Watson, 1988; Costa & McCrae, 1987; Hughes, 2001; McCrae, 1990; Watson and Pennebaker, 1989).

Interestingly, the hierarchical regression analysis was only significant for males, compared with females, which means that even after controlling the effects for rumination, psychological symptoms in men were still affected by the levels of negative sensitivity. This result contrasted quite strongly with findings previously reported in the literature about the higher impact of negative affectivity or neuroticism over the health reports in women (e.g. Williams & Wiebe, 2000), showing apparently that in this case males were more affected by their negative lability. It is worth noting, however, that these gender differences may be the result of unequal sample size for each group. To further explore this issue, an additional analysis matching randomly the size of the samples for males and females was repeated for this hierarchical regression, and results were shown to be very similar to those registered for the greater sample. This means that the significant effect of NES on the report of psychological symptoms in the male group was still maintained even with a smaller sample. In fact, NES accounted for a higher proportion of the variance in explaining these symptoms (9%), even

after controlling for rumination. So, the unexpected results for the male group can be still generalised to the wider population. Finally, it should be mentioned that the negative emotional profile of the male participants in this study was also confirmed by the significant differences in the scores of rumination and emotional inhibition, in which males were higher than females. A similar result had been reported earlier for British and American undergraduate students (McConatha, Lightner, & Deaner, 1994).

When the interaction terms between the ESQ and the ESS scales were analysed for the psychological symptoms in each group, other interesting results appeared. Thus, the contribution to the unique variances of the DVs was different for males and females, since the NES x R term accounted for the variance in the former group, while the NES x EI term accounted for the variance of the psychological symptoms in the latter. This indicates that negative sensitivity together with rumination explained partially the variance in the report of psychological symptoms in men, while for women the negative sensitivity acted together with the emotional inhibition to create this effect. Interestingly, when median splits for the NES x EI term in the female group were calculated, results indicated that women who were high NES but low emotional inhibited were those to report the highest levels of psychological symptoms, compared to the high NES/high EI sub-group as might be expected. This suggests that women with high negative emotional sensitivity, but at the same time expressing more intensively their emotions, were prone to report more intensively their psychological complaints, above those who tend to bottle or inhibit their emotions. What does not seem clear is whether the result of reporting more psychological disturbance and symptoms is a consequence of being more emotionally expressive and generally open to show their own emotions, or in fact the emotional inhibition variable acts as a buffer against the stress when women are high negative sensitivity. Such a result will definitively require further investigation. An identical result was also observed regarding the scores on the CHIPS inventory in the whole sample, where the high NES/low EI sub-group reported the highest level of symptoms report.

Additional evidence for the fascinating results about the psychological health of the male group was found with the analysis of the follow-up data, 8 weeks later.

In fact, this was the only measure that showed a significant change over time, indicating that the boys reported more symptoms of tiredness, anxiety, insomnia and depression at the end of their first period at the university. Neither the psychological symptoms index in females, nor the report of physical symptoms in the whole sample, showed any change after the period of adaptation. Moreover, the magnitude of the correlation between NES and the report of psychological symptoms in females was lower, suggesting that the psychological health in women was less strongly associated to their negative sensitivity after a period of adaptation to the academic demands, and other variables accounted for its variability. As suggested earlier for the NES scale, an additional exploration of the relationship between gender role orientation (GRO) and health reports is necessary, in order to determine if the changes in health status are related to feminine/masculine roles, irrespectively of the biological gender, as was demonstrated by Annandale and Hunt (1990). The hypothesis is that females in this sample were energetically engaged in masculine roles, dealing with the demands of the environment in a more rational way, while men were less protected against the stress due to their tendency to be more negative sensitive and to adopt avoidance related coping styles. Previous studies carried out with similar Venezuelan samples have found women adopting more rational coping styles to deal with the academic stress, compared to men who tended to cope using avoidance coping, and with further negative impact on their immunological system (Guarino & Feldman, 1995; Guarino, Gavidia & Antor, 2000). The protective effects of masculinity over depression have been already suggested (Ingram, Cruet, Johnson & Wisnicki, 1988).

The Spanish-ESS dimensions, together with the report of symptoms assessed at T1, were then used to predict the health indices at Time 2. Results indicated that the health status of the participants at the beginning of their university life accounted for the greatest amount of variance in their health at T2, explaining between 27 and 50% of the variance of the physical symptoms, and around 47% for the psychological symptoms (average for both genders). Apart from this, only NES accounted for an additional proportion of the variance, and just for the case of the CHIPS inventory, as well as for the psychological symptoms index in the male group.

These results indicated that NES is a measure of emotionality able to explain significant changes in the health status of young people undergoing stressful experiences and higher environmental demands, supporting then related findings about the association between *neuroticism* or its proxies and self-report of poor health and symptoms (Clark & Watson, 1988; Costa & McCrae, 1987; McCrae, 1990; Watson & Pennebaker, 1989). Specifically, the negative sensitivity seems to have a distinctly more significant effect on the health of the Venezuelan male students, than on the female ones.

Despite these significant correlations, the Spanish-ESS did not show strong moderating effect in the relationship between the emotional styles (rumination and emotional inhibition) and health, accounting only for unique variance of the dependent variables. A further examination of the moderating hypothesis using indices of perceived stress as the predictor variable in the Venezuelan population should be addressed in future research, in order to determine the role of these personality variables in the stress-illness paradigm, as has already been determined with the British sample. Further studies using physical indices of health deterioration, as well as different measures of psychological distress may also be necessary to fully understand the implications of the emotional sensitivity dimensions, especially the negative sensitivity factor, in predicting more realistic indices of illness.

8.16. Conclusions

The Spanish-ESS showed to be a three-factor scale that describes two independent dimensions of negative and positive sensitivity, with a third related dimension of emotional distancing. The factorial structure of the scale was confirmed through a Confirmatory Factor Analysis (CFA) and the dimensions were shown to have an acceptable internal consistency and test-retest reliability. The NES dimension produced highly significant results related with measures of negative emotionality, as well as the EMDI factor, although to a lesser extent. On the contrary, the PIPS dimension was shown to be an expression of sympathy and empathic concern. The Venezuelan female students reported higher positive interpersonal sensitivity than males, who scored higher on the emotional distancing dimension.

The NES factor was shown to be highly related with the report of psychological symptoms after a period of adaptation to new environmental demands, and also related, but to a lesser extent, with the report of physical symptoms. However, this pattern of relationship was stronger for the male than for the female group.

The next chapter will present the comparisons between the Venezuelan and the British samples on their emotional sensitivity, as well as the comparison of the factorial structures of the emotional sensitivity scales in each language.

CHAPTER 9

A CROSS-CULTURAL COMPARISION OF EMOTIONAL SENSITIVITY BETWEEN VENEZUELAN AND BRITISH COLLEGE STUDENTS

9.1. General Introduction

The present chapter reports the analysis of a cross-cultural comparison between two cultural dissimilar groups of undergraduate students, one British and the other Venezuelan. These two groups participated voluntarily along this research completing the ESS, personality measures, and health inventories. The aim of this comparison was specifically to discuss the differences obtained in the factorial structure of the ESS and its confirmatory analysis, including a brief comparison of the correlations among the factors and the results from the concurrent validation studies. At the same time, scores on the ESS dimensions for the two groups were compared in order to determine possible differences in the emotional sensitivity of British and Venezuelan students. Results of the studies with health outcomes in British and Venezuelan samples could not be incorporated in this comparative analysis, since different health measures and sample sizes were used in both studies making the comparison inappropriate.

A detailed revision of the literature about cross-cultural studies in personality has already been presented in chapter eight, so was not repeated here. However, it is important to emphasise that comparisons of specific personality measures across cultures are aimed at determining whether or not the factorial structures could be recovered when culturally different samples are used. Moreover, it is acknowledged the fact that the expression of these personality features might be different from one culture to another, and that some new dimensions that are culture-specific might emerge from universals or higher-order factors (Church, 2001; Markus and Kitayama, 1998), mainly when these factors are measuring expressions of emotions (e.g. Eid and Diener, 2001; McConatha, Lightner and Deaner, 1994; Oatley and Jenkins, 1996; Roger et al., 2001).

In the specific case of the N scales, results from intercultural comparisons were significantly strong, suggesting the transcendence of this personality dimension in the spectrum of the personality structure of individuals, regardless of their cultural and social background (McCrae, 2001; Eysenck and Eysenck, 1985). Regarding the construct of *empathy*, just a few studies have reported the psychometric properties of foreign versions of existing scales, and a confirmatory factor analysis of a Swedish version of the IRI found the questionnaire hierarchically organised with empathic concern at the apex, overlapping to a great extent with perspective taking and fantasy (Cliffordson, 2002).

This chapter intended, thus, to compare the English and Spanish versions of the ESS developed and validated as part of this thesis, in order to determine possible differences or similarities in their factorial structure. Likewise, the scores on the ESS dimensions for both samples were analysed, aimed at comparing the emotional sensitivity of two culturally dissimilar samples.

Study I. Comparison of the exploratory and confirmatory factor analyses of the ESS.

9.2. Method

9.2.1. Subjects

Two samples of undergraduate students were included:

Sample 1: A British sample of 242 undergraduates, 82 males (mean age = 19.35, SD = 3.09) and 160 females (mean age = 19.14, SD = 2.07) (see chapter 5 for details).

Sample 2: A Venezuelan sample of 413 first year college students, 280 males (mean age = 17.64, SD= 1.47), and 133 females (mean age = 17.42, SD= 1.28) (see chapter 8 for details).

9.2.2. Scale translation and procedure

The 81-item English version of the ESS was translated into Spanish and back-translated into English by fluent bilinguals. The two English versions were compared for discrepancies, which were resolved by discussion to produce a final form. For details, see section 8.2.1. in chapter 8. The complete description of the test construction exercise for the English version was presented in chapter 5.

Similar procedures were used to perform the exploratory factor analysis in both samples. Summarizing, skewed items were removed from the initial pool of items in both scales and the remaining items were factor analysed using principal axis factoring.

Following the scree test, the 81 items of the English version were factor analysed, using a Varimax rotation to a two-factor terminal solution. However, the Scree test for the Spanish version suggested a different structure of three factors, so the responses were rotated to this terminal solution.

9.3. Results

Factor Analysis

The two-factor terminal solution of the English version showed the first factor comprising 28 items, with the highest loading on item 40, "I often feel sorry for myself" (.69). The factor suggested a strong egocentric focus for the emotions expressed in the items, and was then labelled *Negative Egocentric Sensitivity* (NES). The second factor comprised 15 items, with the highest loading on item 70 "I get upset when other people are having a hard time" (0.55). All the items in this factor were referred to sensitivity to others' emotions, as well as concern and empathy for others' well-being, so was labelled *Positive Interpersonal Sensitivity* (PIPS). The essence of the factors is shown in their six highest-loading items displayed in Tables 9.1 and 9.2.

Table 9.1: The six highest-loading items on English ESS factor 1

40. I often feel sorry for myself (.69).
37. Little things are often enough to put me in foul mood (.68).
36. I am easily frustrated (.64).
43. I often feel despair when facing difficult situations (.60).
8. I often get angry with myself (.58).
7. It often feels that my burden is greater than anyone else's (.58).

Numbers in bracket indicate item loading on the factor

Table 9.2: The six highest-loading items on English ESS factor 2

70. I get upset when other people are having a hard time (.55).
35. I feel upset when I realise that there is nothing I can do to help other people who are having problems (.53).
12. I find it easy to understand other's people feelings (.52).
34. I'm easily affected by others' emotional problems (.51).
18. I find it easy to understand others' feelings when they are distressed (.51).
41. I feel really upset about the plight of people on the edge of society (.48).

Numbers in bracket indicate item loading on the factor

In summary, the final version of the English ESS comprised 43 items, 28 items representing the *Negative Egocentric Sensitivity* dimension (NES), and 15 items measuring the *Positive Interpersonal Sensitivity* (PIPS) dimension.

In contrast to the English sample on which the scale had originally been constructed, the Scree test for the Spanish sample suggested an unambiguous three-factor structure. Results from the three-terminal solution yielded a first factor comprising 24 items, with the highest loading on item 43, "I often feel despair when facing difficult situations" (.64), which was also the highest loading item on the English version's first factor. The remaining items all referred to self-oriented negative emotions, thus replicating highly closely the *Negative Egocentric Sensitivity* factor (NES) already described in the English version.

The second factor comprised 10 items, with the highest loading on item 78, "I think the best way to avoid problems is to not get involved with others' personal lives" (.56). All the items in this factor described distancing oneself from others' emotional reactions, and the factor was accordingly labelled *Emotional Distancing* (EMDI). The third factor comprised 13 items, with the highest loading on item 32, "I find it easy to recognise the feelings and moods of people around me, even if they try to hide them" (.48). The items in the factor referred consistently to the ability to recognise and empathise with the emotional states of others, and corresponded closely to the original *Positive Interpersonal Sensitivity* (PIPS) factor.

The six highest-loading items of the three factors of the Spanish ESS are shown in Tables 9.3 to 9.5.

Table 9.3: The six highest-loading items on Spanish ESS (Venezuelan) factor 1

43. I often feel despair when facing difficult situations (.64).
36. I am easily frustrated (.58).
72. I am very questioning of myself (.52).
8. I often get angry with myself (.49).
71. I feel very put out if people don't pick up on how I feel (.46).
7. It often feels that my burden is greater than anyone else's (.44).

Numbers in bracket indicate item loading on the factor

Table 9.4: The six highest-loading items on Spanish ESS (Venezuelan) factor 2

78.I think the best way to avoid problems is to not get involved with other's personal lives. (.56)
79. I like to stay away from other's emotional reactions. (.55)
50. I try to detach myself from other people's difficult situations, in order to not get involved (.55)
61. I sometimes think that showing too much concern and sympathy for others might result in me getting involved with things I don't want to. (.54)
49. When I'm trying to help other people, I find myself worrying that it's going to take too much time. (.50)
20. I try not to get emotionally involved with people experiencing difficult situations. (.46)

Numbers in bracket indicate item loading on the factor

Table 9.5: The six highest-loading items on Spanish ESS (Venezuelan) factor 3

32. I find it easy to recognise the feelings and moods of people around me, even if they try to hide them. (.48)
70. I get upset when other people are having a hard time. (.43)
12. I find it easy to understand other's people feelings. (.43)
65. Whenever I see someone in trouble, I feel it's my responsibility to help and give support. (.42)
35. I feel upset when I realise there is nothing I can do to help other people who are having problems. (.42)
56. I feel more concerned than most people about those who are unfairly treated. (.39)

Numbers in bracket indicate item loading on the factor

Overall, the Spanish version of the ESS comprised 45 items, grouped in three dimensions labelled *Negative Egocentric Sensitivity* (NES), *Emotional Distancing* (EMDI), and *Positive Interpersonal Sensitivity* (PIPS).

Finally, the internal consistency (coefficient alpha) of the scales was satisfactory in both samples, although greater in magnitude for the British group. The reliabilities coefficients are summarized in table 9.6.

Table 9.6. Internal reliability (coefficient alpha) for the ESS factors

	British sample (N = 242)	**Venezuelan sample (N =419)**
Negative Egocentric Sensitivity	.893	.824
Positive Interpersonal Sensitivity	.797	.710
Emotional Distancing	—	.742

Confirmatory Factor Analysis

The final structure of the English and Spanish versions were confirmed using EQS confirmatory factor analysis by parcels, following the procedures already described in chapters 5 and 8, respectively. For the English scale's CFA, an independent

sample of 192 undergraduate students was used, 63 males (mean age = 19.44; SD 3.27) and 127 females (mean age = 19.67; SD 2.88). However, for the Spanish scale, the same original sample of Venezuelan students was used for the analysis, since a different sample was not available. In order to establish the better fit of the three-factor model for the Spanish sample, two and three factor models were tested and compared, with the parcels for EMDI and PIPS constrained to load on the same factor in the two-factor solution. The factors for the two and three factor models were allowed to correlate freely. The fit indices for the models of both scales are displayed in Table 9.7 for comparison.

Table 9.7: Fit indices for the two and three factor CFA solutions

	British N= 192	*Spanish = 419*
Two-factor model		
CFI	0.980	0.817
NNFI	0.971	0.736
RMSEA	0.051 (.000 - .087)	0.136 (.12 - .15)
Three-factor model		
CFI		0.947
NNFI		0.927
RMSEA		0.072 (.05-08)
$\Delta\chi^2_{(1)} = 145.244^{***}$ $p \leq 0.001$		

Key: CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; RMSEA = Root Mean Squared Error of Approximation (90% confidence interval); $\Delta\chi^2$ = chi-square difference between 2 and 3 factors for the Spanish version.

Results clearly suggested that the three-factor solution for the Spanish scale offered a better fit to the data, than the two-factor model. Contrarily, the two-factor solution seemed to fit sufficiently well the English version of the scale. In summary, data indicated clear differences in the structure of the ESS according to the language and culture.

Correlations among the factors

Table 9.8 shows the summary of correlations among the factors for the Spanish and English version of the scales. The positive and negative dimensions of emotional sensitivity on both scales were shown to be completely independent, thus suggesting a repeated pattern of relation between the two across cultures.

Table 9.8: correlations among the factors for the english and spanish ess

	Negative Egocentric Sensitivity (NES)	***Emotional Distancing (EMDI)***	***Positive Interpersonal Sensitivity (PIPS)***
Spanish sample (N= 419)			
NES		.316**	.002
EMDI			-.254**
British sample (N= 242)			
NES			.029

**. Correlation is significant at the 0.01 level (2-tailed). NES= Negative Egocentric Sensitivity. EMDI= Emotional Distancing. PIPS = Positive Interpersonal Sensitivity.

Concurrent validation studies

In order to compare the pattern of relationships between the Spanish and English scales with related measures, results reported in chapters 5 and 8 were summarised in table 9.9. Among the measures used in the concurrent validation studies with the British and Venezuelan samples, only four variables were common and then could be compared. These were the Rumination and Emotional Inhibition scales from the Emotional Style Questionnaire (ESQ - Roger et al., 2000), and the Empathic Concern and Personal Distress scales from the Interpersonal Reactivity Index (IRI – Davis, 1980).

Table 9.9. Intercorrelations among the Spanish and the English ESS dimensions and related scales

	English ESS		Spanish ESS		
	NES	***PIPS***	***NES***	***EMDI***	***PIPS***
Rumination	.85**	.006	.71**	.29**	.03
Emotional Inhibition	.39**	-.49**	.22**	.34**	-.21**
Empathic Concern	.001	.79**	.14**	-.23**	.49**
Personal Distress	.45**	.11	.53**	.19**	-.05

** Correlation is significant at the 0.01 level (2-tailed)

Results indicated that NES correlated with rumination in the same way for both cultures, and the same pattern was also found for PIPS. Likewise, the pattern of correlations with emotional inhibition was identical for NES and PIPS in both groups. Interestingly, a slight different pattern of correlation resulted with empathic concern. Specifically, while the English NES scale was completely independent from this empathy sub-scale, the Spanish NES resulted, although low, positively correlated. For PIPS, the only difference in the pattern of correlation with empathic concern was in magnitude. Regarding the personal distress scale, correlations with NES and PIPS also shared the same pattern. In summary, with the exception of NES and empathic concern, a very similar matrix of correlations has been found between the two versions of the scales and related constructs. The differences in magnitude may have been a function of sample sizes.

Study II. Emotional Sensitivity amongst British and Venezuelan undergraduates.

9.4. Method

9.4.1. Subjects

Data from samples 1 and 2 were used to perform this analysis.

9.4. 2. Procedure

Factor analyses of each scale provided the scoring keys, so total scores for each dimension in each scale were obtained (see chapters 5 and 7 for details). A new database was created pooling the total scores of each sample. To allow for comparisons, the original score of each subject was prorated dividing it by the number of items of the dimension, so a final score ranging from 0 to 1 was obtained. The procedure was repeated for each scale (NES and PIPS, respectively) and for both samples. The EMDI dimension was not included in this comparison.

9.5. Results

Descriptives of the prorated scores for each scale are presented in Table 9.10.

Table 9.10. Prorated scores for NES and PIPS in the British and Venezuelan sample

	N	Mean	SD
	British sample		
NES	242	.432	.239
PIPS	242	.626	.240
	Venezuelan sample		
NES	419	.383	.217
PIPS	419	.536	.221

T-test were then calculated in order to compare the scores. Significant differences were found for both dimensions, with the British students scoring higher than the Venezuelans in NES ($t(658) = -2.67$; $p < 0.01$), and PIPS ($t(658) = -4.91$; $p < 0.001$). In order to determine whether these differences might be attributable to sample size, analyses were repeated using a smaller Venezuelan sample equalizing the British size. Thus, a random sample of 226 Venezuelan students (50 % of the total sample) was selected, comprising 159 males and 67 females (mean age = 17.46; SD= 1.08). Interestingly, the pattern of results remained the same, with the British scoring higher in both NES ($t(466) = -2.29$; $p < 0.05$) and PIPS ($t(466) = -3.93$; $p < 0.001$).

Comparisons by gender

Regarding the differences across genders, the results described in chapters 5 and 7, respectively, showed a similar pattern within each culture where females scored significantly higher than males in PIPS, while no significant differences were found for NES. Thus, females in both cultures showed a higher positive sensitivity than males, while the negative egocentric sensitivity was undistinguishable between genders. However, a cross-cultural comparison between British and Venezuelan college students considering gender seemed appropriate for this study.

Using again the randomly reduced Venezuelan sample (N = 226), comparisons between NES and PIPS in males and females across cultures were performed and results are shown in tables 9.11 and 9.12

Table 9.11. Descriptives for British and Venezuelan males on the ESS dimensions

	N	*Mean*	*SD*
	NES		
British	82	.398	.241
Venezuelan	159	.391	.219
	PIPS		
British	82	.547	.252
Venezuelan	159	.505	.208

Table 9.12. Descriptives for British and Venezuelan females on the ESS dimensions

	N	*Mean*	*SD*
	NES		
British	160	.449	.236
Venezuelan	67	.365	.212
	PIPS		
British	160	.666	.223
Venezuelan	67	.628	.205

T-test statistics were used to compare males and females across cultures, and results showed non-significant differences neither in NES nor in PIPS for males, while a significant difference was found in women for NES, with the British students scoring higher than the Venezuelans (t (227) = -2.535; p= 0.01). No difference resulted for PIPS between cultures.

Overall, the cross-cultural comparisons of the scores on the ESS yielded interesting results, since British students showed higher levels of both negative and positive sensitivity than the Venezuelans, during a period of adaptation. Specifically about NES, the female British undergraduates seemed to experience more negative sensitivity than their Venezuelan counterparts.

9.6. Discussion and Conclusions

Study I indicated that the factorial structure of the ESS was moderately different for British and Venezuelan samples. Specifically, a 2-factor structure was confirmed for the British sample, comprising one dimension for negative egocentric sensitivity (NES) and another for positive interpersonal sensitivity (PIPS). However, the Spanish version of the scale administered to an equivalent sample of Venezuelan undergraduates suggested not two, but rather three dimensions for emotional sensitivity. Thus, a third dimension labelled emotional distancing (EMDI) emerged from the exploratory factor analysis, and the goodness of fit indices from the CFA confirmed that this three-factor model for the Venezuelan sample was superior to the two-factor one.

This means that the Venezuelan participants appeared to be drawing a clear distinction between the concepts of emotional distancing and empathy, which had not emerged amongst British subjects. In fact, this new dimension only shared 1 item with the pool comprised in the original English – PIPS (.06% - *I try not to get emotionally involved with people experiencing difficult situations*), thus indicating the originality and independence of this new factor. Moreover, the three-factor solution

for the British sample (see chapter 5 for details) did not yield distinct empathy and distancing clusters of items, and the two-factor solution provided a better fit than three factors. On the other hand, the negative emotional sensitivity factor replicated closely the original English scale.

As indicated previously, the analysis for the British sample had not simply merged the items relating to empathy and distancing. Rather, the second factor in the English analysis had been primarily concerned with empathy items, while the items comprising the EMDI scale came from the remaining pool of items. This suggests that the third factor might be a culture-specific characteristic of the emotionality of the Venezuelans, who distinguish more clearly between sensitivity to others' emotions and involving oneself with them. These results support previous findings about cultures' differences in personality measures, mainly when emotional styles and their expressions across cultures are assessed (e.g. Eid and Diener, 2001; McConatha, Lightner and Deaner, 1994; Oatley and Jenkins, 1996; Roger et al., 2001).

Regarding the correlations among the factors, results showed that the negative and positive dimensions of both versions of the ESS were completely independent and orthogonal, thus confirming the existence of at least two different kinds of emotional sensitivity across cultures. However, this was not the case for the EMDI factor of the Spanish version, which correlated positively with NES and inversely with PIPS. This suggests that people who took distance from the emotional reactions of others were also experiencing some kind of negative emotions, while feeling less able to sympathise with others. Maybe, the decision to restrain oneself from the emotions of others was precisely a consequence of experiencing some negative feelings and the awareness of not being sufficiently able to express concern and sympathize with others in difficult circumstances. This assumption was also based on the results of the concurrent validation study, where EMDI was shown to be positively related with constructs describing negative emotionality such as rumination, emotional inhibition and personal distress.

Study II presented the results of comparing the British and Venezuelan samples on their scores on the ESS. For obvious reasons, only the negative and positive

sensitivity dimensions in both samples were compared. Thus, using prorated scores, analyses revealed that the British students experienced significantly more negative emotional sensitivity than the Venezuelans, while appeared to be more empathic. This latter result contrasts significantly with the popular notion that Latino cultures are viewed as more open, sociable and interpersonally active than the Anglo cultures. Unfortunately, no references were found supporting this notion, especially comparing these kinds of cultural groups in related constructs. However, it would perhaps be precipitate to simply conclude that the Venezuelans are less positively sensitive than the British students, since it is possible that this result just reflected a specific characteristic of the Venezuelan subjects under study. In summary, further research is required in order to confirm or invalidate these conclusions.

What resulted similar in both cultures was the greater ability of females to be more empathic and concerned about others compared to males, thus supporting previous findings about the relationship between empathy-related constructs and gender (Davis, 1980; Eysenck & Eysenck, 1978; Eysenck, Pearson, Eastig & Allsop, 1985; Hoffman, 1977; Lennon & Eisenberg, 1987 for a review; Martin et al., 1996; Mehrabian & Epstein, 1972).

Equally in both cultures was the non-significant difference between males and females in NES, thus contrasting with traditional findings where females constantly score higher than males in scales measuring *negative affectivity and N* (Costa, Terraciano & McCrae, 2001; Eysenck & Eysenck, 1978; Eysenck, Eysenck & Barrett, 1985; Heaven & Shochet, 1995; Lynn & Martin, 1997; Martin & Kirkcaldy, 1998, Roberts & Gotlib, 1997). As suggested in previous chapters, a further exploration of the relationship between gender role orientation (GRO) and NES may be necessary, in order to determine whether the association might effectively exist for the feminine/masculine roles, irrespectively of the biological sex, as was demonstrated by Annandale and Hunt (1990). However, also considering that NES was equally represented in both genders across the two different cultures, contrasting with typical findings about N, it is plausible to conclude that the NES scale is definitively measuring a largely different construct than the one traditionally measured with the N scales, so explaining this original finding. Finally, as suggested in previous chapters,

it is possible that the lack of differences between genders on NES may be due to a lack of differential item functioning (DIF) on this scale, which has created in others measures of emotionality significant differences by genders by the endorsement of meaningful gender-related items (e.g. Smith & Reise, 1998). In other words, items in the NES scales do not respond to specific gender-related features.

Finally, the cross-cultural analyses of the scores on the ESS by gender indicated that males in both cultures did not differ significantly in NES or PIPS, whereas British females showed a greater negative sensitivity than their Venezuelan counterparts. No previous references were found supporting these results.

Overall, the present chapter revealed interesting results suggesting a moderately different structure for the ESS when comparing two dissimilar cultures, thus indicating that there are culturally distinctive ways of conceptualising emotion. However, further research is required to expand these results, either by assessing other different cultural groups in Europe and Latin America or by assessing samples with different socio-demographic characteristics (e.g. age, working status, etc). In the specific case of the Venezuelan sample, it would be appropriate to assess different groups of undergraduates (e.g. from other universities), since the sample assessed seems to respond to specific environmental characteristics of the university, creating thus an individualistic and extremely high achievement motivation profile.

CHAPTER 10

CONCLUSIONS

The present research was aimed at constructing a new measure of emotional responsivity, entitled *Emotional Sensitivity*, and investigating its role as a moderator variable in the relationship between stress and illness. In particular, the research was aimed at studying the influence of emotional sensitivity on physiological reactivity and health status amongst individuals exposed to laboratory and naturalistic stressors.

The *transactional model of stress* has been chosen as the theoretical framework for this research, in which the personality variables have been placed as moderators in the relationship between stress and illness. Neuroticism (N), as a construct representing the individual's emotional lability, has been considered as one of these personality variables that play a fundamental role in the stress-illness process, thus receiving great attention within the model and generating a vast body of research. Nevertheless, N has been hardly questioned due to the inconsistencies of its empirical findings, which has led to criticism of both the construct and the scales developed to assess it. N is then considered to be a confounding variable in the stress-illness research. The aim of this thesis has been precisely to propose the reconstruction of the concept of N, as well as the construction of a new scale to measure it.

The biological theory of personality proposed by Eysenck (1967) describes N as a dimension that reflects the *sensitivity* of the limbic system to the external stimuli. High N scorers are then more likely than low N scorers to become autonomically aroused, and to experience distress and agitation when subjected to stress (Matthews & Deary, 1999). They are also prone to perceive life as more stressful, to cope less well, to be more dissatisfied with social supports, to have lower psychological well-being, to make more somatic complaints, and to express more anxiety, anger, sadness and disgust (Costa & McCrae, 1987; McCrae, 1990; Watson & Clark, 1984).

Despite these findings, the experimental evidence intended to support the validity of the construct has been inconsistent and equivocal, in contrast to the support the Introversion/Extraversion dimension received using psychophysiological research. Thus, the majority of studies of N have failed to show associations between this personality trait and electrocortical and autonomic nervous system arousal. In fact, the most comprehensive review of electrodermal activity studies showed only a small amount of evidence for either N/trait anxiety or state anxiety relating consistently to any tonic skin conductance level (SCL), rate of spontaneous skin conductance responses (SCRs), or amplitude and rate of habituation of event-related SCRs (Naveteur & Freixa i Baque, 1987).

Likewise, findings have shown N as a confounding variable in the stress and illness investigation, due to widely reported evidence that high N scorers are more likely to report distress, discomfort, and dissatisfaction regardless of the situation, and even in the absence of any overt or objective source of stress (Bolger & Schilling, 1991; Watson & Clark, 1984; Schroeder & Costa, 1984). Moreover, Costa and McCrae (1980) found that neurotic individuals tend to endorse more symptoms and other health complaints on conventional checklists, while Schroeder and Costa (1984) found that events that are not contaminated by N are not related to illness. In a review of the literature, Watson and Pennebaker (1989) found that N was unrelated with a variety of objective health outcomes, including immunocompetence, health-care visits, hospitalisation, cholesterol levels or health-related absences from work or school, as well as this it was also found to be unrelated to risk of death from coronary disease, other cardiovascular diseases, cancer, or all other causes combined (Almada et al., 1991). Recent evidence indicated that N was directly associated to reports of unfounded symptoms at both baseline and post-inoculation in subjects with and without colds previously inoculated with a common cold virus (Feldman, Cohen, Doyle, Skoner, & Gwaltney, 1999), as well as was also found to be unrelated to cardiovascular, neuroendocrine and immunologic parameters (Miller, Cohen, Rabin, Skoner & Doyle, 1999).

The tendency of high N individuals to report more symptoms and health complaints have limited the interpretation of findings derived from studies using self-report measures of stress and health, thus reducing the chance to test the

possible moderating effect of N. However, considering the main hypothesis that high N individuals over-react under stressful circumstances, because they tend to appraise events more negatively, and to adopt more ineffective coping strategies, which might lead to more psychological and physical disturbances, interactive effects should be expected between stress and N to validly support the hypothesis, even using self-report measures. But once again, findings in this regard have been contradictory, since some studies report interactive effects between N and physiological measures, while others fail to confirm these results.

All these inconsistent findings led Eysenck and others to seek methodological explanations. One of the explanations proposed is that the laboratory environments that have tested the hypothesised reactivity of high N subjects have been insufficiently emotionally stressful to activate the viscero-cortical system to create the effect (Eysenck, 1994; Matthews & Deary, 1999). Another possible methodological failure has been the use of "normal" samples such as the students, whose reactions are generally moderate, instead of using samples of patients whose more pronounced emotional reactions could yield clearer results. The difficulties in providing clear support for the reactivity model led Eysenck to question the model itself, noting that ..."perhaps the fault lies in a theory that is not specific enough to make precise predictions, unlike the E-arousal theory" (Eysenck, 1994, p. 186).

From the psychometric perspective, the questionnaires constructed to measure N have also been found to suffer from several shortcomings, thus worsening the problem of validity of the construct. For instance, Roger and Nesshoever (1987) reported the presence of two distinguishable factors for the EPI-N scale (Eysenck & Eysenck, 1964) labelled *Sensitivity* and *Hypochondriasis,* with only 19 of the 24-items of the N scale loading on both. A further factor analysis of the EPQ-N scale (Eysenck & Eysenck, 1975) revealed that this scale replicated only the S*ensitivity* factor included in the EPI-N, with a different pool of items comprising a second factor associated with *Moodiness* (Roger & Morris, 1991). Another significant problem affecting N is that it has been conceived in pejorative terms, with scales measuring only negative facets of emotions and leaving out the possibility to assess more positive and adaptive domains of emotionality, as expected from a measure of emotional lability. Finally, an inspection of the items

on the N scales shows them confounded with low self-esteem. These shortcomings could be resolved by expanding the construct to incorporate "emotional sensitivity", which would include both positive and negative components of emotional lability.

Considering some of the previous shortcomings, Roger (1995) has claimed that the inconsistencies reported in the stress-illness research may be a result of using personality constructs that have not been developed specifically in this context, and are therefore inappropriate. Accordingly, Roger and his colleagues proposed an alternative model based on emotion control (Roger & Nesshoever, 1987; Roger & Najarian, 1989), and two distinctive factors that emerged from this model (rumination and emotional inhibition) have already been shown to be significantly associated to physiological indices of stress, such as heart rate recovery and cortisol secretion (Roger, 1988; Roger & Jamison, 1988; Roger & Najarian, 1998).

The current research has been developed within the emotion control model, but with the specific aim at designing a new instrument to measure *emotional sensitivity* that could address the theoretical and psychometric shortcomings identified in the literature regarding the construct of N. The research has been devoted to test the role of this new personality variable as a moderator factor between stress and illness, and to expand the model of emotional style in order to validly predict changes in the stress and health relationship.

Since emotional sensitivity was conceived as a two-dimensional variable, whose positive factor is intended to describe a more functional and adaptive style of sensitivity, a revision of the construct of empathy was presented as the most related variable. Thus, chapter 1 also presented a section describing the construct of empathy and the empirical findings associated with the new variable to be described. Different theoretical models describing the components of the empathy construct were presented, and among them the *multidimensional approach* proposed by Davis (1980) was considered the most appropriate as the framework for the new positive dimension of emotional sensitivity.

Within this framework, Davis constructed the Interpersonal Reactivity Index (IRI, Davis, 1980), which assesses four different dimensions representing both the cognitive and emotional spheres of empathy. Specifically, the empathic concern scale (EC) assesses "other-oriented" feelings of sympathy and concern for unfortunate others, and has been found to be the dimension most theoretically related to a positive dimension of emotional sensitivity. The empathic concern dimension seems to describe people highly emotionally reactive but with a high ability of regulation, which protects them against becoming over-aroused in social contexts (Eisenberg & Fabes, 1992). However, two basic shortcomings were identified in the *empathic concern* scale proposed by Davis (1980). Firstly, the scale comprises only seven items, so is unlikely to provide a sufficient sampling of the possible other-oriented emotional reactions of an individual (e.g. Kline, 1993). Secondly, some of the items of the scale were borrowed from existing scales, while the author according to his own view of the construct wrote others. This may not take into account the real reactions of people in natural situations, perhaps introducing some bias in the measurement of the concept.

In summary, the necessity of a reliable and valid measure of the individual's emotional responsivity that could be used in the stress-illness research, together with the assumption that the emotional sensitivity could be a two-dimensions variable, led to the construction of the emotional sensitivity scale. The emotional sensitivity construct was thought to explain not only the negative sphere of the emotional responsivity, but also a more positive and adaptive style of sensitivity.

Thus, chapter 2 described the scale construction exercise, where undergraduate students participated at different stages of the process. Initially, a scenario technique pioneered at the University of York (see for example Forbes & Roger, 1999) was used to generate the first pool of items. A total of 14 vignettes about positive and negative events in everyday life were sent to a sample of 26 undergraduates who were asked to indicate how they would feel, think and react in each situation.

The responses yielded over 200 statements, and after rejecting inappropriate or repeated responses, a preliminary pool of 79 items remained. Exploratory factor analysis resulted in three factors, so an initial three-factor terminal solution was

attempted using Varimax orthogonal rotation. This resulted in 38 items on factor 1, 12 items on factor 2, and 9 items on factor 3. Both factors 1 and 3 comprised items describing negative feelings and emotions, except that the items in factor 3 referred to these feelings mainly in social situations. Factor 2, comprised items related to sensitivity toward others. Considering that factors 1 and 3 were describing similar emotions, all related to negative reactions although in different contexts, and that factor 3 comprised just a small sample of items, a two-factor terminal solution was performed. This procedure clearly resulted in 40 items comprised in factor 1 and 15 items comprised in factor 2.

After removing inter-correlated and double-loading items, a final two-factor terminal solution was carried out resulting in 41 items, 27 comprised in factor 1, and 14 items in factor 2. Factor 1 grouped items referred to individuals' negative emotions and reactions such as helplessness, vulnerability, apprehension, self-criticism, upset and anger, then named *Negative Emotional Sensitivity* (NES). On the other hand, factor 2 comprised items, which referred to concern about others' emotions and well-being, and intentions to help others facing problems, so describing an "other-oriented" emotional sensitivity. This dimension was therefore labelled Positive Emotional Sensitivity (PES). Both factors were found to be internally consistent and had adequate test-retest reliability over an inter-test interval of eight weeks.

The gender differences for NES and PES replicated previous findings regarding related variables, since females showed both higher positive and negative sensitivity than males (Bryant, Yarnold & Grimm, 1996; Carter & Loo, 1979; Eysenck, 1958; Eysenck & Eysenck, 1978; Eysenck, Eysenck & Barrett, 1985; Smith & Reise, 1998), as well as higher empathy (Davis, 1980; Mehrabian and Epstein, 1972; Hoffman, 1977; Eysenck & Eysenck, 1978; Eysenck, Pearson, Eastig & Allsop, 1985; Martin et al., 1996; Mehrabian & Epstein, 1972).

The two scales were found to be low positively correlated. However, the very small magnitude of shared variance (4%) suggested that they were conceptually independent. The presence of a small component of emotional involvement with others' problems in the positive sensitivity factor probably explained the relationship, which was considered an issue that deserved further investigation.

Thus, having constructed the ESS, and having established the reliability of its factors in chapter 2, chapter 3 examined their concurrent validity. The concurrent validation of the ESS was based on comparisons with well-established measures of different aspects of personality. Overall, the results supported the two-factor structure of the ESS, since both dimensions correlated significantly with conceptually similar constructs. Nonetheless, some results deserved special attention, since they emerged in the opposite direction from that predicted especially for the positive factor.

Regarding the NES scale, correlations resulted significantly positive with N (NEO-FFI), personal distress (IRI), rumination (ESQ), and the pessimism scale` (PANEQ). Likewise, highly positive correlations were found between NES and emotional and avoidance coping, while at the same time correlating inversely with rational coping, as expected. The NES dimension was also shown to be theoretically dissimilar from constructs such as extraversion, agreeableness, conscientiousness, optimism and fighting spirit, thus showing that high negative emotional sensitivity individuals tend to be less contented, sociable and sympathetic, as well as having less positive expectancies about present and future outcomes.

Overall, the concurrent validity study supported the NES scale, showing it as a measure of the tendency to experience high negative emotional reactivity or negative emotional arousal. Interestingly, NES and NEO-FFI-N shared just around 43% of common variance, suggesting that the NES scale measured a construct somewhat distinct from N.

Regarding the PES scale, some of the results were in the expected direction, since positive correlations were obtained with different measures of empathy (I_7 – Empathy, EC and QMEE), especially with the empathic concern scale. This was consistent with the assumption that PES was a measure of other-oriented emotionality and sensitivity to others' emotions. The magnitude of the correlation with the empathy measures indicated a degree of overlap with this construct, but the range in the correlations indicated that PES constituted a more broadly defined index. The PES scale also resulted positively related to the extraversion and agreeableness scales, perhaps owing to shared components of sociability,

sympathy with others, and willingness to help. Likewise, high PES individuals tended to express and show their feelings and emotions more openly, due to the inverse correlation of the scale with the emotional inhibition scale (ESQ) and to the positive correlation with the emotional expressivity scale (EES).

Despite these congruent findings, the concurrent study also showed some unexpected results for the PES scale. Specifically, the correlation with the negative affectivity/pessimism scale (Olason & Roger, 2001) was significantly positive, as well as the correlation with the personal distress scale (PD – Davis, 1980), while the correlation with the CSQ- detachment scale (Roger, Jarvis & Najarian, 1993) resulted negative. A possible explanation of these findings was some confounding effect of the PES measure by the inclusion of items describing feelings of discomfort, upset and worry about others' emotions and well-being. Results of the concurrent exercise then, supported only partially the validity of the PES construct.

In order to expand the validation process of the ESS, two experiments were carried out and results were presented in chapter 4.

Thus, Experiment I tested the validity of the NES scale in predicting cardiovascular reactivity in individuals exposed to aversive stimuli. The hypothesis for the negative dimension of the ESS was that high NES individuals would show a higher physiological reactivity when exposed to stressful or aversive stimuli, compared to low NES individuals. Additionally, high NES subjects were expected to show a slower habituation to the aversive stimuli, compared to their low counterparts. Finally, the groups were expected to differ in their rating of the emotional stimuli, with the high NES group scoring the stimuli as more stressful than the low group. Accordingly, high and low NES scored individuals were identified and both groups were exposed to stressful and non-stressful slides, using the Affective Picture System (IAPS – Lang, Bradley & Cuthbert, 1999). The physiological reactivity was measured using the blood pressure (systolic and diastolic) and heart rate indices, and subjects were tested in four stages during the experiment, as follows: baseline stage, experimental condition, habituation, and recovery phase. Analyses were made for both genders and cardiovascular indices separately.

In summary, the data from Experiment I did not support the reactivity hypotheses for the high NES group, and some considerations about the experimental design were presented as possible explanations for the unexpected results. Firstly, the stimuli chosen as "emotional" or "aversive" did not seem to have provoked the expected physiological reactions in the high NES group, since they were not rated as "more stressful" by this group, compared to the low NES group. Using the IAPS stimuli to test the interactive effects of neuroticism and controllability/predictability on physiological responses, Vogeltanz and Hecker (1999) similarly reported a main effect for neuroticism, but no interaction effect, and suggested this may have been due to the weak intensity of the IAPS pictures. In fact, Eysenck and Eysenck (1985) have pointed out that some of the inconsistent findings reported in the research of psychophysiological differences as a function of neuroticism ..."may lie in the persistent use of insufficiently stressful conditions" (pp. 234), as well as on the nature of the stimulus, since different stressful stimuli provoke different reactions among high anxiety subjects (Eysenck, 1994).

Another consideration about the nature of the stimuli was stated, which referred to the kind of physiological responses activated by different stimuli. Specifically, the kind of stimuli manipulated in the experiment (e.g. emotional pictures) have been reported to activate changes in the vagal tone, with subsequent decreases in the heart rate, and the descriptive data in fact showed this trend.

Finally, a possible explanation for the equivocal findings was that the participants in this experiment had been exposed several weeks before to the same set of stimuli, which may have created a habituation effect, and hence a decrease in their cardiovascular reactivity. Unfortunately, this was a situation that passed unnoticed throughout the experiment, thus contaminating the results.

In sum, data from Experiment I did not support the reactivity hypotheses, but in light of the previous methodological considerations it was clear that they could not be used properly to test the predictive validity of the NES scale. All these shortcomings were in fact addressed in the next experiment of cardiovascular reactivity (experiment III) presented in chapter 6.

The experiment II reported in chapter 4 tested the predictive validity of the PES scale. The hypothesis was that high PES individuals would be more able to recognise emotional expressions on people's faces, than low PES individuals. Having scored high and low PES subjects among a sample of volunteer undergraduates, a test for the recognition of emotional expressions on faces (Ekman & Friesen, 1975) was used to test the hypothesis.

Despite that the trend of the data was shown in the expected direction, results of the experiment did not support the hypothesis regarding the higher ability of high PES subjects to accurately recognise emotions on people's faces, compared to their low PES counterparts. Again, a methodological consideration was stated as a possible explanation of the results, which referred to the speed of the stimuli exposure that is necessary to evoke the emotional responsiveness. In the case of the experiment II, the photographs were presented for a period of 5 sec., and according to Martin et al. (1996) the emotional sensitivity response can be provoked with presentations as short as 12 to 72 milliseconds. Longer presentations are likely to activate a "knowledge-by-description" response, which is a cognitive rather than an emotional response. This may have caused the non-significant differences in the response rate between the high and low PES groups, and as a result was an issue addressed in a further experiment.

Even though the limitation of the experimental design could be assumed as a sufficient explanation for the lack of difference between the groups in the recognition of emotions, the fact that the concurrent validation study yielded contradictory findings for the PES scale was also acknowledged. As mentioned earlier, some items in the scale were identified as confounders for the validity of the construct, yielding opposite results from those expected. These elements were interpreted as a necessity for the scale to be revised and its validity to be tested again, addressing the shortcomings identified in the previous chapters. Thus, the next two chapters (5 & 6) were dedicated to developing the revision of the ESS, mainly focusing on the PES scale, as well as on the performance of a new series of experiments to test the predictive validity of the revised questionnaire.

Accordingly, chapter 5 presented the results of the revision of the ESS, which included not only a new scale construction exercise, but also a new concurrent validity study. Furthermore, a confirmatory factor analysis was performed as an essential part of the validation of the revised scale.

The scale construction started with a new scenario study, which was used to generate the new pool of items to be tested for the revised scale. The scenarios were referring to events designed to elicit responses such as concern, sympathy, compassion, understanding and helping behaviours, in order to expand the range of emotional reactions toward others already included in the former version. After several factor analyses of the preliminary version, the two-factor terminal solution provided the best structure for the revised scale, which grouped in total 43 items. The first factor comprised 28 items related to the tendency to react with negative emotions to environmental changes, especially with anger, frustration, vulnerability and self-criticism. The structure remained almost identical to the one identified in the former NES scale with just minimal differences, and because the items were referred mainly to the self, the scale was renamed *Negative Egocentric Sensitivity* (NES). One the other side, major changes resulted in the structure of the positive scale as expected, which finally included 15 items referring to reactivity to other's emotions, concern about others in interpersonal settings, and empathy for the other's well-being. This revised scale was labelled *Positive Interpersonal Sensitivity* (PIPS).

The main difference between the two versions of the positive scale was that the former version included an element of negative emotionality, particularly personal distress (Davis, 1980; 1983; Eisenberg et al., 1994; 1998), with items referring to feelings of upset and uneasiness in front of stressful events involving others' emotional reactions. The presence of these items created a confounding effect in the validation studies reported in chapters 3 & 4, and the aim of the revision was precisely to clarify the structure of the scale. As a result, the emphasis in the revised version was primarily with *empathic concern* about others' well-being, but without the distress arising from becoming identified with their emotional state. The factors in the revised ESS were highly internally consistent, had high test-retest reliabilities and were statistically orthogonal.

Interestingly, the gender effects for the revised scales were slightly different from those observed with the previous ESS, since males and females did not differ significantly in their scores on the new NES. This finding produced surprising results and opposite to those typically reported in the literature, where women tend to show a higher score on N or negative affectivity measures than men (Heaven & Shochet, 1995; Lynn & Martin, 1997; Martin & Kirkcaldy, 1998; Roberts & Gotlib, 1997). Although, it is not possible to state whether this gender difference has been an authentic one, or a result of a methodological flaw in the typical negative affectivity measures, which were identified as suffering from the differential item functioning –DIF- (Smith & Reise, 1998), at least the negative emotional sensitivity seems to be independent of gender. It would be necessary to expand this result by studying different samples other than students, to arrive at a definitive conclusion about this issue.

Regarding the new PIPS scale, results replicated typical findings about the higher ability of women to sympathise and to be more sensitive towards others than men (Davis, 1980; Eysenck & Eysenck, 1978; Eysenck, Pearson, Eastig & Allsop, 1985; Hoffman, 1977; Lennon & Eisenberg, 1987 for a review; Martin et al., 1996; Mehrabian & Epstein, 1972). This means that women show generally a higher disposition to recognise and understand the feelings and emotions of others, to display concern about their well-being and to be willing to help others coping with difficult circumstances. This higher sensitivity has been described as a functional and adaptive personality characteristic for the interpersonal adjustment and social functioning of individuals (Eisenberg & Fabes, 1992), who are thus considered highly socially and emotionally competent.

As part of the revision, the new ESS scales were submitted under a new concurrent study, where similar and dissimilar variables were used as criterion. The hypotheses of this study were that the revised positive scale would be positively related with measures of empathic concern and other-oriented emotionality, while the negative scale would be associated with measures of negative emotionality. Furthermore, the PIPS scale was expected to show very low and non-significant correlations with scales measuring negative affectivity, as these correlations resulted in providing significant data for the former positive scale and were therefore considered as evidence of its confounding effect.

One of the biggest concerns of the former PES scale was its relationship with the detachment scale, showing that the individuals identified as high PES scorers also had the tendency to cope emotionally with stressful events. Since the positive scale had been conceived as a measure of adaptive emotionality, and individuals identified as high scorers in this scale were expected to recognise the others' emotions and sympathise with people dealing with difficult circumstances, but avoiding being over-involved in their emotions, the correlation with the detachment scale was expected to be positive or at least near zero. In this last scenario, it would be possible to identify two groups of high positive sensitivity individuals, one who showed concern about others' feelings and well-being, but not over-involving themselves in the same emotions, and another who showed the same concern and understanding, but actually without engaging in the emotions of the others. A group of individuals such as the latter might be considered as highly emotionally adjusted in interpersonal settings, as well as highly functional to work in health and social services.

Results of the concurrent study were very encouraging, since they all were in the expected direction supporting the hypotheses for both scales. For example, the PIPS scale correlated highly positively with empathic concern (IRI - Davis, 1980), while showing no relationship with measures of negative emotionality/affectivity, thus confirming that the small component of this construct that was part of the former scale had been successfully removed as a consequence of the revision. More importantly, the new PIPS scale showed no relationship with the detachment scale from the CSQ (Roger, 1996), as expected. This result supported the hypothesis that among high PIPS scorers it is plausible to identify two groups of individuals, one able to emotionally detach from the stressful situations, and the other who are not able to disengage themselves from the distress and are then likely to get involved in the negative emotions of others whose situation they sympathise with. In the context of the stress and illness research, the individuals high on PIPS and detachment are expected to show a greater positive adaptation under stress, and a greater level of well-being, with fewer implications for their health. The possibility to identify such groups may be an important contribution to the study of the individual differences, especially in applied settings like consulting and clinical psychology where it is essential to identify professionals with highly functional resources to work with the distress

and suffering of others. Although beyond the scope of this thesis, further studies combining these variables and testing their contribution to health outcomes seems to be the next stage in this investigation.

Another interesting result of the new concurrent validation study, was the very low and non-significant correlation between the PIPS and moods scales, and so with self-esteem. Even though these results support previous findings regarding the validity of the emotion perception threshold measure (Martin et al., 1996), they were interesting in suggesting that high positive sensitivity individuals can be identified either as having high or low positive/negative moods, which would may depend on the extent of their emotional involvement with others facing stressful circumstances. The same applies for self-esteem. The implications for psychological health and for the social adjustment this combination of personality variables could have for each group are still to be determined, and should be the subject for future studies.

Since the NES scale was slightly affected by the revision of the positive scale, and resulted in a new 28-item scale, the concurrent validity study included a new series of criterion variables to test against its validity. Overall, the results were highly consistent with the expectations, that the NES scale would be positively related to measures of negative emotionality and affectivity.

For instance, the scale correlated highly positively with the total N score and with the sub-scales of social sensitivity and hypochondriasis (see Roger & Nesshoever, 1987) from the EPI (Eysenck & Eysenck, 1964). However, the results indicated that the EPI-N and the NES scale shared around 64% of the common variance, which made the measures significantly different. Specifically, while the N scale contains a clear and discriminable component of hypochondriasis, with items openly referred to health symptoms, the NES scale does not comprise such kind of items. On the other hand, many of the items in the N scale are referred to negative feelings and emotions triggered in interpersonal settings, while items in the NES scale describe similar emotions but in no specific contexts, in other words, generalised negative emotions. In summary, the NES scale was shown to be a measure of negative emotional responsivity, with a homogenous and uni-dimensional structure, and with items

not confounded with health symptoms or social anxiety. Similarly, the correlation with the NEO-FFI-N, although highly positive, showed the scales sharing only around 38% of common variance, indicating the differences between the scales.

The new concurrent exercise also showed, as expected, that the new NES scale was low correlated with self-esteem, in contrast to the traditional N scales which are highly confounded with low self-esteem (e.g. Roger et al., 2000). A comparison of the magnitudes of the correlations between the NES, the NEO-FFI-N and self-esteem scales, respectively, gave clear support to this statement, indicating thus the stronger validity of the NES scale in measuring negative lability, and the possibility to use this new scale reliably in the context of the stress and illness research.

Finally, a result that deserved further attention was the highly positive correlation between the NES and the emotional inhibition scales. Thus, highly negative sensitivity individuals were shown also to inhibit or "bottle up" their emotions when dealing with the environmental demands. Maybe, the egocentric approach to their own emotions, makes them more reserved and private, as a way of avoiding the social contingencies associated with the expression of frequent negative feelings. Whatever the reason for such a combination of personality characteristics, it seems clear that this might be a very harmful emotional style because of its negative implications on health and well-being.

Overall, the results of the concurrent validation study presented in chapter 5 were very encouraging in demonstrating the theoretical validity of the revised Emotional Sensitivity scales. The last stage of the validation study using psychometric methods was the confirmatory factor analysis (CFA), aimed at confirming the two-factor structure of the ESS using structural equation modelling, which offered a more rigorous procedure for assessing the adequacy of models derived from exploratory techniques.

The confirmatory factor analysis confirmed the two-factor structure of the ESS as an adequate description of the data. The pattern of goodness-of-fit indicators were significantly better for the two-factor solution than for the competing one-factor model, and the nested two-factor model had a significantly lower chi-

square value than the one-factor model. In summary, the CFA confirmed that the construct of *emotional sensitivity* comprised two dimensions of negative egocentric and positive interpersonal sensitivity.

The first part of this thesis (chapters 2-5) dealt with the construction and validation of a new scale to measure emotional sensitivity, as a necessity for the personality and individual differences field to have a reliable measure of emotional lability. The construct of neuroticism –N- was found to suffer from several theoretical and psychometric shortcomings, and the first task of this research was precisely to provide a revision of the construct, as well as a valid measure of the variable to be tested later as a possible moderator in the relationship between stress and illness. As the first version of the scale proposed in this thesis was found to suffer from some limitations, based on some experimental and psychometric inconsistent findings (chapters 3 & 4), a revised version of the instrument was provided and results from new validation studies confirmed the adequacy of its structure. The research progressed then, from this stage to the assessment of the predictive validity of the revised scales, both using new experimental data and health indices measured in natural settings, especially in individuals under stress.

Thus, chapter 6 presented the results of two experiments, the first one aimed at addressing the methodological shortcomings identified in experiment I, and the second experiment aimed at testing the predictive validity of the revised positive sensitivity scale. Specifically, experiment III tested the negative egocentric sensitivity dimension (NES) as a predictor of cardiovascular reactivity to stress, using the Stroop test as a stressful task. Measures of mood and state anxiety were taken during the experiment to allow comparisons between and within the groups. The results of this experiment were very encouraging, and strongly supported the hypothesis that high negative egocentric sensitivity individuals are more reactive to stressful tasks than their low counterparts. They also supported the validity of the NES scale in discriminating among high and low NES individuals. Overall, these results supported the largely investigated reactivity hypothesis that states that high N individuals are likely to show higher physiological reactivity in front of stressful conditions, compared with low N individuals. However, as repeatedly reported throughout this research, evidence

for this hypothesis had been equivocal and inconsistent, and both the psychometric shortcomings of the N scales, and the inappropriate experimental designs to test it, had been suggested as possible explanations. The revised NES scale seems, thus, to have addressed systematically these shortcomings, becoming a reliable scale to measure the negative emotional responsivity of the individuals. The experiment showed, as well, the adequacy of the design to test the reactivity hypothesis. Regarding the mood measures, results indicated that high NES individuals tend to show less energetic arousal at both the beginning and the end of the experimental session, suggesting a general state of low vigour and energy.

On the other hand, the experiment IV was performed to test the predictive validity of the revised Positive Interpersonal Sensitivity scale (PIPS), in discriminating individuals who were able to recognise more accurately facial emotional expressions on others. Specifically, high PIPS scorers were hypothesised as more able to quickly recognise emotional expressions on people's faces than low PIPS scorers. Thus, using a computer-based program to display pictures of faces with different emotional expressions at a very fast speed, high and low PIPS subjects previously assessed with the revised positive scale were tested on their ability to recognise emotions.

Although the high PIPS group performed statistically better than the low PIPS along the whole experiment for facial recognition, the detailed analysis of the pictures resulted in the high PIPS group recognising more accurately the "sadness" emotion. This result might be then a further indication that the new scale actually measures the ability of individuals to quickly recognize and sympathise with the suffering of others, mainly through the identification of their negative emotions.

As with the negative scale, results of this experiment were very encouraging, and clearly supported the hypothesis that high positive sensitivity people recognise more accurately different emotional expressions on others, compared with low positive sensitivity people. Specifically, high PIPS individuals showed a greater ability to identify emotions in others with just very short exposures, thus indicating their higher sensitivity towards the emotional expressions of others. When the

responses to the specific emotions were analysed, high PIPS individuals were shown also to be significantly more sensitive to the expressions of sadness than the low PIPS, which was a result highly congruent with the construct proposed for positive sensitivity as a kind of other-oriented emotionality.

In sum, the results of the experiment IV strongly supported the predictive validity of the PIPS scale as a measure of other-oriented sensitivity. Likewise, these results were highly congruent with findings reported for related constructs such as empathy/sympathy (Eisenberg & Fabes, 1992; Eisenberg et. al, 1998) and emotion perception threshold (Martin et al., 1996).

The experimental results provided in chapter 6 differed substantially from those of the first two experiments, since the former strongly supported the hypotheses for the negative and positive dimensions of the emotional sensitivity construct. However, these results could be only reached when the limitations initially observed for the scales were addressed, and a revised scale was proposed. Considering the latter results of this research, the revised ESS could be then assumed as a valid and reliable measure of the individual's emotional sensitivity, represented by two independent scales for negative and positive emotional sensitivity, respectively. Specifically, the NES scale describes a negative self-oriented sensitivity, which reflects the tendency of the individuals to react to the environmental demands with negative emotions, especially referred to the self. This individual characteristic was considered to be dysfunctional for the interpersonal and environmental adaptation, because of its presumabled consequences over the physical and psychological well-being. The following part of the research was precisely devoted to test this hypothesis.

On the other hand, the PIPS scale is intended to be a measure of other-oriented emotional sensitivity, which assesses the tendency of individuals to recognise and sympathise with the emotions and feelings of others, showing concern and disposition to help them if necessary. Even though the positive interpersonal sensitivity was not expected to affect directly the individual's health, it was supposed to act differentially over well-being and adaptation depending on its joint effect with other personality variables, as for instance the stress coping

styles. This hypothesis was also tested in the last part of this research, and results were presented in chapter 7.

Thus, having constructed and validated the ESS using psychometric and experimental methods, the last part of the thesis was dedicated at assessing the relationship between the emotional sensitivity dimensions and health outcomes. Specifically, chapter 7 presented the results of several analyses where the emotional sensitivity dimensions were used as moderator variables in the relationship between stress and health. Two different samples of undergraduate students participated in various studies, where their scores on emotional sensitivity were analysed together with other personality variables, such as rumination, emotional inhibition and coping styles. Indices of perceived stress, and physical and psychological health were used as the independent and dependent variables, respectively, for the analyses. The students were assessed before (time 1 – T1 hereafter) and after a period of adaptation to the university (time 2 – T2 hereafter), and the data were analysed at both the descriptive and the inferential levels, using multiple regression equations (see Baron & Kenny, 1986).

Overall, the exploratory analysis showed that NES emerged as the strongest predictor of self-reported physical and psychological health status at T1, especially because of its highly positive association with physical and chronic symptoms, psychological complaints, depression and anxiety. However, these effects were not sustained at the follow-up assessment, since NES did not add additional explanation to the variance after the initial values of the health indices were controlled for. Possible reasons for this effect were the invariance between the health indices from T1 to T2, as well as the reduced sample size for the follow-up measurement.

Results for PIPS generally supported the hypothesis that a direct relationship with health indices would be unlikely to exist, although interesting results emerged from the data. For instance, the relationship with the depression index resulted in inconsistent findings from T1 to T2, since the variables were shown to be inversely correlated at T1, but with a tendency to be positively related at T2. This latter result was more congruent with the literature that has reported the

tendency of high empathic people to be more depressed, especially in the absence of certain personal resources and defences (Bonino & Giordanengo, 1993; Schieman & Turner, 2001).

Likewise, the PIPS scale predicted significantly higher scores on the anxiety scale at T1, but a further exploration showed that this effect was moderated by the use of detached coping. This means that only the individuals who were high positive sensitive, but at the same time low detached, scored higher on the anxiety scale. Meanwhile, their counterparts who managed to keep themselves detached from the stressful situations, and maybe from the emotions of others, were those that kept their levels of anxiety at a minimum. This result supports the hypothesis stated in the frame of the emotional control model (e.g. Roger et al., 2000), where high positive sensitivity people who are also able to cope with the situations in a detached way, were hypothesised to fell less distressed, and ultimately less physically and psychologically affected. Similarly, Eisenberg and colleagues (Eisenberg & Fabes, 1992; Eisenberg et al., 1994) predicted such a result when they described the influence of emotional regulation and perspective taking on the functionality of empathic concern.

Despite the interesting results mentioned previously, the aim of the health study was to determine the moderating role of the emotional sensitivity dimensions in the relationship between stress and illness. As expected, NES was shown to moderate the relationship between perceived stress and the report of physical and psychological symptoms at T1, thus indicating that high NES individuals, who also perceive high levels of stress, report the highest intensity of physical and psychological symptoms during a period of adaptation. This result strongly supports the hypothesis that negative egocentric sensitivity acts as a dysfunctional personality characteristic that compromises the physical and psychological well-being of individuals, promoting an overreaction to the stressful demands.

Regarding the moderating role of PIPS, results suggested that high positive interpersonal sensitivity could increase the report of chronic symptoms in individuals under stress, but that this relationship was at the same time moderated by the coping styles adopted by the individual. Specifically, those with

high positive sensitivity, but who tended to use a less detached coping style, were the most affected by the chronic symptoms, compared to those who tended to cope in a more detached way with the stressful circumstances. Perhaps, the individuals who show high sympathy, concern and sensitivity towards the others' well-being need to protect themselves from getting involved in their distress by using more detached coping, and by dealing with the situations with a sense of perspective, which in turn reduces the impact of the stressful environment over their physical health. This result supports previous findings about the negative impact of empathy over health, when personal resources such as coping, self-esteem or locus of control are not playing an interactive role to protect individuals against an over-involvement with the distress of others (Bonino & Giordanengo, 1993; Schieman & Turner, 2001).

On the other hand, the correlations between the ES scales and coping styles resulted in the expected direction. Specifically, high NES subjects used significantly more avoidance coping, while being less prone to use rational or detached coping. These results support previous findings about the maladaptive ways of coping generally shown by high *N/NA* individuals (e.g. Bolger, 1990; Deary et al., 1996; Endler & Parker, 1990; Kardum & Krapić, 2001; McCrae & Costa, 1986; Parkes, 1986, 1990). *In contrast*, the correlations between the PIPS scale and coping styles were not significant, thus indicating that the individuals with high positive sensitivity are not characterised by any specific way of dealing with the stressful demands. However, as reported previously, being high PIPS and using a more emotional or detached way of coping with the stress seems to have a different impact over health, that could be considered harmful in the first case, and protective in the second.

When the moderating effects of coping in the relationship between emotional sensitivity and health status were analysed, results indicated that the impact of the coping styles was quite weak or even non-significant, once the effects of the emotional sensitivity dimensions were controlled for. In other words, the emotional sensitivity showed a stronger impact over health than the coping styles, especially on psychological health, suggesting that this personality variable plays a more determinant role in the individual adaptation and health outcomes. This finding is in line with earlier research, which had failed to find any

mediating effects of coping in the relationship between optimism/pessimism and well-being (e.g. Khoo & Boshop, 1996; Long & Sangster, 1993; Olason, 2000; Scheier et al., 1989), and in fact the coping literature is now being criticized and revised because of the inconsistent findings regarding the role of coping on health and adaptation (Coyne & Racioppo, 2000; Somerfield & Mc Crae, 2000; Lazarus, 2000). Maybe, one of the explanations of these inconsistencies lies in the use of coping scales that have been found to suffer from several psychometric weaknesses, as is the case of the COPE questionnaire (Carver, Scheier & Weintraub, 1989), thus limiting the full understanding of the role of coping styles in the health and illness process.

An investigation of the interactive effects of the emotional sensitivity dimensions with rumination and emotional inhibition in predicting health status showed that NES contributed additionally in explaining the variance of worse health, even after taking into account the scores on rumination. Although the interaction between NES and rumination did not reach significance and the moderation effect could not be supported, NES seems to impact the individual's health independently of rumination, although to a much lesser extent.

Finally, analyses of the follow-up measures (T2) showed that the effects of the emotional sensitivity dimensions were not sustained over time. However, definitive conclusions about this effect could not be provided either, since some methodological limitations were identified in the follow-up study, and results had to be regarded as preliminary.

Overall, the health outcomes study presented evidence that the negative egocentric sensitivity (NES) impacts negatively on the physical and psychological well-being of students undergoing a process of adaptation to the university, not only acting directly over their health status, but also interacting with their levels of perceived stress to create a more pervasive effect. On the other hand, positive sensitivity showed not to affect health directly, however, its influence seems to be protective when individuals use a detached coping style to deal with stress.

Having constructed a new scale to measure emotional sensitivity, as well as having some consistent evidence that the negative sensitivity scale validly

predicts a higher vulnerability of individuals to report physical and psychological complaints when experiencing stressful events, an interesting issue to investigate was whether the ESS would replicate its two-factor structure in a culturally different sample. Thus, a cross-cultural investigation of the ESS was carried out with a sample of Spanish speaking undergraduates (Venezuelans), where the exploratory factor analysis of the scale was complemented by a confirmatory factor analysis, and a concurrent study. Furthermore, the validity of the Spanish scales in predicting the report of health complaints amongst the students was also investigated as part of the cross-cultural analysis.

Accordingly, the next two chapters (8 & 9) reported the psychometric analysis of the Spanish ESS, which was not only translated, but the items submitted to a new exploratory and confirmatory factor analysis, in order to determine whether or not the structure would replicate the original one obtained with the British sample. Also, a study incorporating health indices was performed with the Spanish sample with the aim at assessing the contribution of the ESS scales in predicting health changes along a period of adaptation at the university. Finally, a comparison of the scores obtained by the British and Venezuelan groups on the different scales was performed and reported.

Previous findings had reported cross-cultural comparisons of personality scales (e.g. Barret & Eysenck, 1984; Church, 2000; 2001; Costa, Terracciano & McCrae, 2001; Eysenck & Eysenck, 1983; 1985; Linn & Martin, 1995; McCrae, 2001; Roger et al., 2001), and the specific N scale had been shown to replicate almost identically in different cultures and age groups (McCrae, 2001; Eysenck & Eysenck, 1985), suggesting the presence of a *universal trait* which transcends the cultural differences. This detailed analysis is only possible if the items of the translated scales are submitted to a factor analysis that makes it possible to determine the resemblance of the scales structure. Accordingly, the preliminary 81-item version of the ESS was translated into Spanish and then back translated into English, and after resolving discrepancies a final form was produced. 419 Venezuelan 1st. year college students completed the ESS, together with other scales measuring personality variables and health indices.

The exploratory factor analysis yielded a structure of three factors for the Spanish scale, slightly different from the English version. Thus, while the negative and the positive scales replicated very closely the original ones, with the *Negative Egocentric Sensitivity* scale (NES) comprising 22 items, and the *Positive Interpersonal Sensitivity* scale (PIPS) comprising 13 items, a new third factor grouping 10 items appeared in the scale. The items in the third factor described a tendency to keep distance and not being involved with people dealing with difficult circumstances and with their emotions, so the factor was labelled *Emotional Distancing* (EMDI). The structure of the Spanish ESS suggested then, that the emotional sensitivity of the Venezuelan students was also expressed by the restraint from the emotionality of others, as a way to avoid getting involved with their negative reactions when these people are experiencing stressful situations.

Thus, a cultural difference appeared in the emotional sensitivity of the Venezuelans, who showed that the restraint and avoidance of the other' emotionality is also a way of dealing with the emotions emerged in interpersonal settings. This new structure was revealing in the light of the bi-dimensional structure of the emotional sensitivity construct proposed from the beginning of the research, and was then considered an interesting issue for future research and a source of new explorations, especially for the implications that this emotional style might have over social adjustment and psychological health. However, it should be bom in mind that the presence of cultural differences in personality measures, and especially in questionnaires assessing emotional styles had been already reported (e.g. Eid & Diener, 2001; McConatha, Lightner & Deaner, 1994; Oatley & Jenkins, 1996; Roger et. al, 2001). The fact has also been acknowledged that the expression of the personality characteristics might be different from one culture to another, and that some new dimensions that are culture-specific might emerge from universals or higher-order factors (Church, 2001; Markus and Kitayama, 1998). According to this statement, it could be assumed that the negative and positive emotional sensitivity dimensions might be higher-order factors of emotionality, while the emotional distancing dimension might be a culture-specific characteristic of the emotionality among the Venezuelans.

The intercorrelations among the Spanish ESS dimensions showed that the NES and PIPS factors were independent and orthogonal, while significant correlations resulted between these two and the EMDI scale. Specifically, EMDI correlated positively with the NES scale, while correlating inversely with PIPS. Despite the low magnitude of the correlations, these associations showed that the EMDI scale was sharing some elements of negative emotionality, while described a negative tendency to empathise with others' emotions. On the other hand, the scales were found highly internally consistent and with an acceptable test-retest reliability.

To further explore the structure of the Spanish ESS, a confirmatory factor analysis was performed using the same data available from the sample of Venezuelan college students. Results confirmed the three-factor structure for this scale, which in summary confirmed the different factorial structure of the ESS for a culturally dissimilar sample. However, this result had to be regarded as preliminary, since a definitive conclusion about the factor structure of the scale could be only reached if the CFA would have been performed with a different sample from the original used for the exploratory analysis.

The concurrent study showed the NES scale highly correlated to measures of negative emotionality, as well as the EMDI scale, but to a lesser extent. This latter result confirmed the hypothesis that the emotional distancing was a kind of negative sensitivity, but mostly related to the way of dealing with the emotions of others. Contrarily, the PIPS scale was shown to be an expression of sympathy and empathic concern. Regarding the gender differences, the Venezuelan females showed a higher interpersonal sensitivity than the males, while males showed a higher emotional distancing.

Finally, the study investigating the validity of the ESS scales in predicting health outcomes in the Venezuelan sample showed that the NES dimension was the strongest predictor of physical and psychological health deterioration after a period of adaptation to the university, even after controlling for the initial values of the indices. However, this result was only significant for the male group, indicating that the effects of the negative egocentric sensitivity were more pervasive in males than in females. This gender difference deserves special

attention, since findings have shown repeatedly the higher tendency of women to report negative affects and emotions, compared to men (e.g. Costa, Terraciano & McCrae, 2001; Eysenck & Eysenck, 1978; Eysenck, Eysenck & Barrett, 1985; Heaven & Shochet, 1995; Lynn & Martin, 1997; Martin & Kirkcaldy, 1998, Roberts & Gotlib, 1997), as well as their higher vulnerability and stronger tendency in reporting health complaints (Gijsbers van Wijk & Kolk, 1997; Pennebaker, 1982; Verbrugge, 1985). This finding will be discussed in detail in the frame of the comparison between the British and the Venezuelan college students, where the properties of the NES scale will be considered as determinant for this effect.

Having analysed separately the data from two culturally different samples with regard to the validity of the ESS, the final and obvious step of this research was to perform a comparison of the groups. Thus, chapter 9 addressed this issue by comparing the structure of the two versions of the scale, the results of their respective concurrent validation exercises, and finally the scores on the positive and negative emotional sensitivity scales of the two groups.

The cross-cultural comparison showed that the two main dimensions of sensitivity - negative and positive - replicated very closely in the British and Venezuelan undergraduate groups. However, the Spanish version of the ESS yielded a third factor for emotional sensitivity in the Venezuelan sample, describing a tendency to disengage oneself and keeping distance from the other's emotional reactions (emotional distancing). Thus, the Venezuelans drew a clear distinction between the concepts of emotional distancing and empathy, which did not emerge amongst the British students, then suggesting for the Venezuelans that being emotionally sensitive toward others does not mean necessarily getting involved with them. The structures of both scales were also confirmed by using CFA methods. Overall, the structures of the British and Spanish versions of the ESS were moderately different, and it is essential to carry out more investigations using different cultural groups in order to check whether one of these scale structures replicates. According to these findings, the negative and positive sensitivity dimensions might be considered higher-order factors of emotionality, while the emotional distancing might be regarded as a cultural-specific expression of the emotional sensitivity of the Venezuelans, which is displayed in interpersonal settings.

Whether the emotional distancing is a particular feature of the emotional expression of the Venezuelans, or if is also a characteristic of other culturally similar groups (e.g. Latin American people), is unknown at this stage of the research, but further investigation is necessary in order to determine the exact hierarchy of this personality dimension. Likewise, the impact of this dimension over adaptation and social functioning should be investigated to better understand its nature.

When the scores on the negative and positive scales were compared for both groups, analyses revealed that the British students experienced significantly more negative emotional sensitivity than the Venezuelans, but at the same time showed a greater ability to perceive, concern and sympathise with others' emotions. This result was quite intriguing, since it contrasted with the popular notion about the greater sociability, openness and empathic style of the Latino populations. However, this result might respond to the specific profiles of the samples under study, and should not be assumed as general characteristics of the British and Venezuelan undergraduates, until more data are available from similar groups. At the same time, more investigation is necessary to confirm this pattern of results using groups with different ages, occupational and cultural backgrounds.

What resulted in similar findings in both cultures was the greater ability of females to show more emotional sensitivity towards others than males, which supported previous findings about the higher empathy and sympathy of women, compared to men (Davis, 1980; Lennon & Eisenberg, 1987 for a review; Mehrabian & Epstein, 1972; Hoffman, 1977; Eysenck & Eysenck, 1978; Eysenck, Pearson, Eastig & Allsop, 1985; Martin et al., 1996).

Interestingly, males and females in both cultures did not differ significantly in their negative sensitivity. This was considered an original result of this research, since literature has traditionally reported women scoring higher than men in measures of negative affectivity and N (Costa, Terraciano & McCrae, 2001; Eysenck & Eysenck, 1978; Eysenck, Eysenck & Barrett, 1985; Heaven & Shochet, 1995; Lynn & Martin, 1997; Martin & Kirkcaldy, 1998, Roberts & Gotlib, 1997). One

possible explanation for these results might rely on recent investigations which have stated that not necessarily gender, but gender role orientation (GRO) irrespective of the biological sex, seems to be the variable most related to N (Marusic & Bratko, 1998), as well as to health reports (Annandale & Hunt, 1990). As was suggested in previous chapters, it is possible that the females willing to cope with the demands of college are adopting a more masculine role of dealing with the environmental pressures, putting them in a similar position to men, generally more rational and less emotionally oriented. So, a further exploration of the relationship between GRO and NES may be necessary, in order to determine whether the association effectively exits with the feminine/masculine roles, thus clarifying this issue. It is also plausible to suggest that the NES scale measures a largely different construct than those traditionally measured with the N scales, and gender differences do not exist in this variable. Finally, and regarding to the psychometric properties of the scale, it is also possible that the lack of differences between genders on NES may be due to a lack of differential item functioning (DIF) on this scale, which has in fact created significant differences by gender in other measures of emotionality, through the endorsement of meaningful gender-related items (e.g. Smith & Reise, 1998). In other words, items in the NES scales do not respond to specific gender-related features. Overall, the present result seems to suggest that the NES scale is highly different from the traditional measures of N, and that the negative emotional responsivity is independent of gender.

The analysis of the cross-cultural differences on the ESS by gender revealed interestingly, that the males did not differ in their emotional sensitivity, either positive or negative; while the British women were shown to be more negatively sensitive than their Venezuelan counterparts.

Overall, the cross-cultural study revealed that the ESS behaves moderately differently from one culture to another, thus indicating distinctive ways of conceptualising emotions. However, further research is necessary to extend these findings, both by assessing other different cultural groups in Europe and Latin America, and by assessing samples with different socio-demographic characteristics (e.g. age, working status, etc).

In summary, the aim of this thesis was to address the possible moderating role of the emotional sensitivity in the relationship between stress and illness. To do so, the psychometric properties of the most widely used scales to measure neuroticism - EPI-N, EPQ-N (Eysenck & Eysenck, 1964, 1975), and NEO-PI-N (Costa & McCrae, 1992) as measures of emotional lability, were questioned. The criticism was mainly based on previous studies where the EPI-N and the EPQ-N were *not* found to be psychometrically equivalent (Roger & Nesshoever, 1987; Roger & Morris, 1991), thus leading to questioning the construct itself. Furthermore, the experimental evidence intended to support the validity of the construct was also found to be inconsistent and equivocal, since the majority of the studies failed to show associations between this personality trait and electrocortical and autonomic nervous system arousal, as was claimed by Eysenck (1967). This led to the construction of a new scale, which addressed the shortcomings by incorporating two independent scales to measure the dimensions of negative and positive sensitivity, labelled Negative Egocentric Sensitivity (NES), and Positive Interpersonal Sensitivity (PIPS). The thesis presented extensive validation studies on the new scale by using both experimental and psychometric methods that support the notion that two different dimensions of emotional sensitivity exist, and relate differently to health and well-being indices.

After the first version of the scale was revised and its psychometric shortcomings addressed, some consistent experimental findings started to emerge that suggested that high NES people respond with higher physiological reactivity to stressful events, while high PIPS individuals are more able to quickly recognise and identify emotional expressions in others. However, further studies are needed to expand and confirm these results, mainly by using larger samples and different tasks.

Some interesting results also emerged from studies using health outcomes as dependent variables, as NES was shown to moderate the effects of perceived stress on the report of physical and psychological symptoms in students undergoing an adaptation process. On the other hand, the PIPS dimension was shown not to affect health directly, however, being highly positive sensitive can be protective when individuals use a detached coping style to deal with stress in

their interpersonal encounters. Despite these findings, the effects of the emotional sensitivity dimensions were not sustained over time, since results of the follow-up studies were not significant. Some methodological limitations were identified in these studies; so final conclusions about the validity of the emotional sensitivity dimensions to predict long-term health indices could not be properly established. In this sense, future studies should consider gathering the follow-up data at the end of a demanding or stressful period, when the health and psychosocial indices might be reflecting the real impact of the environment. Likewise, the perceived stress indices should be measured simultaneously with the symptoms report indices, instead of assessing them at different times thus provoking inconsistent statistical results. Finally, it might be also recommended that the individuals under study had not been tested recently for related variables, thus avoiding the effects of nuisance factors like repetition, boredom, tiredness, etc.

Overall, the emotional sensitivity construct provides a new framework for the study of individual differences, by the investigation of the effects of the emotional responsivity in the individuals' general process of adaptation, which can have implications on psychosocial adjustment and health. Likewise, it provides a more reliable and valid measure that overcomes the psychometric limitations identified in the traditional measures of neuroticism. The pervasive effects of the negative egocentric sensitivity should be further examined by using different health indices, as well as individuals of different ages and occupational status. A special recommendation is given to set up investigations with special populations, such as chronic patients, in testing the impact of NES in the illness process and quality of life. To extend the scope of this investigation, it would be also desirable to determine the moderating role of NES in the relationship between stress and immune changes.

On the other hand, given the joint effect of the positive interpersonal sensitivity and the detachment coping style on psychological health, it would be interesting to investigate the impact that these variables may have on the well-being and adaptation of individuals working in high demanding social settings, such as health, social and counselling services. Specifically, it should be investigated whether the positive sensitivity together with a detached coping style have

protective effects on the psychological health of these individuals, who are under high work stress.

Future studies should also examine the possible implications that on health and psychosocial adjustment might have the combined condition of being high negative and high positive emotional sensitivity. Studies in this thesis only investigated the effects of the two dimensions separately, but it would be interesting to carry out further research considering subjects with high scores on both dimensions of the ESS.

Likewise, the next step for continuing with this research should be the analysis of the factorial structure of the ESS in other populations with socio-demographic and culturally different backgrounds. This would confirm the findings reported in this thesis about the different structure of the scale in culturally different groups, and would allow to revise and improving its psychometric properties if necessary.

Appendix A.
Pilot Questionnaire for the Emotional Sensitivity Scale

ESS

Please remember to write your gender and age below.

Gender:_____ **Age:** _____.

INSTRUCTIONS: This scale consists of number of statements. Read each statement carefully and circle the one alternative which is most like you. There are no correct or incorrect answers.

Please do not omit any of the statements.

1. I often get the feeling that I just want to give up altogether.	True	False
2. I try not to involve myself in other people's problems	True	False
3. I hate upsetting other people.	True	False
4. I often worry that I have done something to upset people.	True	False
5. I easily get indignant.	True	False
6. It is pointless to worry about other's emotions or feelings	True	False
7. When someone embarrasses me, my first thought would be revenge.	True	False
8. Unexpected changes in my life often leave me absolutely gutted.	True	False
9. I often adjust my way of thinking to other people's ideas to avoid arguments	True	False
10. It often feels that my burden is greater than anyone else's.	True	False
11. It doesn't take much to make me feel fed up.	True	False
12. I often get angry with my self.	True	False
13. If someone said I was an agitated person, they would probably be right.	True	False
14. I find it easy to understand other's people feelings	True	False
15. I find it easy to share in other happiness	True	False
16. There is no point in getting worried about things you cannot predict or change.	True	False
17. When people close to me are having problems, I worry on them behalf	True	False
18. I can usually understand other's people behaviour, even if it is unexpected	True	False

19. I often feel I am missing out. True False
20. I expect other people to know how I feel. True False
21. I often feel responsible for how other people are feeling. True False
22. I feel embarrassed when I see other people making mistakes True False
23. I easily sympathize with other people put in embarrassing situations. True False
24. I tend to feel responsible for other peoples' behaviour. True False
25. I get angry when things don't work out. True False
26. When I feel miserable, the worst thing is to hear other people laughing and having fun. True False
27. I worry constantly about making mistakes in my work. True False
28. I am always very careful not to annoy other people. True False
29. I get very upset if my friends do not show up as planned. True False
30. When I feel let down by my friends, I still find it easy to forgive them. True False
31. When things do not go according to plan, I can usually accept it if there is nothing I can do about it. True False
32. I feel upset when I realize that there is nothing I can do to help other people who are having problems True Fals e
33. Little things are often enough to put me in foul mood. True False
34. I often suffer because other people are not doing their job. True False
35. I am easily frustrated. True False
36. I go out of my way not to hurt other people's feelings. True False
37. It is pointless to worry about my own emotions all the time True False
38. I don't feel I always have to understand my own feelings True False
39. I often feel sorry for myself. True False
40. I sometimes feel that no-one care about me. True False
41. When something goes wrong, I wish I could make it all better. True False
42. I often feel despair when facing difficult situations. True False
43. I try to detach my self from other people who are facing difficult situations in order to not get involved True False
44. When a project I am working on starts off badly, I often see it as a bad omen for the rest of the project. True False
45. I find it easy to understand my own feelings True False
46. The behaviour of my friends and family often leaves me feeling hurt and disappointed in them. True False
47. I often feel a bit cheated by life. True False

48. When I'm facing any new situation I can anticipate the specific emotions I will have if I could think on the possible results I can get — True False
49. People are constantly letting me down. — True False
50. As long as I try my best in whatever I do, that's enough to make me happy. — True False
51. I often get the feeling that people I know do not want to see me as much as I want to see them. — True False
52. I am often unsure how I feel about things. — True False
53. My feelings often leave me so confused. — True False
54. The worst thing about worrying is not knowing when that feeling will go away. — True False
55. I always know exactly how I feel. — True False
56. I don't try to find out how people close to me are feeling — True False
57. If any of my family or friends have problems I always try to find a way to help them — True False
58. I let other people know if I'm upset with them. — True False
59. I often feel let down by my friends. — True False
60. When I am with friends I try to do and say things that make them feel comfortable and pleased. — True False
61. I often think about how not to make a fool of myself when facing a novel situation. — True False
62. How other people think about me is very important. — True False
63. I can handle criticism well. — True False
64. The worst thing that could happen to me is to feel silly. — True False
65. If someone close to me is embarrassed, I also feel embarrassed for them — True False
66. My feelings often overwhelm me. — True False
67. I am very questioning of myself. — True False
68. I am generally an apprehensive person. — True False
69. I am often taken aback when I am criticized — True False
70. I worry that I could offend people when I ask them for favors. — True False
71. When people I have planned to meet doesn't turn up, I usually think it is me who made the mistake about date or time of our meeting. — True False
72. I often picture the worst case scenario for what ever I am about to do. — True False
73. I can easily control my nerves. — True False
74. I get upset when other people are having a hard time. — True False

75. I feel very put out if people don't pick up on how I feel. True False
76. It doesn't matter to me how other people feel about me True False
77. I think the best way to avoid problems is to not get involved with other's personal lives True False
78. I like to stay away from other's emotional reactions True False
79. I usually try to stay separate from my family and friend's problems True False

APPENDIX B

Item loading for the rotated factors – Final version (41 items)

	FACTORS	
ITEMS	1	2
33. Little things are often enough to put me in foul mood.	.63	
39. I often feel sorry for myself.	.58	
42. I often feel despair when facing difficult situations.	.57	
35. I am easily frustrated	.55	
68. I am generally an apprehensive person	.55	
12. I often get angry with my self.	.54	
1. I often get the feeling that I just want to give up altogether.	.52	
13. If someone said I was an agitated person, they would probably be right.	.50	
73. I can easily control my nerves	-.50	
40. I sometimes feel that no-one cares about me.	.50	
63. I can handle criticism well	-.45	
8. Unexpected changes in my life often leave me absolutely gutted.	.44	
10. It often feels that my burden is greater than anyone else's	.43	
61. I often think about how not to make a fool of myself when facing a novel situation	.43	
25. I get angry when things don't work out	.42	
59. I often feel let down by my friends.	.41	
50. As long as I try my best in whatever I do, that's enough to make me happy	-.41	
44. When a project I am working on starts off badly, I often see it as a bad omen for the rest of the project.	.39	
31. When things do not go according to plan, I can usually accept it if there is nothing I can do about it.	-.39	
72. I often picture the worst case scenario for what ever I am about to do.	.37	
27. I worry constantly about making mistakes in my work	.37	
29. I get very upset if my friends do not show up as planned.	.35	
75. I feel very put out if people don't pick up on how I feel.	.35	
26. When I feel miserable, the worst thing is to hear other people laughing and having fun	.34	

67. I am very questioning of myself.	.33		
16. There is no point in getting worried about things you cannot predict or change	-.32		
64. The worst thing that could happen to me is to feel silly	.30		
32. I feel upset when I realize that there is nothing I can do to help other people who are having problems			.58
57. If any of my family or friends have problems I always try to find a way to help them			.58
78. I like to stay away from other's emotional reactions			-.53
74. I get upset when other people are having a hard time.			.47
43. I try to detach my self from other people who are facing difficult situations in order to not get involved			-.44
79. I usually try to stay separate from my family and friend's problems			-.42
21. I often feel responsible for how other people are feeling	.33		.41
36. I go out of my way not to hurt other people's feelings			.40
14. I find it easy to understand other's people feelings			.40
4. I often worry that I have done something to upset people			.39
77. I think the best way to avoid problems is to not get involved with other's personal lives			-.38
17. When people close to me are having problems, I worry on them behalf			.37
56. I don't try to find out how people close to me are feeling			-.37
15. I find it easy to share in other happiness			.35

APPENDIX C

ESS

Gender:_____ **Age:** _____

INSTRUCTIONS: This scale consists of number of statements. Read each statement carefully and circle the one alternative which is most like you. There are no correct or incorrect answers.

Please do not omit any of the statements.

1. I often get the feeling that I just want to give up altogether.	True	False
2. I often worry that I have done something to upset people.	True	False
3. Unexpected changes in my life often leave me absolutely gutted.	True	False
4. It often feels that my burden is greater than anyone else's.	True	False
5. I often get angry with myself.	True	False
6. If someone said I was an agitated person, they would probably be right.	True	False
7. I find it easy to understand other's people feelings	True	False
8. I find it easy to share in other's happiness	True	False
9. There is no point in getting worried about things you cannot predict or change.	True	False
10. When people close to me are having problems, I worry on their behalf	True	False
11. I often feel responsible for how other people are feeling.	True	False
12. I get angry when things don't work out.	True	False
13. When I feel miserable, the worst thing is to hear other people laughing and having fun.	True	False
14. I worry constantly about making mistakes in my work.	True	False
15. I get very upset if my friends do not show up as planned.	True	False
16. When things do not go according to plan, I can usually accept it if there is nothing I can do about it.	True	False
17. I feel upset when I realise that there is nothing I can do to help	True	False

other people who are having problems

18. Little things are often enough to put me in foul mood. True False

19. I am easily frustrated. True False

20. I go out of my way not to hurt other people's feelings. True False

21. I often feel sorry for myself. True False

22. I sometimes feel that no-one cares about me. True False

23. I often feel despair when facing difficult situations. True False

24. I try to detach myself from other people's difficult situations, in order to not get involved. True False

25. When a project I am working on starts off badly, I often see it as a bad omen for the rest of the project. True False

26. As long as I try my best in whatever I do, that's enough to make me happy. True False

27. I don't try to find out how people close to me are feeling True False

28. If any of my family or friends have problems I always try to find a way to help them. True False

29. I often feel let down by my friends. True False

30. I often think about how not to make a fool of myself when facing a novel situation. True False

31. I can handle criticism well. True False

32. The worst thing that could happen to me is to feel silly. True False

33. I am very questioning of myself. True False

34. I am generally an apprehensive person. True False

35. I often picture the worst case scenario for whatever I am about to do. True False

36. I can easily control my nerves. True False

37. I get upset when other people are having a hard time. True False

38. I feel very put out if people don't pick up on how I feel. True False

39. I think the best way to avoid problems is to not get involved with other's personal lives True False

40. I like to stay away from other's emotional reactions True False

41. I usually try to stay separate from my family and friends' problems True False

APPENDIX D

Instructions for the Experiment I

IDENTIFICATION PAGE (NAME AND AGE)

Please, press the SPACE BAR.

Thank you for coming to this experiment. You will be asked to sit down and have a blood pressure cuff attached around your arm. From time to time you will feel the cuff inflate and deflate but this is nothing to worry about. This experiment involves watching a number of images, some of which MIGHT BE DISTRESSING TO YOU.

Please keep your gaze on the images AT ALL TIMES and do not be distracted. Try to concentrate on the images during the experiment. Each image will be projected for a maximum of 30 seconds.

Due to the fact that you might find some of the images distressing, you have THE OPTION TO LEAVE THE EXPERIMENT at any time if you wish to do so. If you wish to do so now, please inform the experimenter. You are also free to leave the room during the course of the experiment.

If you are ready to start, please press the spacebar.

N.B. ALL THE IMAGES HAVE BEEN APPROVED BY A PSYCHOLOGY ETHICS COMMITTEE IN THE DEPARTMENT AND HAVE BEEN REGULARLY USED IN PREVIOUS RESEARCH.

APPENDIX E

SLIDES RATING SCALE

Name:_____ Age:_____

Please, rate each of the slides you have seen in this experiment according to the degree of stimulation, excitement or arousal they provoked following this scale (mark with **X**):

	Complete relaxation/calm 1	2	3	4	5	6	7	8	*Excitement / high arousal* 9
Baby smiling	1	2	3	4	5	6	7	8	9
Attack with a knife	1	2	3	4	5	6	7	8	9
Dead body	1	2	3	4	5	6	7	8	9
Clouds	1	2	3	4	5	6	7	8	9
Starving child	1	2	3	4	5	6	7	8	9
Nature	1	2	3	4	5	6	7	8	9
Sad child	1	2	3	4	5	6	7	8	9
War victim	1	2	3	4	5	6	7	8	9
Injury	1	2	3	4	5	6	7	8	9
Baby in hospital	1	2	3	4	5	6	7	8	9

APPENDIX F

THE UNIVERSITY *OF YORK*

CONSENT FORM FOR PARTICIPANTS IN PSYCHOLOGY EXPERIMENTS

Name:_____ Date:_____

Address: _____

_____

_____

_____

Declaration: I confirm that have been informed about the aims and procedures involved in the experiment. I reserve the right to withdraw at any stage in the proceedings, and information that I provide as part of the study will be destroyed or my identity removed unless I agree otherwise.

Signed: _____ Date: _____

APPENDIX F

THE UNIVERSITY *OF YORK*

CONSENT FORM FOR PARTICIPANTS IN PSYCHOLOGY EXPERIMENTS

Name:_____ Date:_____

Address: _____

_____

_____

_____

Declaration: I confirm that have been informed about the aims and procedures involved in the experiment. I reserve the right to withdraw at any stage in the proceedings, and information that I provide as part of the study will be destroyed or my identity removed unless I agree otherwise.

Signed: _____ Date: _____

APPENDIX G

INSTRUCTIONS FOR EXPERIMENT II

In this part of the experiment I will need you to take a short look at some pictures with people's faces on them. You will have 5 sec. to see each picture and trying to recognize the emotion or feeling this face is expressing. I (the experimenter) will take the time and will give you the sign to start and to stop seeing the pictures. Immediately after, you should write your answer in this format (rating format for photos), checking that you are answering to the correct picture (see the number at the back). Try to write the first answer that comes to your mind, even if you are not sure. However, if you have no answer, just leave the blank space and go on.

PLEASE WRITE DOWN YOUR NAME, AGE AND GENDER ON THE ANSWER SHEET.

APPENDIX H

RATING FORMAT FOR PHOTOS

NAME:_____ AGE: _____ GENDER:_____

PHOTO	EMOTION EXPRESSED
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

APPENDIX I

SCENARIOS FOR THE REVISED SCALE

1. You have been informed that a close family member of one of your best friends has died, and that your friend feels very depressed and emotionally upset.

   A. How would you feel?
   B. What would you think about in such mood or feelings?
   C. What would you do?

2. A town near your home has been flooded, the news show scenes of people severely injured as well as buildings and properties destroyed. The Red Cross and other agencies are asking for general support, either material or personal/emotional in order to assist the victims.

   A. How would you feel?
   B. What would you think about in such mood or feelings?
   C. What would you do?

3. One of your classmates, who you met at the beginning of your current course, has had personal problems. Those caused him to miss lectures. He is now having tremendous difficulty catching up with the course contents and to completing his essays.

   A. How would you feel?
   B. What would you think about in such mood or feelings?
   C. What would you do?

4. The government is planning a national special volunteer program to work as counselors and trainers with abused children and young offenders, in areas such as sport, leisure activities and basic computational abilities.

   A. How would you feel?
   B. What would you think about in such mood or feelings?
   C. What would you do?

4. You are shopping in a very crowed mall. As you are walking through a corridor, you see a little child crying who seems to be lost.

A. How would you feel?
B. What would you think about in such mood or feelings?
C. What would you do?

6. You are in a meeting with several friends, and a heated argument starts between two of them. You decide not to take sides, but you realise that one of them is being very unfairly treated by the other.

A. How would you feel?
B. What would you think about in such mood or feelings?
C. What would you do?

7. One of your neighbours is a single mother with two children. Her youngest child has been sick for the past few days and she asks if you could help taking care of the oldest child.

A. How would you feel?
B. What would you think about in such mood or feelings?
C. What would you do?

8. You hear that one of your roommates at the college is ill, and there doesn't seem be anyone to help him.

A. How would you feel?
B. What would you think about in such mood or feelings?
C. What would you do?

9. You are walking home one evening and you see a young woman sitting in a shop-front crying.

A. How would you feel?
B. What would you think about in such mood or feelings?
C. What would you do?

10. A man in shabby clothes asks you for money so that he can get home.

A. How would you feel?
B. What would you think about in such mood or feelings?
C. What would you do?

APPENDIX J

NEW ITEMS FOR THE REVISED SCALE

1. I often feel concerned about people around me who are in difficult situations.

2. I feel sympathy for people less fortunate than me

3. I often think about ways to help people in difficulty.

4. I would be willing to participate in aid programs for people in life-threatening situations, if there was something I could do.

5. I find it easy to understand others' feelings when they are distressed.

6. When I'm helping people in stressful situations, I try to keep as calm as possible myself.

7. I feel sorry for people close to me who are having cope with stressful situations.

8. I try not to get emotionally involved with people experiencing difficult situations.

9. I find it difficult to help people coping with stressful events, because I get stressed so easily as well.

10. It feels good to help others to cope with their problems.

11. Whenever I see someone close to me having a problem, the first thing that comes to my mind is how lucky I am not to be in that situation.

12. If someone I know is worried and concerned, I don't try to find out the reasons.

13. I easily get anxious and distressed when I see any of my family or close friends facing a problem, and I wish I wasn't there.

14. I'm usually able to keep calm myself when I'm trying to help someone in need.

15. I'm easily affected by others' emotional problems.

16. I try not to get too emotionally involved in family problems, even though I'm willing to help them.

17. When I'm talking with friends about their problems, I immediately start to think about my own similar ones.

18. I find it easy to recognize the feelings and moods of people around me, even if they try to hide them.
19. I worry about being asked to help someone to cope with their problems.

20. I feel really upset about the plight of people on the edge of society.

21. I'm often more concern about others' feelings and concerns than my own.

22. Whenever I'm helping people cope with their problems, I worry whether I'm involving myself too much.

23. When I'm trying to help other people, I find myself worrying that it's going to take too much time.

24. I would try to help someone crying in the street.

25. If I see someone in trouble I start thinking about how I would be feeling if I was in the same situation.

26. I always try to give attention to family and friends when they feel like talking about their problems.

27. I feel very satisfied when I'm able to help others with their problems

28. It's quite difficult for me to know the feelings and moods of people around me.

29. I feel more concerned than most people about those who are unfairly treated.

30. I'm pleased that people feel they can count on me to help them.

31. I sometimes think that showing too much concern and sympathy for others might result in me getting involved with things I don't want to.

32. I always try to consider others' opinions and points of view before taking a decision that might affect them.

33. I'm usually happy to help my friends and family whenever they ask me to.

34. I feel pleased about the success and happiness of other people.

35. I will go out of my way to help, if someone I know ask me to.

36. Whenever I see someone in trouble, I feel it's my responsibility to help and give support.

37. I find easy to recognize and understand others' feelings and emotions, but not to get involved with them.

38. I find it especially easy to sympathize with someone in trouble if I have experienced the same situation myself.

39. I think you can only really help someone if you don't get emotionally involved.

40. You can't help anyone if you can't feel their emotions.

APPENDIX K

Item loading for the rotated factors – Revised ESS (43 items)

	FACTORS	
ITEMS	**1**	**2**
40. I often feel sorry for myself	.69	
37. Little things are often enough to put me in foul mood	.68	
36. I am easily frustrated	.64	
43. I often feel despair when facing difficult situations.	.60	
8. I often get angry with myself.	.58	
7. It often feels that my burden is greater than anyone else's	.58	
5. Unexpected changes in my life often leave me absolutely gutted	.57	
19. If someone said I was an agitated person, they would probably be right	.53	
1. I often get the feeling that I just want to give up altogether	.53	
60. I often feel let down by my friends.	.52	
16. I get angry when things don't work out.	.52	
73. I am generally an apprehensive person	.50	
26. When I feel miserable, the worst thing is to hear other people laughing and having fun.	.49	
17. I easily get anxious and distressed when I see any of my family or close friends facing a problem, and I wish I wasn't there.	.48	
27. I worry constantly about making mistakes in my work	.47	
71. I feel very put out if people don't pick up on how I feel.	.44	
30. When things do not go according to plan, I can usually accept it if there is nothing I can do about it.		-.44
74. I often picture the worst case scenario for whatever I am about to do.	.43	
45. When a project I am working on starts off badly, I	.40	

often see it as a bad omen for the rest of the project.			
3. I often worry that I have done something to upset people*	.40		
42. I sometimes feel that no-one cares about me.	.38		
62. I can handle criticism well.	-.37		
46. As long as I try my best in whatever I do, that's enough to make me happy	-.37		
21. I find it easy to share in other's happiness*	-.35		
75. I can easily control my nerves	-.35		
28. I get very upset if my friends do not show up as planned.	.35		
55. I often think about how not to make a fool of myself when facing a novel situation	.33		
72. I am very questioning of myself	.33		
70. I get upset when other people are having a hard time*		.55	
35. I feel upset when I realise that there is nothing I can do to help other people who are having problems*		.53	
12. I find it easy to understand other's people feelings*		.52	
34. I'm easily affected by others' emotional problems.		.51	
18. I find it easy to understand others' feelings when they are distressed		.51	
41. I feel really upset about the plight of people on the edge of society		.48	
65. Whenever I see someone in trouble, I feel it's my responsibility to help and give support		.48	
23. When people close to me are having problems, I worry on their behalf*		.46	
6. I often think about ways to help people in difficulty		.46	
20. I try not to get emotionally involved with people experiencing difficult situations		-.45	
32. I find it easy to recognise the feelings and moods of people around me, even if they try to hide them		.44	
56. I feel more concerned than most people about those who are unfairly treated.		.38	

54. It's quite difficult for me to know the feelings and moods of people around me	-.38
44. I would try to help someone crying in the street	.37
47. I'm often more concern about others' feelings and concerns than my own	.34

** Item loaded in the previous PES scale*

APPENDIX L

The revised ESS (43 items)

Gender:_____ **Age:** _____.

INSTRUCTIONS: This scale consists of number of statements. Read each statement carefully and circle the one alternative which is most like you. There are no correct or incorrect answers.

Please do not omit any of the statements.

1. I often get the feeling that I just want to give up altogether.	True	False
2. I often worry that I have done something to upset people.	True	False
3. Unexpected changes in my life often leave me absolutely gutted.	True	False
4. I often think about ways to help people in difficulty.	True	False
5. It often feels that my burden is greater than anyone else's.	True	False
6. I often get angry with myself.	True	False
7. I find it easy to understand other's people feelings.	True	False
8. I get angry when things don't work out.	True	False
9. I easily get anxious and distressed when I see any of my family or close friends facing a problem, and I wish I wasn't there.	True	False
10. I find it easy to understand others' feelings when they are distressed.	True	False
11. If someone said I was an agitated person, they would probably be right.	True	False
12. I try not to get emotionally involved with people experiencing difficult situations.	True	False
13. I find it easy to share in other's happiness	True	False
14. When people close to me are having problems, I worry on their	True	False

behalf.

15. When I feel miserable, the worst thing is to hear other people laughing and having fun.	True	False
16. I worry constantly about making mistakes in my work.	True	False
17. I get very upset if my friends do not show up as planned.	True	False
18. When things do not go according to plan, I can usually accept it if there is nothing I can do about it.	True	False
19. I find it easy to recognize the feelings and moods of people around me, even if they try to hide them.	True	False
20. I'm easily affected by others' emotional problems.	True	False
21. I feel upset when I realize that there is nothing I can do to help other people who are having problems.	True	False
22. I am easily frustrated.	True	False
23. Little things are often enough to put me in foul mood.	True	False
24. I often feel sorry for myself.	True	False
25. I feel really upset about the plight of people on the edge of society.	True	False
26. I sometimes feel that no-one cares about me.	True	False
27. I often feel despair when facing difficult situations.	True	False
28. I would try to help someone crying in the street.	True	False
29. When a project I am working on starts off badly, I often see it as a bad omen for the rest of the project.	True	False
30. As long as I try my best in whatever I do, that's enough to make me happy.	True	False
31. I'm often more concern about others' feelings and concerns than my own.	True	False
32. It's quite difficult for me to know the feelings and moods of people around me.	True	False
33. I often think about how not to make a fool of myself when facing a novel situation.	True	False
34. I feel more concerned than most people about those who are unfairly treated.	True	False

35. I often feel let down by my friends.	True	False
36. I can handle criticism well.	True	False
37. Whenever I see someone in trouble, I feel it's my responsibility to help and give support.	True	False
38. I get upset when other people are having a hard time.	True	False
39. I feel very put out if people don't pick up on how I feel.	True	False
40. I am very questioning of myself.	True	False
41. I am generally an apprehensive person.	True	False
42. I often picture the worst case scenario for whatever I am about to do.	True	False
43. I can easily control my nerves.	True	False

APPENDIX M

UWIST MOOD ADJECTIVE CHECKLIST

PLEASE WRITE YOUR NAME _____

STATE QUESTIONNAIRE FOR THE COGNITIVE SPEED INTELLIGENCE TEST

General Instructions. This questionnaire is concerned with your feelings and thoughts at the moment. We would like to build up a detailed picture of your current state of mind, so there are quite a few questions. Please answer **every** question, even if you find it difficult. Answer, as honestly as you can, what is true of **you**. Please do not choose a reply just because it seems like the 'right thing to say'. Your answers will be kept entirely confidential. Also, be sure to answer according to how you feel **AT THE MOMENT**. Don't just put down how you usually feel. You should try and work quite quickly: there is no need to think very hard about the answers. The first answer you think of is usually the best.

1. MOOD STATE

First, there is a list of words which describe people's moods or feelings. Please indicate how well each word describes how you felt AT THE MOMENT. For each word, circle the answer from 1 to 4 which best describes your mood.

	Definitely	Slightly	Slightly Not	Definitely Not
1. Happy	1	2	3	4
2. Dissatisfied	1	2	3	4
3. Energetic	1	2	3	4
4. Relaxed	1	2	3	4
5. Alert	1	2	3	4
6. Nervous	1	2	3	4
7. Passive	1	2	3	4
8. Cheerful	1	2	3	4
9. Tense	1	2	3	4
10. Jittery	1	2	3	4
11. Sluggish	1	2	3	4
12. Sorry	1	2	3	4
13. Composed	1	2	3	4
14. Depressed	1	2	3	4
15. Restful	1	2	3	4
16. Vigorous	1	2	3	4
17. Anxious	1	2	3	4

	Definitely	Slightly	Slightly Not	Definitely Not
18. Satisfied	1	2	3	4
19. Unenterprising	1	2	3	4
20. Sad	1	2	3	4
21. Calm	1	2	3	4
22. Active	1	2	3	4
23. Contented	1	2	3	4
24. Tired	1	2	3	4
25. Impatient	1	2	3	4
26. Annoyed	1	2	3	4
27. Angry	1	2	3	4
28. Irritated	1	2	3	4
29. Grouchy	1	2	3	4

APPENDIX N

Instructions for Experiment III

1. GENERAL INFORMATION.

The Cognitive Speed Intelligence Test (CSIT).

The CSIT is a measure of speed of cognitive processing. These kinds of intelligence tests measure how "fast" you can think. It is well known in the psychology literature that speed of cognitive processing is an excellent measure of people's intelligence.

INSTRUCTIONS

The test is divided into two phases. Before each phase you will receive exact information about the task. The following is a general description of the CSIT.

The stimuli which appear on the screen one at a time are four colour names. The colour names are "Yellow", "Red", "Green" and "Blue". The colour names are written in four different colours (yellow, red, green and blue). In the first phase you will be asked to answer according to the colours of the stimuli. In the seconf phase you will be asked to answer according to the names of the stimuli. The four number keys on the top left on the keyboard should be used to answer. Thus: 1= Yellow, 2= Red, 3= Green and 4= Blue.

Your must answer as fast as you can with as few errors as possible.
Your speed and accuracy performance will be estimated.

REMEMBER THAT YOUR PERFORMANCE WILL BE COMPARED WITH THE PERFORMANCE OF THE REST OF THE STUDENTS ATTENDING THE EXPERIMENT, SO YOU WILL HAVE A FINAL SCORE.

Please push the spacebar to continue.

2. INSTRUCTIONS FOR PHASE 1 IN THE STROOP TASK.

Phase 1.

In the first phase of the test a couple of colour names will appear on the screen one at each time. **YOU WILL ONLY SEE THE STIMULI FOR 100 MS AND THEN THEY DISAPPEAR.**

The colour names are: "Yellow", "Red", "Green" and "Blue". Your task is to answer what **colour** the word which is on the screen each time has. You should use the keys "1" "2" "3" and "4" on the top left side of the keyboard. That means:

If the **colour** is "Yellow" you push "1"

If the **colour** is "Red" you push "2"
If the **colour** is "Green" you push "3"
If the **colour** is "Blue" you push "4"

Answer as fast as you can and make no mistakes. Each answer will be followed with a "correct" or "incorrect" beep.

There will first be 6 practice trials and then will test start.

Push the spacebar to continue.

3. INSTRUCTIONS FOR PHASE 2 IN THE STROOP TASK

Phase 2.

In the second phase of the test a couple of colour names will appear on the screen as before, one at each time.

The colour names are "Yellow", "Red", "Green", and "Blue".

Your task is now to answer what **word** is on the screen each time.

You should use the keys "1" "2" "3" and "4" on the top left side of the keyboard. That means:

If the **word** is "Yellow" you push "1"
If the **word** is "Red" you push "2"
If the **word** is "Green" you push "3"
If the **word** is "Blue" you push "4"

Answer as fast as you can and do no errors. Each answer will be followed with a "correct" or "incorrect" beep.

There will first be 6 practice trials and then will test start.

Push the spacebar to continue.

4. FINAL INSTRUCTIONS AT THE END OF THE STROOP TASK

Thank you for your co-operation. The computer will now need some time to calculate your final score.

You have a break now for few minutes.

APPENDIX O

Item loading for the rotated factors (Spanish ESS)

	FACTORS		
ITEMS	1	2	3
43. I often feel despair when facing difficult situations. (Con frecuencia siento desespero cuando enfrento situaciones difíciles).	.64		
36. I am easily frustrated. (Me siento fácilmente frustrado(a)).	.58		
72. I am very questioning of myself. (Yo me cuestiono mucho a mí mismo(a)).	.52		
8. I often get angry with myself. (Con frecuencia me pongo bravo(a) conmigo mismo(a)).	.49		
71. I feel very put out if people don't pick up on how I feel. (Me siento realmente molesto si la gente no capta como me siento).	.46		
7. It often feels that my burden is greater than anyone else's. (Con frecuencia parece que mis preocupaciones son más grandes que las de cualquier otra persona).	.44		
37. Little things are often enough to put me in foul mood. (Con frecuencia pequeñas cosas bastan para ponerme de mal humor).	.43		
45. When a project I am working on starts off badly, I often see it as a bad omen for the rest of the project. (Cuando un proyecto en el que estoy trabajando arranca mal, con frecuencia lo veo como un mal presagio para el resto del proyecto).	.43		
22. I find it difficult to help people coping with stressful events, because I get stressed so easily as well. (Me resulta difícil ayudar a gente que está enfrentando situaciones estresantes, porque yo me estreso fácilmente tambien).	.42		
26. When I feel miserable, the worst thing is to hear other people laughing and having fun. (Cuando me siento triste y abatido(a), lo peor que puede pasarme es oir gente riéndose y divirtiéndose).	.41		
1. I often get the feeling that I just want to give up altogether. (Con frecuencia tengo la sensación de que quiero	.40		

abandonarlo todo).			
42. I sometimes feel that no-one cares about me. (A veces siento que nadie se preocupa por mí).	.40		
74. I often picture the worst case scenario for whatever I am about to do. (Con frecuencia me imagino el peor escenario posible para cualquier cosa que estoy por comenzar).	.38		
75. I can easily control my nerves. (Yo puedo controlar mis nervios fácilmente).	-.38		
16. I get angry when things don't work out. (Me enfurezco cuando las cosas no funcionan).	.37		
5. Unexpected changes in my life often leave me absolutely gutted. (Los cambios repentinos en mi vida con frecuencia me dejan absolutamente consternado(a)).	.36		
63. The worst thing that could happen to me is to feel silly. (La peor cosa que podría pasarme es sentirme como un(a) tonto(a)).	.34		
31. When I'm talking with friends about their problems, I immediately start to think about my own similar ones. (Cuando empiezo a hablar con mis amigos acerca de sus problemas, inmediatamente comienzo a pensar en los míos propios).	.33		
24.I often feel responsible for how other people are feeling. (Con frecuencia me siento responsable por la forma como otros se están sintiendo).	.33		
17. I easily get anxious and distressed when I see any of my family or close friends facing a problem, and I wish I wasn't there. (Yo me pongo fácilmente ansioso(a) y estresado(a) cuando veo a algún familiar o amigo cercano enfrentando un problema, y desearía no estar allí).	.32		
27. I worry constantly about making mistakes in my work. (Yo me preocupo constantemente de cometer errores en mi trabajo).	.32		
28. I get very upset if my friends do not show up as planned. (Yo me molesto mucho cuando mis amigos no se presentan, tal como estaba planeado).	.31		
78. I think the best way to avoid problems is to not get involved with other's personal lives. (Yo pienso que la mejor manera de evitar problemas es no involucrarse con la vida		.56	

personal de los otros).		
79. I like to stay away from other's emotional reactions. (Me gusta mantenerme alejado(a) de las reacciones emocionales de los otros).		.55
50. I try to detach myself from other people's difficult situations, in order to not get involved. (Yo trato de mantenerme alejado(a) de las situaciones difíciles de otra gente, para no involucrarme).		.55
61. I sometimes think that showing too much concern and sympathy for others might result in me getting involved with things I don't want to. (Con frecuencia pienso que mostrar mucha preocupación y lástima por otros puede resultar en involucrarme en cosas que no quiero).		.54
49. When I'm trying to help other people, I find myself worrying that it's going to take too much time. (Cuando estoy tratando de ayudar a otras personas, empiezo a preocuparme de que eso me vaya a llevar mucho tiempo).		.50
20. I try not to get emotionally involved with people experiencing difficult situations. (Yo trato de no involucrarme emocionalmente con gente que está pasando por situaciones difíciles).		.46
69. I find easy to recognise and understand others' feelings and emotions, but not to get involved with them. (Me resulta fácil reconocer y entender los sentimientos de otros, pero no involucrarme con ellos).		.38
48. Whenever I'm helping people cope with their problems, I worry whether I'm involving myself too much. (Cada vez que estoy ayudando a otra gente a enfrentar sus problemas, me preocupo si me estaré involucrando demasiado).		.35
77. I think you can only really help someone if you don't get emotionally involved. (Yo pienso que uno sólo puede ayudar realmente a alguien, si no involucra emocionalmente).		.35
15. Whenever I see someone close to me having a problem, the first thing that comes to my mind is how lucky I am not to be in that situation. (Cada vez que veo a alguien cercano a mí teniendo algún problema, la primera cosa que viene a mi mente es lo afortundado(a) que soy de no estar en esa situación).		.33

32. I find it easy to recognise the feelings and moods of people around me, even if they try to hide them. (Me resulta fácil reconocer los sentimientos y estados de ánimo de la gente a mi alrededor, incluso aunque traten de esconderlos).			.48
70. I get upset when other people are having a hard time. (Me siento molesto(a) cuando otra gente está pasando por momentos difíciles).			.43
12. I find it easy to understand other's people feelings. (Me resulta fácil entender los sentimientos de otras personas).			.43
65. Whenever I see someone in trouble, I feel it's my responsibility to help and give support. (Cada vez que veo a alguien en problemas, siento que es mi responsabilidad ayudar y dar apoyo).			.42
35. I feel upset when I realise that there is nothing I can do to help other people who are having problems. (Me siento molesto(a) cuando me doy cuenta que no puedo hacer nada para ayudar a otra gente que está teniendo problemas).			.42
56. I feel more concerned than most people about those who are unfairly treated. (Yo me siento más preocupado(a) que mucha gente por las personas injustamente tratadas).			.39
54. It's quite difficult for me to know the feelings and moods of people around me. (Es algo difícil para mí conocer los sentimientos y estados de ánimo de la gente a mi alrededor).			-.38
6. I often think about ways to help people in difficulty. (Con frecuencia pienso en las maneras de ayudar a la gente en dificultad).			.37
44. I would try to help someone crying in the street. (Yo trataría de ayudar a alguien llorando en la calle).			.36
58. I don't try to find out how people close to me are feeling. (Yo no trato de averiguar como la gente a mi alrededor se siente).			-.36
18. I find it easy to understand others' feelings when they are distressed. (Es fácil para mí entender los sentimientos de otros cuando ellos están estresados).			.35
11. I would be willing to participate in aid programs for people in life-threatening situations, if there was something I could do. (Yo estoy dispuesto a participar en programas de ayuda para gente en situación de peligro, si hubiera algo			.34

que yo pudiera hacer).			
47. I'm often more concern about others' feelings and concerns than my own. (Con frecuencia me siento más preocupado(a) por los sentimientos y preocupaciones de otros, que por los míos propios).			.31

Spanish translation in brackets

APPENDIX P

ESE

Sexo:_____ **Edad:** _____

INSTRUCCIONES: Este cuestionario contiene una serie de afirmaciones. Lee cada una de ellas atentamente y encierra en un circulo la alternativa que mejor te describa. No hay respuestas correctas o incorrectas. Por favor, se lo más honesto posible. GRACIAS

Por favor, no dejes en blanco ninguna de las afirmaciones.

1. Con frecuencia tengo la sensación de que quiero abandonarlo todo.	Cierto	Falso
2.Los cambios repentinos en mi vida con frecuencia me dejan absolutamente consternado(a)	Cierto	Falso
3.Con frecuencia pienso en las maneras de ayudar a la gente en dificultad.	Cierto	Falso
4. Con frecuencia parece que mis preocupaciones son más grandes que las de cualquier otra persona.	Cierto	Falso
5. Yo estoy dispuesto a participar en programas de ayuda para gente en situación de peligro, si hubiera algo que yo pudiera hacer.	Cierto	Falso
6. Con frecuencia me pongo bravo(a) conmigo mismo(a).	Cierto	Falso
7. Me resulta fácil entender los sentimientos de otras personas.	Cierto	Falso
8. Cada vez que veo a alguien cercano a mí teniendo algún problema, la primera cosa que viene a mi mente es lo afortundado(a) que soy de no estar en esa situación.	Cierto	Falso
9. Me enfurezco cuando las cosas no funcionan.	Cierto	Falso
10. Yo me pongo fácilmente ansioso(a) y estresado(a) cuando veo a algún familiar o amigo cercano enfrentando un problema, y desearía no estar allí.	Cierto	Falso
11. Es fácil para mí entender los sentimientos de otros cuando ellos están estresados.	Cierto	Falso

12.Yo trato de no involucrarme emocionalmente con gente que está pasando por situaciones difíciles. Cierto Falso

13. Me resulta difícil ayudar a gente que está enfrentando situaciones estresantes, porque yo me estreso fácilmente tambien. Cierto Falso

114.Con frecuencia me siento responsable por la forma como otros se están ssintiendo. Cierto Falso

15. Me resulta fácil reconocer los sentimientos y estados de ánimo de la gente a mi alrededor, incluso aunque traten de esconderlos. Cierto Falso

16.Yo me preocupo constantemente de cometer errores en mi trabajo. Cierto Falso

17. Yo me molesto mucho cuando mis amigos no se presentan, tal como estaba planeado. Cierto Falso

18. Cuando empiezo a hablar con mis amigos acerca de sus problemas, inmediatamente comienzo a pensar en los míos propios. Cierto Falso

19. Me siento molesto(a) cuando me doy cuenta que no puedo hacer nada para ayudar a otra gente que está teniendo problemas. Cierto Falso

20. Me siento fácilmente frustrado(a). Cierto Falso

21. Con frecuencia pequeñas cosas bastan para ponerme de mal humor. Cierto Falso

22. A veces siento que nadie se preocupa por mí. Cierto Falso

23. Con frecuencia siento desespero cuando enfrento situaciones difíciles. Cierto Falso

24. Yo trataría de ayudar a alguien llorando en la calle. Cierto Falso

25. Cuando un proyecto en el que estoy trabajando arranca mal, con frecuencia lo veo como un mal presagio para el resto del proyecto. Cierto Falso

26. Con frecuencia me siento más preocupado(a) por los sentimientos y preocupaciones de otros, que por los míos propios. Cierto Falso

27. Cuando me siento triste y abatido(a), lo peor que puede pasarme es oir gente riéndose y divirtiéndose. Cierto Falso

28. Cuando estoy tratando de ayudar a otras personas, empiezo a preocuparme de que eso me vaya a llevar mucho tiempo. Cierto Falso

29. Yo trato de mantenerme alejado(a) de las situaciones difíciles de otra gente, para no involucrarme. Cierto Falso

30. Cada vez que estoy ayudando a otra gente a enfrentar sus problemas, me preocupo si me estaré involucrando demasiado. Cierto Falso

31. Yo me siento más preocupado(a) que mucha gente por las personas injustamente tratadas. Cierto Falso

32. Yo no trato de averiguar como la gente a mi alrededor se siente. Cierto Falso

33. Con frecuencia pienso que mostrar mucha preocupación y lástima por otros puede resultar en involucrarme en cosas que no quiero. Cierto Falso

34. La peor cosa que podría pasarme es sentirme como un(a) tonto(a). Cierto Falso

35. Cada vez que veo a alguien en problemas, siento que es mi responsabilidad ayudar y dar apoyo. Cierto Falso

36. Me resulta fácil reconocer y entender los sentimientos de otros, pero no involucrarme con ellos. Cierto Falso

37.Me siento molesto(a) cuando otra gente está pasando por momentos difíciles. Cierto Falso

38. Me siento realmente molesto si la gente no capta como me siento. Cierto Falso

39. Es algo difícil para mí conocer los sentimientos y estados de ánimo de la gente a mi alrededor. Cierto Falso

40. Con frecuencia me imagino el peor escenario posible para cualquier cosa que estoy por comenzar. Cierto Falso

41. Yo puedo controlar mis nervios fácilmente. Cierto Falso

42. Yo pienso que uno sólo puede ayudar realmente a alguien, si no se involucra emocionalmente. Cierto Falso

43. Yo pienso que la mejor manera de evitar problemas es no involucrarse con la vida personal de los otros. Cierto Falso

44. Me gusta mantenerme alejado(a) de las reacciones emocionales de los otros. Cierto Falso

45. Yo me cuestiono mucho a mí mismo(a) Cierto Falso

APPENDIX Q

Item loading for the rotated factors of the Spanish HSC. English and Spanish translation

	FACTORS	
ITEMS	1	2
17. Lethargy/tiredness (Letargo/cansancio)	.68	
16. Anxiety (Ansiedad)	.67	
28. Insomnia (Insomnio)	.58	
3. More/less appetite (Más/menos apetito)	.58	
21. Depression (Depresión)	.54	
29. Menstrual problems (Problemas menstruales)	.49	
19. Headache/ migraine (Dolor de cabeza/migraña)	.42	
12. Acne (Acné)	.36	
27. Upset stomach/ vomiting (Estómago perturbado/vómitos)	.36	
15. Constipation (Estreñimiento)	.34	
22. Cold sores (Dolores gripales)		.66
5. Throat infection (Infección en la garganta)		.65
9. Cold/flu (Resfrío/gripe)		.55
25. Allergies (Alergias)		.40
23. Chest Infections (Infección en el pecho)		.37
8. Sinusitis (Sinusitis)		.36
11. Glandular fever (Fiebre Glandular)		.32

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