DEPARTMENT OF PSYCHOLOGY

EATING DISORDER RISK: THE ROLE OF SENSITIVITY TO NEGATIVE AFFECT AND
BODY-IMAGE INFLEXIBILITY

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A Dissertation Submitted to the University of Cyprus in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

May, 2016

DECLARATION OF DOCTORAL CANDIDATE

The present doctoral dissertation was submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy of the University of Cyprus. It is a product of original work of my own, unless otherwise mentioned through references, notes or any other statements.

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ΠΕΡΙΛΗΨΗ

        Οι Διατροφικές Διαταραχές (ΔΔ) αποτελούν ένα σοβαρό πρόβλημα δημόσιας υγείας με συνεχώς αυξανόμενα ποσοστά εμφάνισης ανάμεσα σε νεαρές γυναίκες. Σύγχρονες θεωρητικές προσεγγίσεις υποστηρίζουν ότι οι ΔΔ δεν αντιμετωπίζονται πλέον ως διακριτές κλινικές κατηγορίες αλλά κυμαίνονται σε ένα συνεχές που περιλαμβάνει την πλήρη απουσία ΔΔ, τα υπο-κλινικά συμπτώματα καθώς και τα κλινικά σύνδρομα ΔΔ (Shisslak, Crago & Estes, 1995). Παρόλο που οι παράγοντες ρίσκου για την ανάπτυξη ΔΔ έχουν μελετηθεί εκτενώς στην εμπειρική βιβλιογραφία, ο μηχανισμός που διέπει την ανάπτυξη τους παραμένει ασαφής. Εμπειρικά τεκμηριωμένα ευρήματα υποδεικνύουν δύο βασικούς μηχανισμούς για την ανάπτυξη των ΔΔ: i) με έμφαση σε εμπειρικά-λειτουργικά στοιχεία όπως την ευαλωτότητα στο αρνητικό συναίσθημα και τις δυσκολίες στη ρύθμιση των συναισθημάτων (Merwin, 2011), και ii) με επίκεντρο το περιεχόμενο γνωσιών και συγκεκριμένα το δυσλειτουργικό σύστημα αυτο-αξιολόγησης, όπου οι πεποιθήσεις για την αυτο-αξία του ατόμου στηρίζονται σχεδόν αποκλειστικά στην εμφάνιση (Fairburn, Cooper, Shafran, 2003). Η παρούσα μελέτη έχει ως στόχο να εξετάσει αυτούς τους μηχανισμούς χρησιμοποιώντας συγχρονικά (Cross-sectional) και πειραματικά δεδομένα (ερωτηματολόγια αυτο-αναφοράς, ψυχο-φυσιολογικές ενδείξεις και συμπεριφορικές μετρήσεις). Κατά τη διάρκεια της συγχρονικής μελέτης (Φάση Ι) χορηγήθηκαν ερωτηματολόγια ανίχνευσης ρίσκου για ΔΔ σε νεαρούς ηλικίας 14-24 ετών. Στη συνέχεια, μια ομάδα έφηβων κοριτσιών και νεαρών γυναικών σε υψηλό ρίσκο για ΔΔ και μια ομάδα σε χαμηλό ρίσκο έλαβαν μέρος στην πειραματική μελέτη (Φάση ΙΙ). Ο σκοπός του πειράματος ήταν να υποβάλει αρνητική διάθεση μέσα από δύο αποσπάσματα ταινιών (με γενικό περιεχόμενο και περιεχόμενο σχετικό με ΔΔ) και να συγκρίνει τις συναισθηματικές αντιδράσεις και την ικανότητα συναισθηματικής ρύθμισης μεταξύ των δύο ομάδων. Οι ψυχο-φυσιολογικές μετρήσεις, καρδιακού παλμού, αγωγιμότητας του δέρματος και του συνοφρυώματος καθώς και οι αυτό-αναφερόμενες συναισθηματικές αντιδράσεις των συμμετεχόντων καταγράφηκαν. Η συνοχή/αντιστοιχία των ψυχο-φυσιολογικών και αυτό-αναφερόμενων συναισθηματικών αντιδράσεων των συμμετεχόντων καθώς επίσης και η επίδραση του αρνητικού συναισθήματος σε συμπεριφορικές μετρήσεις, π.χ. κατανάλωση τροφής (bogus taste task) και εκτίμηση των διαστάσεων του σώματος, εξετάστηκαν ως ενδείξεις συναισθηματικής ρύθμισης. Τα αποτελέσματα από την παρούσα μελέτη υποδεικνύουν ότι η συναισθηματική εμπειρία των ατόμων σε υψηλό ρίσκο για ΔΔ χαρακτηρίζεται από αυξημένη ψυχο-

φυσιολογική διέγερση στο αρνητικό συναίσθημα τόσο σε γενικό πλαίσιο όσο και σε πλαίσιο σχετικό με ΔΔ καθώς και από ελλιπή ενημερότητα των ψυχο-φυσιολογικών τους αντιδράσεων.

Επιπλέον, μετρήσεις αυτό-αναφοράς με έμφαση στο περιεχόμενο των γνωσιών, όπως πεποιθήσεις για την αυτό-αξία και γνωσίες για την εμφάνιση, καθώς και με έμφαση σε λειτουργικά στοιχεία, όπως η ακαμψία στην εικόνα σώματος και οι δεξιότητες ρύθμισης των συναισθημάτων εξετάστηκαν σε σχέση με τις ψυχοφυσιολογικές ενδείξεις και συμπεριφορικές μετρήσεις που συλλέχθηκαν. Η παρούσα διδακτορική μελέτη παρέχει προκαταρκτικά ευρήματα που υπογραμμίζουν το ρόλο εμπειρικών (π.χ., ευαλωτότητα στο αρνητικό συναίσθημα) και λειτουργικών στοιχείων (π.χ., ακαμψία για την εικόνα σώματος) στην ανάπτυξη των ΔΔ και περαιτέρω υποστηρίζουν μοντέλα αποδοχής και ενσυνειδητότητας.

ABSTRACT

Eating Disorders (ED) constitute a serious public health issue with increasing prevalence rates among young females. Current directions in the field support that ED exist on a continuum of absolute absence of disordered eating, subtle gradation of symptoms severity and clinical ED diagnosis (Shisslak, Crago & Estes, 1995). Even though high risk factors for ED have been extensively listed in the empirical literature, the mechanism underlying the development of ED still remains inconclusive. Current models of ED point to different mechanisms with: i) a focus on experiential-functional components such as sensitivity to affective cues and emotion regulation difficulty (Merwin, 2011), and ii) a cognitive-content emphasis suggesting a maladaptive self-evaluation scheme where self-esteem cognitions rely almost exclusively on appearance (Fairburn, Cooper, Shafran, 2003). The present study aims to examine these mechanisms using cross-sectional and experimental data (self-reported, physiological and behavioral). During the cross-sectional study (Phase I) participants aged 14-24 years were screened for high risk in developing an ED. Subsequently, a group of high risk participants and a group of low risk participants took part in the experimental study (Phase II). The purpose of the experiment was to examine emotional reactivity and emotion regulation between the two groups in response to pathology-specific and general affective film stimuli. Physiological measures such as heart rate, skin conductance and corrugator activity, as well as subjective affect ratings were recorded. The discrepancy between physiological and subjective reactions to negative affect and affect impact on behavioral measures employed (bogus taste task and body-size estimations) were examined as indications of emotion regulation in both ED risk groups. Based on these preliminary results, the affective experience of high risk participants is characterized by an overall hypersensitivity to negative affect in both general and pathology-specific contexts as well as of lack of awareness in regards to their autonomic responses.

Additionally, self-report measures with an emphasis on cognitive content, that is appearance schemata and beliefs on self-worth, and on functional components such as body-image inflexibility were examined in relation to the physiological indices and behavioral outcomes collected. The present dissertational project provides preliminary findings that highlight the role of experiential (i.e., hypersensitivity to negative affect) and functional (i.e., body-image inflexibility) components in the development of ED risk and build upon existing acceptance and mindfulness models.

"To the women who run with the wolves…"

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Chapter 1: General Introduction

Eating Disorders (ED) including Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Binge Eating disorder (BED) (DSM-V; American Psychiatric Association, 2013), constitute a serious public health problem with constantly increasing prevalence rates among adolescents and young adults (Smink, van Hoeken & Hoek, 2012; Richard, 2005). ED are characterized by severe disturbances in an individual's eating behaviors as a result of a pre-occupation with body-image and often have serious physical effects as well as enduring psychological difficulties (Richards, 2005).

Contemporary theoretical models argue for a unified approach claiming that ED do not consist distinct categories but rather lie on a continuum, ranging from normal eating to full disorder including subtle variations of eating pathology (Shisslak, Crago & Estes, 1995). In this line of argument, Cognitive-Behavioral Theory (Fairburn, Cooper, Shafran, 2003) proposes a new transdiagnostic treatment model, i.e. CBT-enhanced that is based on the notion that eating pathology has a common mechanism underlying all ED diagnosis. This mechanism entails a maladaptive self-evaluation scheme and more specifically a core low self-esteem that relies almost exclusively on body shape and weight and an extreme need to control eating or other life areas (Fairburn, Cooper, Shafran, 2003; Fairburn, Shafram, & Cooper, 1999). The dominant role of self-esteem has received a great deal of empirical support. More specifically, low self-esteem has been found to increase the risk by eight times in developing ED symptoms, based on the Eating Attitudes test-26 (EAT-26), in a community sample of schoolgirls aged 11-12 and 15-16 years (Button, Sonuga-Barke, Davies, & Thompson, 1996). In cross-sectional studies, self-esteem deficits have been documented in both girls and women who present disturbed eating in comparison to healthy cohorts (Shisslak, Crago, Renger & Clark-Wagner, 1998). In addition, longitudinal studies have provided further evidence for the protective role of higher self-esteem in later body dissatisfaction in 12-13 year adolescents (Ghaderi & Scott, 2001; Beato-Fernández, Rodríguez-Cano, Belmonte-Llario & Martínez-Delgado, 2004).

Despite the well acknowledged role of a maladaptive self-evaluation scheme, CBT intervention protocols that target core self-beliefs were found less effective than expected, especially in regards to their long-term benefits across ED subtypes and disappointing

efficacy for AN (Zipfel, et al., 2014; Wilson, Grilo, & Vitousek, 2007; Juarascio, Forman, & Herbert, 2010). This is possibly due to individuals with ED being less able to regulate their emotions and lack the ability to efficiently identify and process their emotional states and somatic sensations (Haynos & Fruzzetti, 2011). These experiential deficits might not be adequately dealt with in traditional CBT models (Merwin, 2011; Juarascio et al., 2013).

There is growing evidence for the role of somatic-affective experience in the development and maintenance of ED. Lack of emotional awareness (Racine & Wildes, 2013; Lech, Holmqvist & Andersson, 2012), emotional expression (Claes et al, 2012; Davies, Swan, Schmidt & Tchanturia, 2012) as well as experiential avoidance (Rawal, Park, & Williams, 2010) in individuals with clinical and subclinical levels of ED are empirically evidenced. These deficits as evidenced in both clinical and subclinical samples point to difficulties in emotion regulation, the nature of which still remains poorly understood due to the different terminology used and the methodology employed by each of the above mentioned studies.

Emotion regulation refers to the processes used by individuals to influence their emotions and more specifically to control, either consciously or unconsciously, their emotional experience in terms of which emotions they have, when they have them and how they experience and express them (Gross, 1998). Experiential avoidance that entails attempts to regulate emotions via maladaptive ways such as suppression, avoidance and control is linked to eating pathology. Preliminary results suggest that there are high rates of emotional avoidance in patient with AN which mediates the relation between depressive and anxiety symptoms and eating pathology severity (Wildes, Ringham & Marcus, 2010) thus pointing to the function of AN symptoms used as a way to avoid aversive emotional states.

The function of ED symptoms as well as experiential avoidance as defined above are targets of Acceptance and Commitment Therapy (ACT) (Manlick, Cochran, & Koon, 2013) that is a third wave behavioral therapy. ACT rests on the premises that human functioning and adaptability may be improved by helping individuals live more fully in the present moment, observe and accept their somatic-affective experience and act effectively in the presence of negative internal events such as sensations, emotional states and cognitions. The above mentioned processes underlie the construct of psychological flexibility that is found to be significantly compromised in individuals with eating pathology.

Psychological inflexibility in individuals with ED is expressed via an extreme preoccupation with appearance and ineffective control strategies. These control strategies are

focused on weight and appearance and they are maintained via reinforcement of resulting weight loss. In addition, they may serve as a possible bypass of emotional experience. Both somatic and affective cues are avoided since they are uncontrollable, they entail ambiguity and uncertainty and seem to threaten control over one's life. Controlling the experience of the body, including aversive emotional cues and somatic-affective arousal, provides a sense of safety and certainty which is highly needed in individuals with ED (especially with AN). Based on this conceptualization, patients with ED do not rely on any somatic signals, including emotion, to determine their behavior (Merwin, Timko, Moscovich, Ingle, Bulik & Zucker, 2010). Over time, this may generate hyposensitivity to somatic-affective cues and maintains low interoceptive awareness, which is the difficulty in accepting emotional experience and having clarity for emotional responses (Merwin, 2011).

In this framework, psychological inflexibility is considered as a viable process that maintains eating pathology especially as it appears in AN. Preliminary evidence suggests that improvements in psychological inflexibility and more specifically reductions in experiential avoidance and improvements in acceptance were concurrently observed with symptom remission in adolescents with AN (Timko, Zucker, Herbert, Rodriguez, & Merwin, 2015). In addition, interventions incorporating emotion acceptance techniques have promising results showing modest weight gains in AN patients and improvements in depressive and anxiety symptoms, emotion avoidance, and quality of life (Wildes & Marcus, 2011).

In conclusion, difficulties in emotion regulation incorporating difficulties in sensing, labeling and responding to somatic-affective experience have received increasing attention in the development and maintenance of eating pathology. However, the nature of these deficits remains poorly understood due to a number of challenges, including the different terminology (e.g., interoceptive awareness, sensory sensitivity, emotion regulation, etc.) as well as the over-reliance on self-report measures which mainly assess the individual's perception of their experience, rather than their actual physiological experience.

The physiological component of emotional response in individuals with ED

Even though individuals with ED engage in emotional avoidance, the intensity of their emotional experience is found to increase (Gross & Levenson, 1997). This is demonstrated in studies measuring emotional reactivity through physiological measures in individuals with ED (Zhu et al., 2012; Friedrich et al., 2006; Vocks, Legenbauer, Wachter, Wucherer, & Kosfelder, 2007; Tchanturia, Liao, Uher, Lawrence, Treasure, & Campbell, 2007; Gross &

Levenson, 1997; Green, Hallengren, Davids, Riopel & Skaggs, 2009). *Autonomic disturbances* are observed in clinical (Mazurak, Enck, Muth, Teufel, & Zipfel, 2011) and subclinical (Green, Hallengren, Davids, Riopel & Skaggs, 2009) presentation of ED. There are however, contradictory findings on the severity and specificity of these disturbances in the clinical population with some studies supporting parasympathetic dominance and decreased sympathetic modulation while others show the exact opposite pattern of results. Evidence showing sympathetic dominance supports a hypersensitivity to negative affect (Merwin et al., 2013). On the contrary, ED patients are not able to accurately detect their own heartbeat, a finding that despite being confounded by low weight (Pollatos et al., 2008) suggests decreased visceral sensitivity. This finding as well as patients' lack of emotional awareness has been taken to suggest hyposensitivity to somatic-affective experiences (Merwin et al., 2013). These claims on the hyper vs. hypo sensitivity to negative affect remains however at the level of speculation since the majority of studies rely on self-report measures while experimental studies differ in the stimuli they use to provoke emotional reactions thus resulting in inconsistent findings (Merwin et al, 2011; Treasure, 2012).

Methodological variations in studying emotion processing in ED

The difficulty in managing heightened arousal to negative stimuli in individuals with eating pathology has been examined with diverse experimental methodologies including exposure to pictorial affective stimuli (positive, negative, neutral) (Friederich et al, 2006), food stimuli (Friederich et al, 2006; Giel et al., 2011), distorted (own vs. other) body images (Miyake et al., 2010), eating pathology related words (vs. neutral words) (Herbert et al, 2013) and film-clips (Fox et al., 2013; Evers et al., 2010; Davies et al, 2011).

Empirical findings resulting from such a diverse set of methodologies highlight that after employing unpleasant mood induction procedures individuals with ED: a) have decreased emotional expressions in response to film-clips, as assessed via the facial expressions in comparison to healthy controls (Davies, et al., 2011), b) rate food cues as less pleasurable, anxiety provoking (especially in AN) with an accompanied sense of losing control (especially in BN) in comparison to healthy controls (Friederich, et al., 2006; Giel, et al, 2011), and c) report increased negative emotions and cognitions when exposed to their own body image as compared to controls (Vocks et al., 2007). Findings from these studies cannot be generalized though, due to inconsistencies in experimental manipulations and variations in the response system that was assessed.

In addition, inconsistent manipulations and conflicting results are reported in studies investigating autonomic function. For example, autonomic function (as measured via Heart Rate Variability - HRV) was examined mostly in response to pathology relevant stimuli (e.g., body image and eating) and has confusing and rather contradictory findings as to the predominance of parasympathetic or sympathetic activity. Findings on emotional expression are again confusing, with studies reporting either increased corrugator activity in response to food stimuli (pathology-relevant stimulus) or attenuated facial expression (based on the Facial Expression Coding system) in response to negative and positive film-clips (general stimuli).

In conclusion, there are two sources of inconsistency noted in experimental studies, the affective context used to elicit emotions, general and pathology-specific, and the different measurements implemented. Conclusions on the specificity of the emotion regulation deficits and the indices of emotional response (physiological, behavioral) through which these deficits become apparent remain inconclusive.

Summary

Empirical literature has signified some fundamental difficulties in emotion regulation and cognitive processes in relation to body image and food consumption in individuals with ED and subclinical ED. However, there is still a great deal of disagreement and ambiguity regarding the following:

1. Sensitivity to emotional stimuli and its etiological role in the development of ED at a subclinical level

2. The emotional context in which emotion regulation difficulties arise and their relation to the development of ED (i.e., only in pathology relevant situations and/or in response to more general emotional situations)

3. The relative contribution of self-evaluation cognitions vs. sensitivity to emotional stimuli in ED risk scores among youth.

In conclusion, research cannot yet provide consistent evidence for the *hypothesis of hypo or hypersensitivity to affective cues* and its etiological role in the development of ED. It is not yet clear whether heightened negative affect and difficulties in emotion regulation are present in individuals at high risk for ED. More interestingly, there are no conclusions on the pathophysiological correlates of ED or of subtle gradations of ED symptoms. Moreover, the context where emotion regulation difficulties emerge and correlate with ED high risk is yet to be specified. That is, it is unclear whether individuals with ED symptomatology have more

intense emotional reactions in response to emotional stimuli generally, or only in response to pathology-specific stimuli. Finally, the relationship between experiential/affective and cognitive components of ED risk have yet to be explored.

Present Thesis

The aim of the present thesis is to examine emotional reactivity in response to pathology-specific and general affective stimuli in female adolescents and young adults at high vs. low risk for ED. Physiological measures such as heart rate, skin conductance and corrugator activity were recorded while subjective emotional ratings were also collected. Physiological and self-reported reactions were compared in both conditions, general and pathology-specific. Behavioral tasks of body size estimations and food consumption were administered to determine the impact of emotional arousal on pathology-relevant behavior. We expected that participants in high risk for ED would present with higher reactivity to negative affect in both conditions and more intensely in the pathology-specific condition. We also expected that the behavioral outcomes in both tasks would be more profoundly affected by negative affect induced in the pathology-specific condition for the high risk group as compared to the low risk group.

Additionally, self-report measures on psychological factors, pertaining to the level of self-esteem, appearance schemas, body-image inflexibility, and emotion regulation skills were administered to participants and were combined with the physiological indices and behavioral outcomes collected. The measures on self-esteem, self-schemata reflect the participants' beliefs and reflect the cognitive aspects of ED while the psychophysiological measures as well as self-report measure on psychological inflexibility and emotion regulation skills reflect the experiential and functional aspects of ED respectively. These measures allowed us to test cognitive vs. experiential/functional aspects of ED and their relative contribution in ED risk.

A subclinical sample was used in order to avoid the confounding (physical and psychological) effects of ED symptoms (e.g. starvation, excessive exercise, vomiting, laxative/diuretics use) in the acute or chronic stages of the illness either in the context of AN or BN. This is a limitation of previous research studies that to date restricts our understanding of factors that contribute to the development of ED.

In addition, adolescents and youth were selected to participate in the current project since adolescence and young adulthood is considered as a critical age for developing eating pathology in females. Based on Southgate and colleagues (2005), adolescence poses an

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increased number of challenges and psycho-social demands that individuals often fail to manage. Emotional regulation deficits and maladaptive self-attributions are related to difficulties in meeting significant developmental psycho-social milestones in adolescence. These factors may often trigger disordered eating in young college students when freshly admitted to the university (Soet & Sevig, 2006).

   Overall, the strengths of the present thesis lie in the integration of data from multiple sources that is from both physiological and self-report measures as well as behavioral outcomes, and thus provides a deeper understanding of the cognitive and emotional aspects underlying ED risk. The present finding : i) elaborate on the role of emotional responding in ED symptomatology, ii) contribute in existing acceptance and mindfulness models in the field, and iii) inform preventive efforts with adolescents and youth.

Overview of Studies

   Study 1

   The first study (Chapter 2) aimed to identify individuals at high and low risk for ED among adolescents and young adults recruited via high/middle schools and the university respectively. Self-reported measures were administered to screen for ED risk and ED diagnosis. The female individuals identified as having an increased risk for ED were later invited to take part in the following experimental study (see Chapter 3), while individuals meeting criteria for an ED diagnosis were excluded from the study. Prevalence rates of ED risk, subthreshold and threshold ED are examined separately for middle/high school students and university students and compared to prior epidemiological studies conducted locally and internationally. A preliminary investigation of demographic and individual factors such as gender, age, dieting, exercise, and body dissatisfaction as predictors of ED risk was conducted in each age cohort in order to understand disordered eating attitudes and behaviors among Cypriot adolescents and young adults.

   Study 2

   The second study (Chapter 3) was conducted to develop and test the efficacy of a set of four film-clips to induce negative affect. More specifically, the study examined the subjective emotional experience (valence, arousal, anxiety, induction of annoying somatic symptoms and ability to control reactions during film-clips) of Greek-Cypriot university students in response to three types of film clips: general unpleasant, ED-specific unpleasant, and emotionally neutral. Secondly, the study aimed to compare the emotional reactions to the

aforementioned clips between two groups differing on their risk for ED (high vs. low). Based on these preliminary findings, the most effective clip in their category (general, pathology-specific) are presented and selected for the mood induction procedure employed in the following study.

Study 3

The third study (Chapter 4) aimed to assess the physiological and subjective emotional responses of female adolescents and young adults in high vs. low risk for ED in two affective contexts induced via film clip with general and pathology-specific content. Physiological measures of Heart Rate (HR), skin conductance levels (SCLs) and corrugator activity were recorded throughout the exposure to these film-clips while self-reported affect ratings were also administered. A high discrepancy between physiological reactions of negative affect and self-reported affect (through ratings on valence, arousal and control) was examined as a possible indication of emotional dysregulation reflecting lack of emotional awareness. The effect of negative affect induced through film-clips was examined on body size evaluations and on food consumption, via a behavioral task, namely the bogus taste task. These tasks were carried out after the film-clips. The influence of emotion on eating and body-size estimations was considered to reflect participants' ability to modulate emotions and their impact on behavior and was thus examined as a possible indication of their emotion regulation skills. Prior to the experiment, participants completed a battery of self-reported questionnaires measuring either participants 'cognitions/beliefs (i.e., self-esteem level, appearance schemas) or their relation to such cognitions and emotions (i.e., level of psychological flexibility, emotion regulation skills). Individual differences on these measures were examined between the two ED risk groups of the study.

Study 4

The aim of the present study (Chapter 5) was to develop and assess an expanded theoretical model for predicting ED risk integrating results from our prior cross-sectional and experimental research (Chapter 3). More specifically, the relative contribution of cognitive vs. experiential/functional constructs was examined in relation to ED risk. More specifically, measures with an emphasis on cognitive content such as the measures assessing self-esteem, appearance schemata, and measures with an emphasis on functional content such as body-image inflexibility and emotion regulation skills as well as experiential measures such as physiological indices of arousal (Heart Rate and Skin Conductance Levels) and self-reported

affect (PANAS Negative Affect) were examined in order to identify the most potent and significant predictors of ED risk in female adolescents and young adults.

Chapter 2: Prevalence and correlates of Eating Disorders in Greek-Cypriot adolescents and young adults

Introduction

Based on the revised Diagnostic and Statistical Manual for Mental Disorders-5 (DSM-5), three main diagnoses are specified under the heading "Feeding and Eating Disorders", Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Binge Eating disorder (BED) (American Psychiatric Association, 2013). Eating disorders (ED), as specified above, have a high prevalence among adolescents and young adults and have potentially serious physical and psychological consequences making them a major public health hazard in these populations (Berg, Frazier & Sherr, 2009; Sanlier, Yabanci & Alyakut, 2008).

Contemporary theorists suggest that eating pathology may actually lie on a continuum, ranging from normal eating to full disorder (Shisslak, Crago & Estes, 1995). On this continuum, high risk differs from partial or subclinical/subthreshold ED in terms of symptom intensity and frequency e.g. frequency of caloric restrictions (Dancyger & Garfinkel, 1995; Fairburn & Beglin 1990). ED high risk thus refers to individuals who present with body shape/weight disturbance and weight loss behaviors but do not currently meet the criteria for having an ED diagnosis. Despite the lower intensity of eating pathology among individuals at high-risk for developing an ED compared to individuals who already meet criteria for an ED, they nevertheless present significant mental and health risks, such as anxiety problems and alcohol abuse (Fisher, Schneider, Pegler, & Napolitano, 1991), low self-esteem and social adjustment (Crow, Stewart Agras, Halmi, Mitchell, & Kraemer , 2002; Jacobi, Abascal, & Taylor, 2003).

The lifetime prevalence of AN based on the DSM-5 criteria is 1.7%, of BN 0.8% and of BED 2.3% (Smink, van Hoeken, Oldehinkel, & Hoek, 2014). In regards to the sub-threshold ED, a cross-sectional survey conducted in six European countries with adults 18 years and older found rates of 0.72% for sub-threshold BED and 2.15% for any other binge eating (Preti, Girolamo, Vilagut, Alonso, Graaf, Bruffaerts, & Morosini, 2009). In the US, a nationwide survey revealed high prevalence estimates of 0.8% for sub-threshold AN and 2.5% for sub-threshold BED in adolescents aged 13-18 years (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Research in Europe and the US thus provide evidence that

sub-threshold ED are increasing in prevalence while the age of onset seems to be decreasing (Davison, Markey, & Birch, 2003).

Risk factors

Several studies point to well established demographic and individual factors that are consistently linked with ED onset (see Jakobi, Hayward, de Zwaan., Kraemer & Agras, 2004 and Stice, 2002 for a review). One of the most important contributing factors to the development of ED is gender. ED are characterized as gender-specific disorders since disordered eating patterns and attitudes are three times higher in females than in men (American Psychiatric Association, 2013). Societal and cultural factors placing a great value on the ideal female body that seems to be shrinking in size over the years leads to body dissatisfaction and drive for thinness among females of specific age groups (Sypeck, Gray, Ahrens, 2003; Keel & Forney, 2013; Stice et al., 2004).

A predisposition for ED is also associated with specific age ranges that seem to be critical for the development of this group of disorders, especially among females. Middle adolescence is considered a period of peak risk since it is associated with significant changes in the development of neurobiological and social functioning (Southgate, Tchanturia Treasure, 2005). Early adulthood and more specifically the transition from adolescence to adulthood that for most individuals in western countries is associated with college entry poses significant challenges for the individual. The competition for succeeding in college entry, the choice of major, academic responsibilities and course attendance and the social pressures of campus life are perceived as important stressors. In the context of individual vulnerability, this distress may result in the manifestation of various clinical symptoms, with ED being the second most common psychological disorder (6.1%) after depression (14.9%) among this age group (Rand & Kuldau, 1991). More specifically, the first year of college has been associated with increased ED risk (Delinsky & Wilson, 2008) while high rates of ED are also found among graduate students (Berg et al, 2009; Delinsky & Wilson, 2008).

One of the most robust factors contributing to the development of ED is body dissatisfaction that is defined as the discrepancy between one's actual body size/shape to one's ideal body size/shape (Cash & Deagle, 1997; Neighbors & Sobal, 2007) and it is often linked to unrealistic weight loss goals. Reaching one's unrealistic weight loss goals requires intense caloric deprivation. This type of dietary restriction increases the likelihood for binge eating intervals that will subsequently intensify one's dietary efforts (Stice, 2002). This spiral

setting of events is often met in individuals at high risk for ED in less frequency and or intensity that in individuals with ED diagnosis (in Levine, Smolak, Moodey, Shuman, & Hessen, 1994). In conclusion, a high discrepancy between current and ideal weight is considered another important risk factor in the development of ED.

Normal dieting will not necessarily lead to ED symptoms; however, specific behaviors associated with dieting predict ED onset. Such behaviors include, preoccupation with eating and body, wanting to have an empty stomach, and fear of losing control over eating (Fairburn, Cooper, Doll, & Davies, 2005). When these behaviors are assessed in dieters aged 16 to 23 years, they resemble ED clinical symptoms with less severity. Interestingly, even thoughts of dieting and "being on a diet" increase risk for developing an ED, as found in female students during their first year in college (Anstine & Grinenko 2000). Based on a meta-analytic review by Stice (2002), there is consistent evidence supporting the association of dieting with eating pathology even though the mechanism by which these are linked is not yet fully understood.

Compulsive exercise in the context of weight and shape concerns also plays a key role in the development of eating pathology and it is often an overlooked risk factor of ED. Compulsive exercise that is used as a weight loss behavior and as an affect regulation strategy is often encountered in individuals with ED diagnosis or at risk for ED (see, Meyer, Taranis, Goodwin & Haycraft, 2011, for a review). Over-exercising as a way of counteracting the effects of eating, as an attempt to lose weight or as a way to distract from negative emotions can lead to ED especially if over-exercise is the main and probably the only focus of individuals on the expense of other important areas of their life such as school, work, relations etc.

Most of the above mentioned risk factors have received strong empirical support (for a review see Stice, 2002) mainly from studies conducted in Western countries. There are however indications that cultural factors have differential effects on the expression of ED (Jackson, Keel and Lee, 2006). The current study aims to examine ED prevalence rates and correlated risk factors in a non-Western country, Cyprus.

Current state of the art in Cyprus

In Cyprus a significant increase in ED incidents, and more precisely a doubling of cases between 1992 and 2002, was registered in the records of the Child and Adolescent Psychiatric Ward at Makarios Hospital (that is the Cyprus governmental hospital). This alarming increase led to the first epidemiological study in 2003 by Hadjigeorgiou and

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colleagues. In a sample of 1900 adolescents aged 10 to 18 years, 18.8% of males and 34.4% of females were identified as high risk for ED based on their self-reported body weight/shape concerns and disordered eating behaviors. In a replication of the study in 2010, the results showed an increasing trend with females at risk reaching 35.9%. In addition, a significant increase in the maladaptive thoughts and behaviors associated with binge eating and self-induced vomiting was found in the 30.6% of the sample (Hadjigeorgiou, Tornaritis, Savva, Solea, & Kafatos, 2012).

In another study conducted in a public high school in the capital of Cyprus in 2011, a substantial number of 29.6% of middle school students declared dieting and 13.4% were assessed to be at high risk for ED (Koushiou, Loutsiou-Ladd, Christodoulou, Demetriou, Kapetaniou, Karekla, 2012). Among university students, 13.9% were at risk for developing ED (Kyranides, Koushiou, Loutsiou-Ladd, Loizidou, Neokleous, 2011). This data are disconcerting from a public health perspective and points to the need of close monitoring of prevalence rates of eating pathology among Cypriot youth.

It is important to note that previous studies conducted in Cyprus have not thoroughly examined eating pathology correlated factors in at risk individuals. Given the importance of the cultural context in the development of eating pathology, the above-mentioned risk factors and their relation to ED prevalence among Greek-Cypriot youth fall under the scope of the present study.

Present Study

The present study has a two-fold aim, at first to explore the prevalence rates of eating pathology among Greek-Cypriot adolescents and young adults and second to examine the above mentioned factors that are associated with increased risk for ED.

To our knowledge there is no published study exploring ED risk factors in Greek-Cypriot individuals above the age of 18 years. Furthermore, the examination of the role of certain demographic and individual risk factors such as gender, age, dieting, exercise, and body dissatisfaction is deemed necessary for understanding disordered eating attitudes and behaviors among Cypriot adolescents and young adults.

Method

Participants

A total of 1081 students aged 13 to 32 years (*M*= 16.79, *SD*= 2. 95) participated in the study. Of those, 741 were middle and high school students while the rest (*N*=340) were

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university students. The vast majority of the sample (90%) was Greek-Cypriot while 4% were Greeks or other (4%). Middle and high school students (*Mag*e= 15.12, *SD*=1.34) were recruited from twenty-five public schools in the Republic of Cyprus with 55% coming from middle schools. 63% of the middle and high school students were female. Regarding the university students (*Mage*=20.68, *SD*= 1.76), 90% were female. 37% were on the final year of their undergraduate studies, 21% on their third year, 23% on their second year and 15% on their first year and 1% were graduate students.

Procedure

Middle and High Schools

Twenty-five public middle and high schools were recruited from the government-controlled area of Cyprus and more specifically, from the districts of Nicosia (12 schools), Limassol (five schools), Larnaka (five schools), Paphos (one school) and the free part of Famagusta (two schools). The schools were recruited via the Health Promotion Network of the Ministry of Education and Culture and all the necessary approvals were obtained in advance from the Cyprus Bioethics Committee. Informed consent was obtained from the participants as well as from their parents/guardians. Questionnaires were completed during class time and supervised by the project's researchers in collaboration with teachers. Parents were informed about the results only in the case that their child was at risk or was found to meet the criteria for an ED diagnosis. In the latter case, parents were encouraged to seek further assessment and possibly treatment for their child.

University

University students participated in the study in exchange for course credit. Participants completed the questionnaires package in group format during course time. Written consent was obtained from each student who participated in the study.

Participants who met criteria for an ED based on their score on the Eating Diagnostic Scale were referred for further testing and treatment at the Center for the Prevention and Treatment of Eating Disorders.

Measures

Measures not already available in Greek were translated following a standard front and back translation by doctoral students fluent in both languages. The questionnaires (see Appendix A) were administered in a separate pilot sample that was used for validation purposes and all were found to have adequate psychometric properties .

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The Demographic/Historical Data questionnaire was compiled by the authors to obtain demographic and personal information including participants' medical history, eating and exercise habits and weight status and goals (current, highest, lowest, ideal and disappointing).

The Eating disorder diagnostic scale (EDDS; Stice, Telch, & Rizvi, 2000) is a 22 item self-report measure answered on a 0-6 Likert scale, assessing the presence of ED. Answers can be used to provide a composite score for ED, a possible diagnosis for AN, BN and BED and the corresponding sub-threshold syndromes based on DSM-IV criteria. The scale was included in the present study to identify individuals with an ED diagnosis and sub-threshold syndromes. The scale has shown high test-retest reliability (r=.87) and internal consistency (*mean a*=.89) in previous studies (Stice, Telch, & Risvi, 2000) and adequate reliability in the present study for both middle-high school (α=0.67) and university students (α=0.66).

The Weight Concern Scale (Killen, et al., 1994) is a 5-item questionnaire assessing fear of weight gain, worry about weight and body shape, importance placed on weight, diet history, and perceived fatness. It has been associated to ED onset in female adolescents over a 4-year period (Killen et al., 1996). A score of greater than 52 is indicative of high risk for developing ED. Adequate psychometric properties with $a > .7$ have been reported in previous studies (Killen et al, 1994; Killen et al., 1996) and satisfactory internal consistency in both university (α= 0.75) and high and middle school students (α=0.80) in the present study. Exploratory Factor Analysis with Principal Components extraction method yielded a one component with eigenvalue over Kaiser's criterion of 1 accounting for 59.25% of the variance.

Results

Eating Disorder Risk prevalence and relevant parameters

Based on the participants' scores on the WCS, university students had higher total scores (*M*=38.97, *SD*=23.96) in comparison to middle/high schools students (*M*=32.71, *SD*=24.56). Higher scores were noted for females in both age cohorts (middle/high school students: *M*=38.66, *SD*=25.22; university students: *M*=40.64, *SD*=23.67) in comparison to males (middle/high school students: *M*=22.89, *SD*=19.89; university students: *M*=23.33, *SD*=21.22). Regarding the EDDS, middle/high schools students gave similar total scores (*M*=29.21, *SD*=8.85) in comparison to university students (*M*=30.15, *SD*=9.68). The mean score of adolescent female students was 30.70 (*SD*=8.68) and for university female students

was 30.64 (*SD*=9.79). For male, university students gave similar overall scores (*M*=25.80, *SD*=7.50) in comparison to middle/high school students (*M*=26.81, *SD*=8.61). Table 2-1 presents the prevalence results on Eating Disorder risk and diagnosis (that is cases meeting threshold criteria for an ED diagnosis based on the EDDS), including sub-threshold syndromes.

Table 2-1.
Prevalence rates of ED risk and diagnosis among middle-high school and university students

	Middle and High School Students		University students		Total	
Weight Concern Scale	N	%	N	%	N	%
High risk	141	21.40	102	30.50	275	26
Low Risk	518	78.60	232	68.20	787	64
Eating Disorder Diagnostic Scale*						
Anorexia Nervosa	40	5.40	31	9.11	71	6.55
Bulimia Nervosa	22	3	25	7.35	47	4.33
Binge Eating Disorder	8	1.10	4	1.18	12	1.11
Subthreshold Anorexia Nervosa	65	8.77	32	9.41	97	8.97
Subthreshold Bulimia Nervosa	46	6.21	16	4.71	62	5.73
Subthreshold Binge Eating Disorder	2	0.26	1	0.29	3	0.28

*Note: The prevalence rates mentioned for the diagnostic categories of the Eating Disorders Diagnostic scale refer to Eating Disorder symptoms meeting threshold criteria and do not necessarily warrant a diagnosis

Table 2-2 presents results on ED risk and related factors such as engaging in diet, exercise, and discrepancy between present and ideal weight. Results are presented separately for middle-high school students and university students. Based on the participants' responses, 79% do not follow a specific type of diet and only 21% reported a specific type of diet that was mostly described as a Mediterranean diet. 86% of the participants declared that a member of their family prepares their meals while only 11% cooked on their own. 79% of the participants reported that they engage in exercise and most of them (43%) exercise 3-4 times per week. 769 (72%) of the participants reported that they are not currently on a diet.

Table 2-2. Eating Disorder Risk and related parameters among middle school, high school and university students*

	Middle and High School Students n = 673		University students n= 278	
	Low Risk	High Risk	Low Risk	High risk
Gender				
Female	293	117	182	65
Male	225	24	30	1
On a diet				
Yes	61	107	28	45
No	455	33	184	20
Discrepancy between present and ideal weight				
1-5kg	194	42	79	21
6-10kg	65	33	29	17
11 +kg	47	50	18	19
Exercise				
1-2 times per week	105	37	49	15
3-4 times per week	204	50	48	23
5-7 times per week	115	30	16	4
7+ times per week	50	5	1	0

Note: Cases meeting threshold criteria for an ED diagnosis on the EDDS are excluded.

Based on their total scores on the Weight Concern Scale, 26% of the participants were at high risk for developing an ED. 12% of the sample presented clinical symptoms fulfilling the criteria for AN (6.55%) or BN (4.33%) or BED (1.11%) based on their scores on the Eating Disorders Diagnostic Scale while 15% of the participants presented with sub-threshold ED.

Participants were classified based on their self-reported measures on height and weight following the World Health Organization guidelines on Body Mass Index (BMI; calculated as weight in kilograms divided by height in meters squared). Participants were classified as follows: 24% of the participants were underweight (BMI less than 18.5), 64% fell within the normal range (18.5 and 25), 10% were overweight (BMI between 26 and 30) while the rest (2%) had a BMI above 30.

Middle and High School Students

Based on their total score on the Weight Concern Scale, 21.40% of the middle and high school participants were at high risk for Eating Disorders. Rates of ED risk were found higher in female students aged 14 years (6.61%) and 16 years old (5.53%). 9.5% of the participants reported clinical symptoms pertaining to one of the three Eating Disorders diagnosis, Anorexia (5.34%), Bulimia (3.01%) and Binge Eating Disorder (1.09%).

University Students

Based on the university students' total score on the Weight Concern Scale, 30% of the students (99 female and 3 male students) presented to be at high risk for developing an Eating Disorder. 9.11% of the university students reported clinical symptoms of AN, 7.35% of BN and 1.18% of BED.

Predictors of Eating Disorder Risk

Two multivariate logistic regressions with forward entry were conducted to determine potential ED risk factors separately for middle-high school students and university students. The dichotomous variable high/low ED risk was used as the dependent varibale while the following were entered as the independent variables: gender, age, dieting, exercise, discrepancy between present and ideal weight. School (middle and high school) was tested as an IV only in the adolescents sample. For the analysis, only participants previously deemed to be at risk for developing an ED were included. Table 2-3 presents these Logistic Regression results.

Middle and High School Students

The logistic regression model was statistically significant $\chi^2(9) = 236$, $p \leq .01$. The model explained 53% of the variance (Nagelkerke R^2) in high ED risk and correctly classified 88% of the participants. Gender, dieting, and a discrepancy of six kilos and above between present and ideal body weight significantly contributed in the prediction of the outcome risk for ED. Females were significantly more likely (Exp(B)= .30, p= .001) to present high risk for ED as compared to males. Participants who reported dieting had a 95% higher possibility to present high risk for ED (Exp(B)= .046, p= .000). In addition, the risk for ED was 62% higher for students reporting that they want to lose 6-10 kg to achieve their ideal weight (Exp(B)=.38, p= .04) while the risk percentage increased to 74% for those who wish to lose 11 or more kilos (Exp(B)= .26, p= .00).

University Students

The logistic regression model was statistically significant ($\chi^2(8) = 65.98$, $p \le .01$) explaining 56% of the variance (Nagelkerke R^2). The model correctly identified 88% of the university students. Four variables significantly predicted ED risk. Women had significantly higher odds for ED risk (Exp(B)= .05, $p<.05$). Also, the risk for ED was 96% higher in participants that engaged in dieting (Exp(B)= .04, $p<.001$) and 83% higher in students who reported that they want to lose 11 kg or more to achieve their ideal weight (Exp(B)= .16, $p<.05$). Participants who engage in exercise were less likely to develop an ED (Exp(B)= 13.18, $p= .02$).

Discussion

The present study aimed to investigate ED prevalence rates among Greek-Cypriot adolescents and young adults and explore the role of demographic and individual characteristics such as gender, age, dieting, exercise and present-ideal weight discrepancy in relation to the disordered eating attitudes and behaviors in at risk participants.

In a sample of middle and high school students, the prevalence of positive screens for high ED risk was 21.40%. This rate is slightly lower in comparison to two epidemiological studies conducted in Cyprus in 2003 and 2010 (Hadjigeorgiou, et al., 2012). Based on the first epidemiological study in 2003, the percentage of adolescents at risk for ED was 27% and it slightly increased in the second epidemiological study in 2010 with more females presenting disordered attitudes and behaviors (female percentage increased from 34.4% in 2003 to 35.9% in 2010). This discrepancy between the present study and the two previous epidemiological studies may be attributed to the differences in the screening questionnaires used to identify adolescents at risk. The present study used the Weight Concern Scale (WCS), a brief 5-item questionnaire to identify general concerns and attitudes in relation to eating pathology while the epidemiological studies mentioned above used a more extensive tool such as the EAT-26 that measures both disordered eating attitudes and behaviors (Jacobi, Abascal, & Taylor, 2003).

To our knowledge there are no previous published studies examining ED risk prevalence rates among young adults in Cyprus. The percentage of at risk university students in our sample is 30.50% that is similar to the results of another study reporting that 29.50% of university students (N=2,822) were screened positive for ED with symptoms that persisted even at a 2-year follow up (Eisenberg, Nicklett, Roeder, & Kirz, 2011). These rates further

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Table 2-3. Logistic Regression for Middle-High school and University students

	Middle and High School Students				University Students			
		95% CI for Odds Ratio				95% CI for Odds Ratio		
	B (SE)	Lower	Odds Ratio	Upper	B (SE)	Lower	Odds Ratio	Upper
Gender	1.18* (0.34)	1.68	12.23	6.34	-3.01* (1.39)	0	0.05	0.75
Age	-2.55 (2.81)	0	0.82	19.29	-2.41(3.66)	0	0.09	116.47
School (Middle school/High School)	-2.34 (0.52)	0.29	0.79	2.17	/	/	/	/
Diet	-3.09* (0.31)	0.02	0.05	0.08	-3.25* (0.65)	0.01	0.04	0.14
Exercise	-0.71 (1.24)	0.04	0.49	5.53	2.58* (1.14)	1.41	13.18	123.57
Exercise (duration)	-0.01 (0.01)	0.98	0.99	1	-0.01 (0.07)	0.78	0.78	1.05
Present-Ideal Weight Difference								
1-5 kg	0.19 (0.42)	0.53	1.22	2.79	-0.13 (0.80)	0.18	0.88	4.22
6-10 kg	-0.98* (0.47)	1.15	0.38	0.94	-0.17 (0.91)	0.14	0.84	4.98
11+ kg	-1.35* (0.45)	0.11	0.26	0.63	-1.80* (0.94)	0.03	0.16	1.04
Constant	-39.57 (42.91)		0		-48.37 (76.60)		0	

Note: For Middle and High School Students: R^2 = 3.68 (Hosmer & Lemeshow), .34 (Cox & Snell), .53 (Nagelkerke). Model $\chi^2(9)$ = 236.21, $p \leq$ .01. *$p \leq$ .01.

For University Students: R^2 = 0.62 (Hosmer & Lemeshow), .37 (Cox & Snell), .53 (Nagelkerke). Model $\chi^2(8)$ = 78.77, $p \leq$ .01. *$p \leq$ .01.

confirm that university students are another vulnerable group for developing ED (Delinsky & Wilson, 2008).

The current study is also the first to provide rates on the whole ED spectrum including prevalence rates for ED sub-threshold syndromes among Greek-Cypriot youth. The rates of ED diagnosis as derived based on the Eating Disorders Diagnostic Scale (EDDS) indicate that 9.50% and 17.64% of middle-high and university students respectively meet the threshold criteria of an ED. These rates are obviously greater than the rates presented in studies using strict DSM criteria such as structured interviews. They are however, similar with studies using dimensional measures yielding ED prevalence rates ranging between 14 to 22% in community youth samples (Swanson et al, 2011). In addition, prevalence rates of ED for university students range between 8 to 17% (Eisenberg et al., 2011), classifying ED as one of the most frequent group of disorders encountered in this population. Taken together, our findings on ED prevalence rates correspond with previous results, underscoring the urgent need for a more comprehensive assessment of the ED identified cases and for the implementation of prevention and intervention programs.

Higher prevalence rates are found for the sub-threshold ED syndromes with 15.24% middle-high school students presenting some but not all diagnostic ED symptoms. The fact that similar findings of subthreshold symptoms are found in the university students (14.41%) suggests that eating pathology may begin in adolescence and it is maintained as the person moves from adolescence to adulthood, emphasizing further the need for early screening and prevention (Stice, Marti, Shaw, & Jaconis, 2009).

Our study confirmed the role of well-established risk factors. Dieting and present to ideal weight discrepancy, all associated with body dissatisfaction; are significantly present in both adolescents and university students in high risk for ED. Our findings are in line with previous findings supporting that body dissatisfaction and self-reported dieting are among the most robust predictors of eating pathology across adolescence and early adulthood (Stice, Marti and Durant, 2011) persisting even later in a large segment of adults (Heatherton, Mahamedi, Striepe, Field, & Keel, 1997).

Based on the self-discrepancy theory (Higgins, 1987), individuals struggle to minimize the discrepancy between their actual self and their ideal self, including their appearance, body shape and weight. This divergence from actual to perceived body ideals has been linked with higher body dissatisfaction and disordered eating behaviors (Gluck & Geliebter, 2002;

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Neighbors & Sobal, 2007). In the present study, the discrepancy between present and ideal weight was found to differently contribute in the prediction of risk among adolescents and young adults. More specifically, a stricter criterion in terms of weight loss was related to ED risk among middle and high school students that is equal or exceeds 6 kilograms. For the university students this criterion was raised to 11 kilograms. These findings are crucial since there are no specific guidelines as to what consists a problematic weight loss goal and how this contributes in the development of ED in at risk populations such as adolescence and early adulthood. These results are interpreted though with caution since they are based on self-reported measures of weight. Objective Body Mass Index (BMI) measurements would allow more meaningful and accurate interpretation of present to ideal weight discrepancy in our sample.

Another important finding of the present study is that exercise was found to have a protective role since university students engaging in exercise were less likely to develop an ED. These results are in correspondence with previous findings pointing to the positive outcomes associated with healthy exercise such as reduced rates of hopelessness and depression and increased self-esteem among university students (Taliaferro, Rienzo, Pigg, Miller, Dodd, 2008; Thome & Espelage, 2004).

One possible limitation of the study is the relatively small sample of university students in comparison to the middle-high school students as well as the smaller sample of male university students. In addition, the lack of objective BMI measurements does not allow us to take into account the role of body composition in the interpretation of body dissatisfaction as measured by the discrepancy between present and ideal weight. Another limitation of the study is the identification of cases with ED full syndromes based on self-reported measures. Additional measures such as structured interviews or parents' questionnaires are important to determine ED diagnosis prevalence rates in future studies.

Despite these limitations, the present study provides important and novel information regarding the prevalence rates of the eating pathology spectrum, including high risk, sub-threshold and full symptom syndrome among Greek-Cypriot adolescents and young adults. Previous epidemiological studies in Cyprus did not include rates on the whole ED spectrum thus underestimating the actual magnitude of the eating pathology in the Greek-Cypriot population. More interestingly, this is the first study that examines the factors associated with increased ED risk among two different age cohorts, namely adolescence and early adulthood

in the Greek-Cypriot population. These factors can provide guidance for the development of age-specific screening tests and prevention practices delivered in schools and campuses.

Chapter 3: Inducing negative affect using film clips with general and Eating Disorders related content.

Introduction

Emotion induction through films

The increasing interest in the effects of emotion on social, cognitive and neural processes generates a constant need for reliable and efficient techniques of emotion elicitation. Emotion elicitation procedures to date include among others: music (Sutherland, Newman, & Rachman, 1982), mental imagery, static images, and hypnosis (Schaefer, Nils, Sanchez, Philippot, 2010). Utilizing emotional film clips is however one of the most effective methods of emotion elicitation (Schaefer, Nils, Sanchez, Philippot, 2010). Film clips have the desirable properties of being dynamic rather than static and provide artificial resemblance to real-life situations (Gross, & Levenson, 1995). Moreover, watching film-clips is a very popular activity to which participants can easily adapt to even under experimental conditions.

Film excerpts can elicit strong physiological and subjective responses and changes. Westernmann and colleagues (1996) showed in a meta-analysis that among various methods, film clips were the most effective ways to induce both negative and positive affect. There are however, several challenges in the development and validation of a database of film-clips that can be readily used by researchers as easily as other affective stimuli, such as the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1995). Selecting possible film sources, editing film-clips, collecting pilot data and finalizing edited film-clips entail several complications that may go beyond the scope and budget of experimental laboratories (Schaefer, et al.,, 2010). Despite these obstacles, there are reported attempts to develop libraries of film stimuli, mostly for the elicitation of basic emotions (Shaefer, et al., 2010; Gross & Levenson, 1995; Philippot, 1993). These libraries are not yet widely used and thus not well established. One of the reasons might be that they don't extent to specific content that is relevant to psychopathological conditions e.g. disordered eating or eating related concerns.

Emotional Reactivity in relation to eating pathology

Emotional processing and specifically maladaptive emotion regulation receives increasing empirical attention and it is included in the conceptualization of ED (Haynos & Fruzzetti, 2011; Merwin, 2011) with evidence suggesting high rates of emotional avoidance (Wildes, Ringham & Marcus, 2010), poor interoceptive awareness (Merwin, Zucker, Lacy &

Elliott, 2010), lack of emotional awareness (Racine & Wildes, 2013; Lech, Holmqvist & Andersson, 2012) and lack of emotional expression (Claes et al, 2012; Davies, Swan, Schmidt & Tchanturia, 2012) in individuals with clinical and subclinical levels of ED. All these constructs that are conceptually overlapping possibly pointing to slightly different processes indicate that difficulties in emotion regulation are significantly present in individuals with ED and contribute in the development and maintenance of eating pathology (Merwin, 2011).

Despite the wealth of cross-sectional studies supporting the relation between emotion dysregulation and eating pathology (Davies, Schmidt, Stahl, & Tchanturia, 2011), there have been limited experimental studies (Merwin, 2011) investigating emotional processing/reactivity of individuals with various ED symptoms. The few available experimental studies to date, that have used emotion induction paradigms via film-clips, were mainly conducted with clinical ED groups and used mainly general content clips to elicit basic emotions, e.g. negative affect (such as sadness) and then examine the effect on the pathology investigated such as binge eating (Svaldi et at., 2009), eating restriction (Warren et al., 2005), and body-size overestimation (Fox et al., 2013). For example, in a study by Davies et al. (2011) patients with Anorexia showed decreased positive emotion and avoided negative affect while watching a positive and a negative film-clip respectively as compared to healthy controls. In another study by Fox et al. (2013), participants with Anorexia and healthy controls followed an anger induction procedure that involved watching a general content film-clip inducing anger. Even though participants did not differ on the level of anger experienced, participants with Anorexia reported significantly higher disgust levels and performed more inaccurate body-size estimations. Based on these findings, patients with Anorexia show a maladaptive response to anger which is transferred to the body and thus experienced as self-disgust; a feeling that associates with experiencing one's body as bigger or fatter. One of the few studies using affective priming with pathology content presented a film clip depicting body relevant information to women with BED and overweight healthy controls (Svaldi et al., 2009). The information included in the clip was selected to activate participants' body-related schema. This activation seemed to induce higher negative affect in women with BED but had no emotional impact on participants with no diagnosis (Svaldi et al., 2009). Higher negative affect in participants with BED was associated with increased desire to binge.

Overall, there remains a dearth in experimental studies using mood induction procedures that are relevant to the ED population. This may be due to the absence of

pathology-specific stimuli. Mood induction procedures that are specific to eating pathology are deemed necessary to elucidate the complicated relation of emotion and symptom expression especially at its early onset.

Present Study

The present study aims to assess the efficacy of a set of film-clips with general vs. ED related content in inducing negative affect, especially in individuals at risk for developing an ED. More specifically, the study aims to examine the emotional experience (valence, arousal, anxiety, induction of annoying somatic symptoms and ability to control reactions during film-clips) of Greek-Cypriot university students in response to three types of film clips: general unpleasant, ED specific unpleasant, and emotionally neutral. It is expected that participants will report higher negative affect in relation to the unpleasant clips (both general and ED specific) as compared to the neutral clip. The exploration of the specific dimensions (valence, arousal, annoying somatic symptoms induced, ability to control reactions) of the participants' affective responses to each clip will provide preliminary data for the development and validation of a set of ED specific film-clip stimuli. Secondly, the study aims to compare the emotional reactions to the aforementioned clips between two groups differing on their risk for an Eating Disorder. It is expected that the two groups will differ on their reactions to the different types of film clips with high risk participants reporting higher negative affect in response to pathology-specific rather than general content or neutral clips.

Method

Participants

Seventy nine psychology students (Females= 72; *Mag*e = 21, *SD*= 3.17) from the University of Cyprus took part in the study in exchange for course credit. The majority of students were Greek Cypriots (89.87%) while the rest were Greek (8.86%) or other (1.26%). The majority of the participants were undergraduate students (92.40%) while the rest were graduate students. Most of the students reported being unmarried (98.73%) and living either alone or with roommates (54.43%). Inclusion age was 18-24 since this is considered as the high risk age range for the emergence of Eating Disorders. Ethical approval from the Cyprus National Bioethics Committee was obtained and all participants gave their written consent to participate.

Materials

Five film clips with duration of 2.5 minutes were selected for the purposes of this study. Two general content film clips (*"The Champ"* and *"Terms of endearment"*) and two pathology-specific film clips (*"Sharing the secret"* and a TV documentary on Binge Eating Disorder) were selected to induce general and pathology specific negative affect, respectively. A documentary excerpt (The *"Winged Migration"*) was selected to elicit neutral affect.

The general film clips were selected based on previous studies demonstrating that these film clips can successfully induce general negative emotions (Gross, & Levenson, 1995; Fucito, & Juliano, 2009; Jacobs, Manstead, & Fischer, 2001). Since no previous study in ED used affective film-clips with eating pathology content, the pathology-specific clips were generated for the purposes of the present study by the researchers. At the beginning, a web-based search on film directories/blogs resulted in a list of films/documentaries/TV shows with ED relevant content. Most films did not present short clips demonstrating eating related symptoms and were excluded. From this list, the research team finally selected clips from the film "*Sharing a Secret*" (2000) and a TV documentary on Binge Eating disorder (BED) with the highest ecological validity, i.e. representing ED symptoms more accurately and in brief time slots.

An excerpt with duration of 2.5 minutes was compiled from scenes of the film "*Sharing a Secret*" (2000) that depicts the story of a teenage girl's struggle with bulimia and its effect on her life. The scenes selected to be included in the film-clip represented the main character's bulimia symptoms (preoccupation with body image, over-eating, over-exercise and other compensatory behaviors). Certain compensatory behaviors (such as throwing up) were not explicitly shown in the film-clip.

The film-clip based on scenes of a TV-documentary on Binge Eating disorder (BED) presented a young woman with binge eating disorder and the way her problem adversely affected her mood and body image. This documentary was broadcasted in the Open Forum show in "ebru TV" channel. It was found on "YouTube" under the category Education (link: https://www.youtube.com/watch?v=Vr8Lho29np4&spfreload=10). The scenes selected showed a young woman eating compulsively large amounts of different fatty foods and then experiencing distress. At the same time, images of an overweight body were presented projecting the young woman's fear about the possible resulting effects of her overeating behavior.

The neutral film clip selected was utilized successfully in previous studies examining emotional processing in various clinical groups and showed to evoke affectively neutral reactions (Griskevicius, Goldstein, Mortensen, Sundie, Cialdini, & Kenrick, 2009). In this study the neutral film clip was presented in between the other two types of clips as a way to aid in returning affect to a neutral state and thus reduce carry over effects between general and pathology specific film clips.

All film-clips (general, pathology-specific and neutral) followed Rottenberg and colleagues' criteria (2007): 1) valence: clips had to be unpleasant; 2) intelligibility: content had to be comprehensible without further explanation required; 3) all films had to be in color; 4) picture motion: moving scenes were shown. It is important to note that not all film-clips had the same complexity in terms of the number and age of displayed characters and number of scenes in each clip. A divergence from Rottenberg and colleagues (2007) criteria was made regarding the sound in the film-clips. It is recognized that the sound can often increase the impact of the emotional tension or arousal thus creating additional differences among selected film-clips (Ray, 2007). In light of previous research demonstrating that mute film clips are as effective as clips with dialogues in emotion induction (Jurasova & Spajdel, 2013) and in order to maintain the stimuli's equivalence, the sound was erased from all the film-clips of the present study.

Measures

Demographic/Historical Data recording: Participants were asked to complete a personal information questionnaire including multiple choice or open ended questions regarding their gender, age, year in college, height, weight (current, highest, lowest, ideal and disappointing), meal habits, dieting and exercise habits.

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, and Tellegen, 1988) is a self-reported adjective checklist consisting of two 10-items subscales assessing positive affect (PA: active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong) and negative affect (NA: afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, and upset). Participants are asked to use a 5-point Likert Scale (*very slightly*, *a little bit*, *moderately*, *quite a lot*, *very much*) to indicate the extent to which each adjective describes how they feel at the moment (state). Participants completed the PANAS at the end of each film-clip to assess their state negative affect. The

questionnaire's validity was tested in a study with Greek-Cypriot university students and was found adequate based on preliminary data (Panayiotou, 2008).

In order to capture additional emotional reactions to the film-clips the following adjectives were added to the PANAS with the same response set: (1) *sad;* (2) *angry;* (3) *surprised;* (4) *anxious;* (5) *disgust*; and (6) *bored***.** These adjectives were selected based on the comments and feedback of a small sample of university students For the validation of the extended version of PANAS, a Confirmatory Factor Analysis with the principal components extraction method and a varimax rotation was conducted on the current sample with average scores of each item across film-clips. The items loaded on the appropriate factors as expected (PA and NA factors) explaining 55.26% of the variance. All of the newly added adjectives had loadings ranging from .41 to .83 on the NA factor. The adjective *bored* had a factor loading below .40. It was however retained in the subsequent analysis since it did not affect the internal consistency of the extended scale (Cronbach's a = .91) and its NA subscale (Cronbach's a = .92).

The Subjective Units of Distress (SUDS) present a series of questions assessing the level of distress experienced on a 10-point scale. The questions used for the present study were compiled by the authors (researchers with clinical and research experience in the field) based on Wolpe's notion of SUDS (1969): a) *How pleasant or unpleasant did you feel while watching the film clip*? (1-extremely unpleasant, 10-extremely pleasant); b) *How much arousal or tension did you feel while watching the film clip*? (1-calm, 10-tense); (c) *How anxious did you feel while watching the film clip*? (1-not at all, 10-extreme anxiety) d) *To what extent did you experience annoying somatic symptoms while watching the film clip?* (1-not at all, 10-very much)*,* and e) *Were you able to control your reactions while watching the film clip?* (1-not at all, 10-absolutely).

The Eating Attitudes Test-26 (EAT-26; Garner, Olmsted, Bohr & Garfinkel, 1982) consists of 26 self-reported items assessing symptoms of eating disorders via a 6-point Likert scale (1=always to 6=never). Studies have recognized EAT-26 as a valid measure to detect individuals at high risk for developing an ED (Garner, 1993; Ocker et al., 1987; Garfinkel, & Newman, 2001; Douka et al., 2009). Its Greek translation showed good psychometric features and adequate internal consistency (Koushiou, Kyranidou, Loizidou, & Neokleous, Loutsiou-Ladd, 2010). The EAT had a satisfactory internal consistency in this sample as well (Cronbach's α= 0.86).

Procedure

Participants were recruited via University of Cyprus courses. With the professors' approval, the presentation of film-clips was conducted at the end of one of their classes. Each course audience watched the film clips in a classroom and the order of film-clip presentations was counterbalanced among different administrations: Order 1- general, neutral and pathology-specific; Order 2- pathology-specific, neutral and general.

Participants were informed that they would watch certain emotional excerpts and they would be requested to report their emotional reactions by filling out questionnaires after each excerpt. Participants were informed that it was important to report their emotional reactions without predisposing them to the negative affect associated with the four film-clips (general and pathology-specific). They were advised to report their emotional reactions to the film-clips irrespective of their mood or general emotional state prior to watching the film-clip.

Film-clips were displayed on a screen via the use of a projector. After the end of each film clip, participants were asked to complete ratings about their emotional reactions to the film-clips. At the end of all the screenings, participants completed the Eating Attitudes Test-26 (EAT-26). This questionnaire was not administered at the beginning of the screening to avoid biasing the participants about the content of the pathology-specific clips.

Results

Emotional Reactions to film-clips

Table 3-1 shows the means and standard deviations of participants' emotional ratings of each film-clip. To investigate the participants' reactions to the film-clips, separate Repeated Measures ANOVAs were conducted for each of the following dependent variables: PANAS Negative Affect score, SUDS1, SUDS2, SUDS3, SUDS4 and SUDS5. Film-clip type was added as a within-subject variable with five levels. For all variables, the assumption of sphericity was violated and Greenhouse–Geisser (for SUDS1 and SUDS5) or Huyn-Feldt (for PANAS Negative Affect score, SUDS2, SUDS3 and SUDS4) corrected degrees of freedom were used to assess the significance of the corresponding F-ratio. Bonferroni-corrected, univariate pairwise comparisons were conducted to follow up the main effects.

PANAS Negative Affect Score

There was a significant effect of the film-clip type ($F_{(3.48, 271.59)} = 53.54$, $p < .00$, $\eta_p^2 = .41$) on the total PANAS Negative score. Based on the post hoc tests, significant differences were found between *Terms of Endearment* (*M*=24.29, *SD*=7.30) and *The Champ* (*M*=28.73, *SD*=8.71)

Table 3-1. Means and Standard Deviations of Emotional Ratings in response to each film clip watched.

Film-Clips	PANAS Negative		SUDS1		SUDS2		SUDS3		SUDS4		SUDS5	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Terms of Endearment	24.29	7.30	3.20	1.45	6.06	1.83	5.44	2.32	3.02	2.37	7.83	2.27
The Champ	28.73	8.71	2.59	1.48	7.30	1.94	6.67	2.24	4.43	3.01	7.31	2.56
Wing Migration	16.70	2.38	6.92	1.95	2.94	2.08	1.71	1.44	1.24	.81	9.26	1.51
The Sharing the Secret	24.24	8.50	3.61	1.27	5.90	2.06	5.08	2.22	3.55	2.65	8.35	2.04
Documentary	25.38	8.62	3.23	1.61	6.25	2.33	5.76	2.62	4.60	2.87	7.86	2.28

Note. PANAS Negative Affect Score of each film clip; SUDS: Subjective Units of Distress Scale; SUDS 1: Valence; SUDS 2: Arousal; SUDS3 : Anxiety; SUDS 4: Annoying Somatic Symptoms; SUDS 5: Control over reactions

(p< .001), and *The Champ* and *Sharing the Secret* (*M*=24.24, *SD*=8.50) (*p*< .001) with *The Champ* inducing the highest negative affect. No significant differences were found between the *Documentary* and other clips. As expected, participants experienced significantly less negative

affect while watching the neutral film-clip, *Winged Migration* (*M*=16.70, *SD*=2.38) in comparison to all other film-clips (*p*< .001).

SUDS 1: Valence

A significant effect of the film-clip type ($F_{(2.88, 222.04)} = 117.14$, p < .00, η_p^2= .60) was found for SUDS1. Based on the post hoc tests, *The Champ* (M=2.59, SD=1.48) was significantly (p< .001) rated as less pleasant than *Sharing the Secret* (M=3.61, SD=1.28), than the *Documentary* (M=3.24, SD=1.61; p= .04) and to *Terms of Endearment* (M=3.20, SD=1.46; p< .001). The neutral clip was rated as significantly more pleasant (M=6.95, SD=1.95) than all other clips (p< .001).

SUDS2: Arousal

There was a significant effect of the film-clip type ($F_{(3.37, 262.78)} = 64.93$, *p* < .00, η_p^2= .45) on self-reported arousal with *The Champ* (*M*=7.30, *SD*=1.94) resulting in significantly higher arousal than the other general clip (*Terms of Endearment, M*=6.06, *SD*=1.83; (p< .001), and the two pathology-specific clips: *Sharing the Secret* (*M*=5.90, *SD*=2.06, (p< .001)*, and the *Documentary* (*M*=6.25, *SD*=2.33, *p*=.002). The other film clips did not differ from

each other. As expected, the neutral film-clip, *Winged Migration* (*M*=2.94, *SD*=2.08) induced the lowest arousal in comparison to all other film-clips (*p*< .001).

SUDS3: Anxiety

A significant effect of the film-clip type ($F_{(3.28, 252.88)}$ = 80.53, *p* < .00, η_p^2 = .51) was found. *The Champ* (*M*=6.67, *SD*=2.26) induced significantly higher anxiety as compared to the *Documentary* (*M*=5.76, *SD*=2.62; p=.02), *Terms of Endearment* (*M*=5.44, *SD*=2.33; p< .001) and *Sharing the Secret* (*M*=5.08, *SD*=2.23; (p< .001). The neutral film-clip, *Winged Migration* (*M*=1.70, *SD*=1.45) was significantly less anxiety provoking than all the other film-clips (p< .001), as expected.

SUDS 4: Annoying Somatic Symptoms

The results show that there was a significant effect of the film-clip type ($F_{(3.57, 271.83)}$ = 42.26, *p* < .00, η_p^2 = .36). Based on the post hoc tests, significant differences (*p*< .001) were found between *Terms of Endearment* (*M*=3.06, *SD*=2.39) and *The Champ* (*M*=4.49, *SD*=3.02) with the latter producing more annoying somatic symptoms. *The Champ* also induced significantly (*p*=.01) more annoying somatic reactions than *Sharing the Secret* (*M*=3.55, *SD*=2.67). The *Documentary* (*M*=4.60, *SD*=2.87) provoked significantly (*p*< .001) more annoying somatic symptoms than all the other film-clips except from *The Champ*. The neutral film-clip, *Winged Migration* (*M*=1.24, *SD*=.81) induced significantly (*p*< .001) less annoying somatic reactions as expected in comparison to all other film-clips.

SUDS 5: Control over reactions

A significant effect of the film-clip type ($F_{(2.98, 232.47)}$ = 15.15, *p* < .00, η_p^2 = .16) was found. Participants were significantly (*p*= .01) more able to control their reactions during *Sharing the Secret* (*M*=8.35, *SD*=2.04) than *The Champ* (*M*=7.31 *SD*=2.56). During *Winged Migration* (*M*=9.26, *SD*=1.51) participants reported feeling significantly more able to have control over their reactions than in any other film-clip, that is Terms *of Endearment* (*M*=7.83, *SD*=2.27), *The Champ*, *Sharing the Secret*, and T*he Documentary* (*M*=7.86, *SD*=2.28). *Emotional Reactions to film-clips between participants with low or high ED risk.*

Eating disorder risk group assignment was based on the participants' total score on the EAT-26. Following Garner & Garfinkel (1979) guidelines, a score greater than 20 was used as the clinical cut-off. Participants with total score above 20 were thus considered to be at high risk for developing ED (*N* = 12). Given an absence of specific guidelines as to what would constitute low risk, we decided to examine the participants that presented with the least

maladaptive eating attitudes and habits and thus had the lowest scores on EAT-26. Participants that scored below the sample mean (M=12, SD=10.31) with a S.D. of minus 8 comprised the low risk group (N = 10). Two univariate outliers were excluded from the following statistical analysis due to their extreme high values on EAT-26 (z scores > 3). These scores would probably identify individuals with an ED diagnosis and were thus excluded from our ED high risk sample.

To compare the emotional effects of each film-clip between participants with high risk for Eating Disorders and participants with low risk, a two-way mixed ANOVA was conducted. Film-clip type (*Terms of Endearment, The Champ, Wing Migration, The Sharing the Secret, The Documentary*) was entered as the within-subject independent variable and group (high vs. low risk) was the between-subject variable. Self-report affect ratings were entered as dependent variables (PANAS Negative Affect Score, SUDS1-5). A significant main effect of film-clip type was found on all dependent measures except from the SUDS5 on control over reactions. Bonferroni-corrected, univariate pairwise comparisons showed that *The Champ* had significantly higher mean scores on the PANAS Negative Affect score than *Terms of Endearment* ($F_{(2.96, 59.15)}$ = 10.45, p<.001, η^2_p= .45). *The Champ* was also found to be significantly more arousing ($F_{(2.76, 58.83)}$ = 10.92, p < .001, η^2_p= .34) and more anxiety provoking ($F_{(4, 76)}$ = 14.74, p < .001, η^2_p= .44) than the *Documentary.*

A significant interaction (Group x Film-Clip) was found for the self-reported valence (SUDS1) ($F_{(2.61, 54.95)}$ = 3.35, p = .03, η^2_p= .14). To examine the nature of the interaction, single degree of freedom contrasts were examined. Results showed that for both the high risk group rated *The Terms of Endearment* (p=0.004) and *The Champ* (p=0.001) as significantly less pleasant than low risk (Figure 3-1). These was also as significant main effect of group with high risk participants reporting overall higher unpleasantness (M=3.22, SD=0.29) than low risk participants (M=4.12, SD=0.31) ($F_{(1,21)}$=4.41, p=0.05, η^2_p= .17).

A significant interaction (Group x Film-Clip) was also found for self-reported anxiety (SUDS3) ($F_{(4, 80)}$ = 7.18, p = .001, η^2_p = .26). Single degree of freedom interaction contrasts showed that the high risk group rated the neutral clip as significantly less anxiety than low risk group (p=0.01). Also, the high risk group experienced significantly more anxiety during *The Champ* (p=0.004) and during the *Documentary i*n comparison to the low risk group (p =.002) (Figure 3-2). There was a significant main effect of group with high risk participants

reporting overall higher anxiety (*M*=5.72, *SD*=0.44) than low risk group (*M*=4.20, *SD*=0.48) ($F_{(1,20)}$=5.49, *p*=0.03, η^2_p = .22).

Figure 3-1. Interaction Group x Film-Clip on SUDS 1 (Valence)
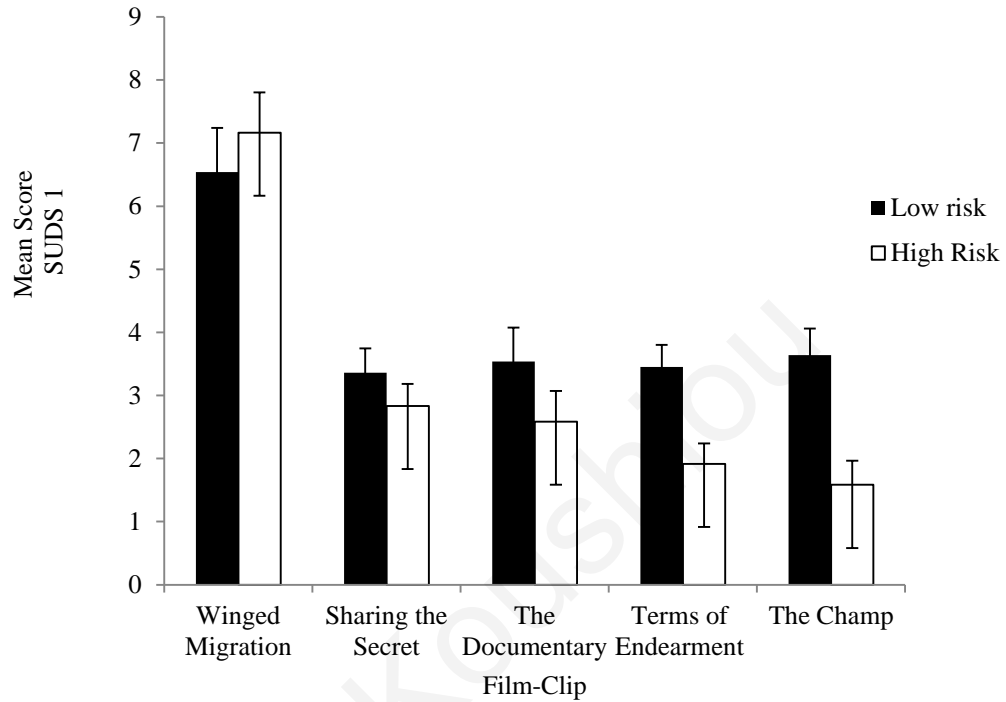
Figure 3-2. Interaction Group x Film-Clip on SUDS 3 (Anxiety)
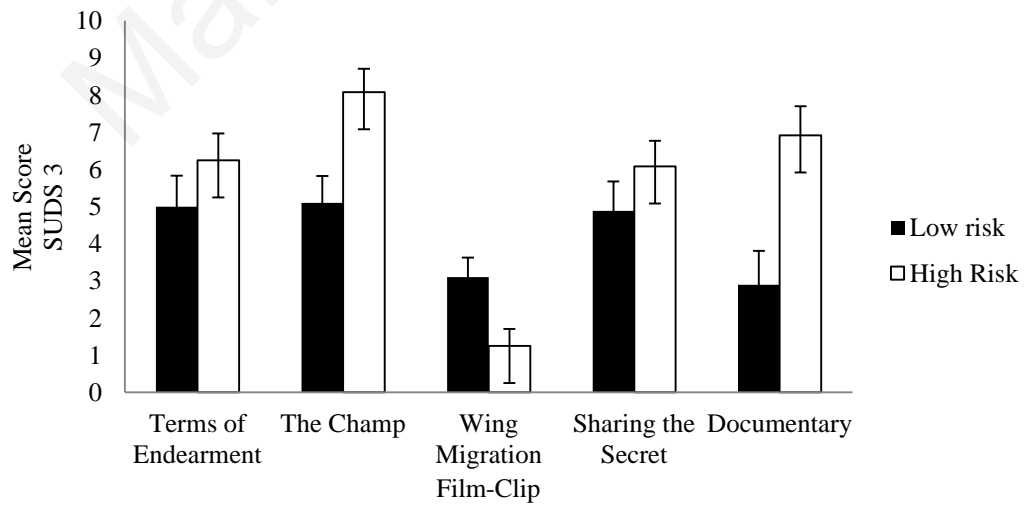
Discussion

The aim of the present study was first to examine the effectiveness of a set of film-clips with both general and ED pathology specific content to induce negative affect. A second aim was to explore possible differences on the affect induced in young adults with high vs. low risk for ED.

In the general content film category, *The Champ* produced the highest negative affect, arousal and anxiety and elicited the most annoying somatic symptoms compared to the rest of the film clips (both general and pathology specific). These results correspond with previous findings showing that *The Champ* was the most effective film-clip among others in producing a discrete state of sadness (Gross & Levenson, 1995). Therefore, *The Champ,* a well-documented excerpt in the western culture is found to be as effective in a Mediterranean culture such as the Greek-Cypriot one even after the deletion of the clip's sound.

In the pathology-specific film category, participants responded in a similar way to both clips in terms of unpleasantness, arousal, anxiety and the ability to control their reactions during the clips. Significantly more annoying somatic symptoms were however experienced during the *Documentary* than during the *Sharing the Secret*. In addition, comparisons of clips between the pathology and general category showed that the *Documentary* appears to be equivalent to the *Champ* in inducing negative affect since the clips' differences on PANAS negative affect score and control over reaction (SUDS5) were not significant. Based on these preliminary findings, the *Documentary* appears to be a good pathology-specific film clip to induce intense negative affect.

Experimental studies that used emotion induction procedures have shown that negative emotions affect the expression and development of ED symptoms (Wildes et al, 2012). To our knowledge, negative emotion has never been induced via film-clips with ED pathology-specific content and hence there are no relevant data on how participants with ED symptoms respond to this type of affective stimuli. Based on the preliminary results of the presents study, the two general clips differentiate the two ED risk groups inducing higher unpleasantness (SUDS 1) in high risk participants as compared to their low risk cohort. The two groups differed also in the anxiety they experienced during *The Champ* as well as during *The Documentary* with high risk participants reporting significantly higher anxiety in comparison to their low risk cohort. In conclusion, the current findings support that *The Champ* and *The Documentary* seem to trigger strong emotional reactions that can differentiate

participants in high vs. low risk for ED in terms of subjective feelings of anxiety. The newly developed pathology-specific clip seems to capture the eating and/or body related concerns of the high ED risk participants and thus induce a subjective feeling of anxiety that is distinguished from the lower anxiety response of participants with less eating and body related concerns.

One of the limitations of the present study was the small sample and especially the low number of high-risk participants. This was however only a preliminary investigation and further replication in larger groups of participants both deemed to be at high risk and low risk for EDs should be undertaken. Another possible limitation was the inclusion of *The Champ* among the general content film clips the effect of which might overshadows the emotional effects exerted by the rest of the film-clips included in the study. The specific clip includes a strong emotional content since it depicts a child mourning on the corpse of his father and thus brings the attention to sensitive subjects such as death and possibly to feelings of injustice and empathy towards the child's suffering. This content comes in contrast with the rest of the film-clips that do not include such emotional scenes (such as in *The Terms of Endearment*) and revolve around dysfunctional and/or distressing habits as in the case of the pathology-specific clips.

To our knowledge, this is the first study that used pathology-specific film clips for inducing negative affect. Our findings indicate that there is great perspective in using this type of affective stimuli as a way to broaden our understanding on emotion expression in populations with eating disordered concerns in comparison to controls. Further research is however needed to verify the effectiveness of these pathology-specific clips in larger ED clinical and subclinical samples. Experimental data of the physiological and behavioral correlates of affect induced are also of great significance in refining our understanding of how these ED populations experience negative emotion.

Chapter 4: An investigation of the affective-cognitive processes in general and pathology-specific contexts among youth in high risk for Eating Disorders

Introduction

Are Eating Disorders (ED) considered as pathologies of feeling? As William James (1884) suggested feelings emerge from our ability to sense our body resulting in the perception of body states such as thirst, hunger, the need to breath, the feeling of pleasure and pain, as well as the feelings of disgust, fear, sadness and joy. These feelings are mapped into the Central Nervous System and signify the detection of homeostatic imbalances that in turn trigger the deployment of corrective physiological actions. These corrective actions that at many times remain on an unconscious level can be subjected to conditioning (Damasio & Karvalho, 2013). For example, in patients with Anorexia Nervosa (AN), the prolonged state of starvation alters the physiological response to the feeling of hunger and diminishes the corrective actions that would normally follow on a physiological level (visceral motility and secretion, salivation) and on a behavioral level (e.g., search for food). This often leads to a phenomenon met in patients with severe eating disturbances called "silencing of the body" (Wang, Hung, & Randall, 2006).

Affective processing is currently in the focus of research in the area of ED. The lack of awareness of bodily sensations and affective states, conceptualized as interoceptive awareness deficiency, is related with disordered eating. In an attempt to specify this deficiency in patients with ED, Merwin and colleagues (2010) examined the two distinct aspects of emotional awareness deficiency namely clarity about the feelings that one is experiencing and the willingness to experience/accept such internal states. Results from a sample of ED patients showed that only non-acceptance of affective states (and not clarity) predicted significantly dietary restraints in patients.

These findings are replicated in many cross-sectional studies suggesting a strong link between poor emotion regulation skills and eating pathology, theorizing that eating itself might be used as a regulator of emotional states. For example, women with Binge Eating Disorders report limited use of cognitive reappraisal and engage more frequently in emotional eating (Aldao et al., 2010; Hilbert & Tuschen-Caffier, 2007). It is therefore assumed that emotional eating functions as an escape mechanism helping binge eaters to soothe their distress in the absence of other effective strategies. In the same line of argument, an

examination of various emotion regulation skills showed that only lack of emotional awareness strongly predicted eating disorder cognitions in AN females (Racine & Wildes, 2013). Based on these results, it is inferred that not only disordered eating but also disordered thinking is used as a possible regulator of emotional states (Wildes, Ringham, Marcus, 2010).

Inhibition of emotional expression is also prevalent among ED patients and more specifically among patients with AN. AN patients showed limited verbal expression when requested to talk about discrete emotional experiences as compared to BN patients or non-eating pathology controls, despite reporting higher negative affect (Davies, Swan, Schmidt, Tchanturia, 2012). In another study by Torres and colleagues (2011), AN presented higher levels of alexithymia but they were nevertheless able to label and imagine basic emotions in one of two conditions: daily situations and eating/weight relevant situations. They also reported feeling heightened negative affect in the second condition in comparison to controls. It is concluded emotion regulation deficits are specific to situations relevant to AN.

An important behavioral manifestation of eating pathology is body size and/or shape overestimations. Ineffective strategies in emotion regulation and body dissatisfaction are often interlinked in ED patients and mediate the relation between body size over-estimations and disordered eating (Mussap, McCabe, Ricciardelli, 2008). Based on experimental studies, induced negative mood had a significant effect on body image disturbances in a non-clinical sample of female students with body size concerns (Taylor & Cooper, 1992). In AN patients, emotional experiences such as changes in mood was recognized as a significant contextual factor triggering body image fluctuations and negative appearance evaluations (Espeset, Gulliksen, Nordbø, Skårderud, & Holte, 2012). Therefore, prior research suggests that individuals with eating disordered symptoms attribute or relate negative mood with their body and appearance as a way to compensate for mood regulation difficulties (Fox et al, 2013).

Overall, there is an accumulating body of research suggesting that individuals with eating pathology experience heightened negative emotionality and present maladaptive cognitions in relation to their body and eating habits. Furthermore, they tend to avoid their emotional experience and they have difficulties to openly and mindfully experience unpleasant cognitions regarding their body and or eating. The tendency to avoid internal states (experiential avoidance) in relation to one's body or appearance and limited mindfulness are dimensions of Body-Image Inflexibility (Sandoz, Wilson, Merwin, Kellum, 2013). Body-image inflexibility has been associated with various aspects of eating symptomatology

including ED cognitions and body image disturbance (Sandoz et al, 2013; Wendell, Masuda, & Le, 2012).

However, it is not yet clear why individuals with ED are non-accepting or otherwise avoid affective experience and how this contributes to the maintenance of their pathology. One of the most prominent theories suggest a heightened level of arousal experienced by individuals with ED, especially AN, in response to afferent information and the perception of such arousal as negative or threatening. The response to such threatening sensations differs between typologies of ED with binge eaters engaging in emotional eating while anorexics engaging in emotional non-eating (more caloric restriction and/or excessive exercise; (Hurrison, Sullivan, Tchanturia, & Treasure, 2009). Both of these responses are conceptualized to result in negative affect avoidance (Schmidt & Treasure, 2006). The studies reviewed in the following section shed light on the physiological underpinnings of the emotional experience of ED patients that are essential in understanding the function of the disordered behaviors as manifested along the eating pathology spectrum.

The physiological component of the emotional response of individuals with ED

Even though individuals with ED engage in emotional avoidance, the intensity of their emotional experience seems to be increased (Gross & Levenson, 1997). This is demonstrated in studies measuring emotional reactivity through physiological measures in individuals with ED. *Heightened arousal* to unpleasant/negative stimuli (Zhu et al., 2012; Friedrich et al., 2006) and slow recovery/return to baseline (Haynos and Fruzzetti, 2011) are present in individuals with ED when exposed to pathology relevant stimuli.

For skin conductance, body exposure in front of a mirror did not produce significant differences between ED patients and controls (Vocks, Legenbauer, Wachter, Wucherer, & Kosfelder, 2007). Decreased skin conductance responses were however recorded for AN patients in comparison to healthy controls and AN recovered patients when performing the Iowa Gambling Task (Tchanturia, Liao, Uher, Lawrence, Treasure, & Campbell, 2007).

For individuals with BN a decelerated heart rate and increased corrugator activity after the induction of negative mood was observed when they were exposed to food stimuli (Gross & Levenson, 1997). In a subclinical sample, increased High Frequency (HF) component of Heart Rate Variability was observed which suggests a link between increased parasympathetic activity and eating disturbance (Green, Hallengren, Davids, Riopel & Skaggs, 2009). Finally, a review (Mazurak, Enck, Muth, Teufel, & Zipfel, 2011) concluded that *autonomic*

disturbances with a predominance of parasympathetic activity are observed in clinical and subclinical (Green, et al., 2009) presentations of ED.

However, studies investigating autonomic function present conflicting results as mentioned above that might be related to methodological variations and inconsistencies. For example, autonomic function was examined mostly in response to pathology relevant stimuli (e.g. body image and eating) and has confusing and rather contradictory findings as to the predominance of parasympathetic or sympathetic activity. Findings on emotional expression are again confusing with studies reporting either increased corrugator activity in response to food stimuli (pathology-relevant stimulus) or attenuated facial expression in response to negative and positive film-clips (general stimuli).

In conclusion, there are two sources of inconsistency noted in experimental studies, the affective context used to elicit emotions, categorized in general and pathology-specific, and the different measurements implemented. Therefore, there are contradictory findings on the severity and specificity of these disturbances in the clinical population with some studies supporting parasympathetic dominance and decreased sympathetic modulation while others show the exact opposite pattern of results. These findings supporting either hyposensitivity or hypersensitivity even though they seem contradictory, they actually signify the complex interactions between basic affective mechanisms that contribute to ED symptoms and evolve with pathology progression (Merwin, 2011). It is hypothesized that hypersensitivity e.g. heightened emotional reactivity, is present at the early stages of ED and it is eventually attenuated resulting in hyposensitivity due to starvation and other physical effects over the course of the illness e.g. bradycardia (Haynos and Fruzzetti, 2011). This claim remains however at the level of speculation since the majority of studies rely on self-report measures while experimental studies differ in the stimuli they use to provoke emotional reactions thus resulting in inconsistent findings (Merwin et al, 2011; Treasure, 2012). This is the first study to examine the assumption of hypersensitivity to negative affect in relation to the context where is occurs (general or ED-specific) in a sub-clinical sample.

Present study

The aim of this study was two-fold: a) to explore physiological reactivity to negative affect (specific and general) in female adolescents and young adults at high risk vs. low risk for ED, and b) to explore the differences between participants on high vs. low risk for ED on measures with cogntive (level of self-esteem, appearance schemas) vs. functional/experiential

(body-image inflexibility, emotion regulation skills, depression levels) focus and delineate the factors that are significantly associated with ED risk.

Females were selected for the purposes of the present study since they are substantially more prone to ED. Also, studying ED at a subclinical level can provide valuable insights as to the development of the illness without the confounding (physical and psychological) effects of ED symptoms (e.g. starvation, excessive exercise, vomiting, laxative/diuretics use) found in the acute or chronic stages of the illness.

A two-stage design that incorporates cross-sectional and experimental elements was followed for the purposes of the study. In the cross-sectional stage, self-report measures were collected on factors that are consistently linked with ED predisposition based on previous research such as: level of self-esteem, emotion regulation skills, appearance schemas, body acceptance and flexibility.

In the experimental stage of the study, negative emotion was experimentally induced in the lab, in order to examine the physiological (heart rate, skin conductance and corrugator muscle activity) and self-reported affect responses of participants at high vs. low risk for ED. Furthermore, we also assessed the impact of negative emotion on illness-behaviors, assessed via self-reported body-estimations and food consumption (via the bogus taste task) that followed emotion induction. The methodology of the present study employs the ecologically valid experimental method of film-stimuli, to induce negative emotion in a general and pathology-specific context. Film-clips are chosen since they allow more long-lasting and more intense emotional experiences compared to pictorial stimuli. We selected two film-clip contexts (general and pathology-specific) because based on previous findings ED patients show emotional impairments that are specific to ED relevant stimuli (Torres et al., 2011).

Hypotheses

Based on previous findings the following hypotheses were formulated:
1. Participants at high risk for ED are expected to have more emotion regulation difficulties, higher body-image inflexibility, and more difficulties in experiencing body related negative emotions, sensations and thoughts when compared to low risk participants.
2. A stronger mental focus on appearance and higher behavioral investment in appearance matters are expected to be found in the high risk participants as compared to their low risk cohorts. It is also hypothesized that the above mentioned appearance schemas will have a negative impact on the self-esteem level among high risk participants as compared to low risk.

3. High ED risk participants are expected to present higher reactivity, as reflected by the physiological indicators of negative valence (i.e. corrugator activity) and arousal (heart rate and skin conductance) when negative emotions are induced in the laboratory, compared to low risk participants. The differences between the two groups will be more pronounced in the pathology-specific clip context compared to the general clip content. Correspondence between physiological and self-reported responses to negative affect will also be examined. It is hypothesized that a lack of correspondence will provide indications for lack of effective emotional regulation/awareness that will be more pronounced among high ED risk participants. This is the first study to examine the emotional reactivity to negative affect in relation to ED risk and results are expected to be indicative of the actual emotional experience of individuals at risk without the confounding effects that are observed in later stages of the illness.

4. The effect of negative affect as induced via pathology-specific and general contexts on body-size estimations and food consumption will be assessed. Negative affect as induced via the pathology-specific clip is expected to have a negative impact on body size estimations and lead to greater disinhibition in food consumption in the ED high risk group. The effects of negative affect on the above mentioned behavioral measures will be examined as indications of emotion regulation reflecting the participants' ability to modulate their emotions and impact on illness related behavior.

Methods

Participants

Eighty-five female participants (M_{age}=17.97, SD=2.74) were selected based on the following inclusion criteria: a) females aged 14-24 years, b) voluntary participation (and parental consent for ages below 18 years), c) good working knowledge of the Greek language and d) score either above or below 52 on the Weight Concerns Scale (WCS; Killen, et al., 1994). Participants not meeting the above inclusion criteria and/or meeting criteria to warrant an ED diagnosis based on the Eating Disorders Diagnostic Scale (EDDS; Stice, Telch, & Risvi, 2000) were excluded from the study.

Before their participation in the study, a phone interview was conducted to verify participants' responses in the WCS and EDDS. Based on this interview, four participants that scored below the cut-off score on the WCS and their score on the EDDS indicated subthreshold Bulimia were finally recruited as high risk. Two groups were formed: a) the

group at high risk (M_{age}=18.38, SD= 0.42) for developing an Eating Disorder (*n*=42) who scored above the threshold (≥52) on the WCS, and b) the group at low risk (M_{age}=17.65, SD=0.42) for developing an Eating Disorder (n=43) who scored below the above mentioned threshold on the WCS. There were significant differences between the two groups on their Body Mass Index with high risk participants having a higher BMI (*M*=23.02, *SD*=0.45) than low risk participants (*M*=21.22, *SD*=0.66) (*t*(82)=2.25, *p*=.01). Significant differences were detected as expected between the two groups on their WCS scores with high risk participants reporting more ED symptoms (*M*=66.15, *SD*=2.08) than low risk (*M*=26.23, *SD*=2.30) (*t*(83)=13.05, *p*<.001).

Materials and measures

   Physiological Measures and Apparatus:

   E-Prime 1.0 (Schneider, Eschmann & Zuccolotto, 2002) was used to run the experiment and BIOPAC MP150 for Windows and AcqKnowledge 3.9.0 data acquisition software (Biopac Systems Inc, Santa Barbara, CA) were used for the collection and processing of physiological measures. Physiological data were collected using Ag/AgCl shielded electrodes that were placed on participants' face and arms according to standard procedures (Fridlund & Cacioppo, 1986). Raw ECG (recorded via electrodes placed on each inner forearm following skin preparation) was filtered by a BIOPAC ECG100C bioamplifier, set to record beats per minute (BPM) in milliseconds. Skin conductance level (SCL) was recorded via electrodes attached on the second digit of the index and middle fingers of the participants' non-dominant hand after skin preparation. Skin conductance levels were recorded using a BIOPAC GSR100C transducer amplifier. Corrugator activity was recorded via two electrodes placed above the right eyebrow, starting from the inside corner of the eye toward the outside of the eye following the eyebrow. Mean scores for Heart Rate, skin conductance level and corrugator activity were computed for each 2.5 minute clip and for the last 2.5 minutes of the baseline period.

   Affective Stimuli: Mood was induced in this study via the presentation of either neutral, general negative or pathology specific film clips (see Chapter 3 for the selection and validation of the film-clips used in the study). All film-clips used in the study had duration of 2.5 minutes and had no sound.

Neutral film-clips: two excerpts were selected from the documentary *Winged Migration* to elicit neutral affect (hereafter referred to as Winged Migration 1 and Winged Migration 2).

General content negative film-clip: an excerpt from the film-clip *The Champ* was selected to induce general negative affect.

Pathology-specific film-clip: an excerpt from a TV documentary on Binge Eating Disorder was selected as the pathology-specific stimulus to induce negative affect.

Self-report Measures

Screening Questionnaires:

The Eating disorder diagnostic scale (EDDS; Stice, Telch, & Risvi, 2000): see Chapter 2 for more information.

The Weight Concern Scale (Killen, et al., 1994): see Chapter 2 for more information.

Measures of the experimental study:

The self-reported measures used for the purposes of this study were (see Appendix B for more information):

Battery of questionnaires:

Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) assesses global self-esteem by asking respondents to rate their agreement on a 0-3 scale (ranging from 0 = *not at all true* to 3 = *definitely true*) with 10 statements reflecting their feelings about themselves (e.g. ''I feel that I have a number of good qualities" etc.). Higher scores indicate a more positive self-evaluation. It has been widely used as a reliable indication of self-esteem in empirical studies. The scale has been validated in a sample of Greek-Cypriot adolescents with internal consistency estimate of 0.85 (Fanti & Henrich, 2014).

*Body Image–Acceptance and Action Questionnaire (*BI-AAQ; Sandoz, Wilson, Merwin, & Kellum, 2013) consists of 12 statements assessing cognitive flexibility and acceptance in relation to body image. Greater summed scores indicate greater body image inflexibility. Previous work shows excellent reliability estimates (Cronbach's alpha = 0.92; Sandoz, et al., 2013). The questionnaire was translated in Greek using the front and back translation method and validated in an opportunistic sample of 240 Greek and Cypriot university (undergraduate) students (M_{age}= 21.5, SD=2.98) of both genders, before it was administered in the present study. The factorial analysis of the BI-AAQ indicated a one-factor structure of 12 items, similar to the original English version (Sandoz et al., 2009), accounting for 65.5% of the variance. Moreover, it showed good internal consistency, with a Cronbach alpha of 0.95, and presented item-total correlation values between 0.5 and 0.85. In conclusion, the results from the validation study indicate that the Greek version of the BI-AAQ

questionnaire is a robust and reliable instrument (Mavraki, Nicolaou, Karekla, personal communication).

The Difficulties in Emotion Regulation Scale (DERS; Gratz, & Roemer, 2004): it is a self-report questionnaire that contains 36 items assessing emotion regulation. Items are rated on a 5-point scale from 1=almost never to 5=almost always. Higher total score indicates greater difficulties with emotion regulation. Previous work shows that Cronbach's alpha is above .90 (Gratz and Roemer, 2004; Racine & Wildes, 2013). The questionnaire was translated in Greek by the research team using the front and back translation method for the purposes of this study and was validated in previous pilot study (see above for sample details). We conducted a Confirmatory Factor Analysis with the principal components extraction method and a varimax rotation. Items loaded on the appropriate factors explaining in total the 67.56% of variance. The questionnaire had a high internal consistency with Cronbach's α reaching .91.

*Appearance Schemas Inventory-Revised (*ASI-R; Cash, Melnyk, & Hrabosky, 2003): assesses dysfunctional schemas about ones' appearance and its impact in one's life. This questionnaire was originally developed by Cash and Labarge (1996) and in its original form consisted of 14 items. With later amendments, an extended 20-item version emerged, the ASI-R. It comprises of 20 items rated on a 5-point scale from strongly disagree to strongly agree and has two factor subscales, namely Self-Evaluative Salience and Motivational Salience. The former subscale reflects the degree that physical appearance determines the participant's sense of self and the latter measures the investment into one's appearance as in engaging in grooming behaviors etc. Based on a previous validation study (Argyrides, & Kkeli, 2013), the ASI-R showed adequate psychometric properties in a Greek-Cypriot population with alpha coefficient of .93.

Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, *1996):* This 21-item questionnaire assesses the current intensity of depressive symptoms. The BDI-II shows high internal consistency (Cronbach's a = 0.89; Kjærgaard, Arfwedson,Waterloo, Jorde, 2014). The Greek version of the questionnaire is widely used in clinical and healthy samples after its translation and validation (Jemos, 1984). For the purposes of the present study it was used to assess depression levels in female participants over 18 years

Youth Inventory-4 (YI-4; Gadow, & Sprafkin, 1999): is used to assess clinical symptoms in adolescents pertaining 18 diagnostic entities. For the purposes of the present

study, only the 9-item Depression subscale was used to measure depression levels of the participants of the present study that were under 18 years old. Items are assessed on a Likert scale from 0-absence of symptoms to 3-strong presence of symptoms. Higher total scores indicate greater depression levels. A previous study by Fanti (2011) indicated the questionnaire's adequate internal consistency in Greek-Cypriot adolescents.

The Perceived Stress Scale (PSS-10; Cohen, Kamarck & Mermelstein, 1983) provides an indication of the individual's overall perceived distress during the past month. It includes 10 items rated on a 0-4 Likert scale. The PSS has adequate psychometric properties (Cole, 1999), with internal consistency values above a=.86 (Cole, 1999). A previous validation study of PSS-10 in Greek-speaking adults yielded satisfactory psychometric properties (Cronabach's a = 0.82; Andreou et al., 2011).

Affect Ratings

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, and Tellegen, 1988) is a self-reported adjective checklist consisting of two 10-items subscales assessing positive affect (PA: active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong) and negative affect (NA: afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, and upset). Participants indicate on a 5-point Likert Scale (*very slightly*, *a little bit*, *moderately*, *quite a lot*, *very much*) the extent to which each adjective describes how they feel at the moment (state). The questionnaire's validity was tested in a study with Greek-Cypriot university students and was found adequate based on preliminary data (Panayiotou, 2008). An extended version of the questionnaire was used (for details see Chapter 1) to assess participants' negative affective state after each film-clip. For the purposes of the present study only the NA subscale was used.

The Subjective Units of Distress (SUDS; Wolpe 1969) present a series of questions assessing the level of distress experienced on a 10-point scale. The questions used for the present study were compiled by the authors: a) *How pleasant/unpleasant did you feel while watching the film clip*? (1-extremely unpleasant, 10-extremely pleasant), b) *How much arousal or tension did you feel while watching the film clip*? (1-calm, 10-tensed), (c) *How anxious did you feel while watching the film clip*? (1-not at all, 10-extreme anxiety) d) *To what extent did you experience annoying somatic symptoms while watching the film clip?* (1-not at all, 10-very much)*,* and e) *Were you able to control your reactions while watching the film clip?* (1-not at all, 10-absolutely).

Body Image Estimations

        Cognition of body image distortion (Zanetti, Santonastaso, Sgaravatti, Degortes, & Favaro, 2013) assesses body image disturbance via two questions: (i) 'At your present weight, how do you see yourself in the mirror?' (ii) 'Referring to inner feelings, at your present weight, how do you feel?' Both questions are rated on a 7-point scale ranging from: very fat (1), fat (2), slightly fat (3), normal (4), slightly thin (5), thin (6), very thin (7). Participants' responses are compared with their actual BMI, which are categorized as follows: very fat (BMI ≥ 30), fat (BMI between 23.5 and 30), slightly fat (BMI 22–23.5), normal (BMI 19–22), slightly thin (BMI 19–17.8), thin (BMI 16–17.8), very thin (BMI<16). These BMI ranges reflect the norms of an Italian young female community sample derived without eating disordered patients included (Favaro, Ferrara, & Santonastaso, 2003), and are used here since they are derived from a European, Mediterranean sample that resembles the present sample.

Behavioral Measure

        Bogus Taste Task*:* During this task, participants were provided with two pre-weighted bowls containing different food: chocolate (105 g/531 kcal) and salted potato chips (45 g/243 kcal). Participants rated the two types of food provided on taste, smell and texture on a 0 to 7 Likert scale (0-not good at all, 7=extremely good). Before the taste task participants rated their hunger and mood level as well as enticement to eat the above mentioned foods on a 0 to 7 Likert scale (0-not at all to 7-more than ever; based on Dingemans, Martijn, Jansen, & van Furth, 2009). After the taste task, the quantity of food left was measured and total caloric intake was calculated.

Procedure

        Informed consent was received from all participants and their parents (if they were under 18 years old). Participants were first requested to complete the questionnaires packet. Then, the researcher provided a thorough description of the experimental procedure followed by all the necessary preparations for the physiological recordings e.g. fitting of electrodes etc.

        Once the electrodes were attached and tested, participants were requested to relax for 5 minutes in their seat in order for physiological signals to stabilize. Next, participants completed two experimental blocks. Each experimental block consisted of a neutral film-clip followed by either the general or the pathology specific negative film-clip. The block order was counter-balanced between participants. After each film-clip, participants completed affect ratings (SUDS, PANAS) and the Cognition of body image distortion questionnaire.

Physiological measures of Heart Rate, skin conductance and corrugator activity were recorded throughout the film-clip presentations. Between the two experimental blocks a break of two minutes was employed to prevent emotional carry-over effects from the first condition to the second. During this interval, participants were requested to stay seated.

After the presentation of the film-clips, participants were requested to complete a Bogus Taste Task. More specifically, they were asked to taste a bowl of savory (salty chips) and a bowl of sweet food (chocolate). During the taste tests participants were left alone in the room and were provided with questionnaires to evaluate taste, smell and texture of the foods. It's important to note that two participants with food allergy and diabetes were excluded from this task. Two high participants refused to participate in the task because they were on a diet. Each bowl was weighed in the end of the experiment to evaluate the amount of food consumed. Finally, participants' weight and height was measured and recorded by the researcher. Debriefing was provided after the experiment with a semi-structured mini-interview on how the participant felt during the various tasks of the experiment, her thoughts on the experimental procedure and content. Explanation was provided on the scope of each task of the study and participants had the chance to ask questions and make comments.

Results

1.Battery of self-reported questionnaires: Participants' characteristics, behaviors and attitudes

1.1 Correlations between measures used in the study

Table 4-1 presents the Means and Standard Deviations for the participants and Cronbach's α reliabilities for the questionnaires used in the cross-sectional section of the study.

Table 4-2 presents Pearson's r correlation coefficients among all assessed measures. Higher level of body image inflexibility had strong positive correlation with schematic investment in one's appearance and difficulties in general emotion regulation skills. Lower level of self-esteem correlated with more difficulties in emotion regulation and distress as well as with higher depression levels in both adolescents and young adults. Higher depression levels related with difficulties in emotion regulation in both university students and adolescents. Higher body image inflexibility correlated with higher levels of depression only in adolescents.

1.2.Comparisons between ED risk groups

Independent samples t-tests were conducted to examine differences between low and high risk participants on each of the questionnaires of interest (see Table 4-1). Bonferroni corrected p value was used. High risk participants had significantly lower self-esteem levels, more difficulties in emotion regulation, experienced more body image inflexibility, had more dysfunctional schematic investment in their appearance, and reported more perceived stress as compared to the low risk group. More specifically, for high risk participants their self-worth was more dependent on their physical appearance and engaged more with their appearance and reported more grooming behaviors when compared to those at low risk for an ED. No significant differences among high and low ED risk participants were found on the affective awareness, acceptance, goals and clarity subscales of DERS or on the depression levels.

Table 4-1. Sample Descriptives, reliability results for measures and t-tests comparisons

	Total Sample (N=85)		High risk (n=42)		Low risk (n=43)		t-test	Chronbach's
	M	S.D.	M	S.D.	M	S.D.	t(df)	a
RSE	20.69	4.44	19.04	4.54	22.30	3.74	-3.61 (83)*	0.84
DERS	81.76	16.34	88.30	17.34	75.37	12.48	3.94 (74.40)**	0.88
Non Acceptance	12.63	4.06	13.59	4.24	11.68	3.69	2.20 (83)	0.71
Goals	14.43	4.50	15.81	4.59	13.09	4.03	2.90 (83)	0.84
Impulse	13.25	4.62	14.78	5.10	11.74	3.56	3.18 (73.12)*	0.80
Awareness	15.27	3.35	15.47	3.13	15.07	3.57	0.56 (83)	0.53
Strategies	16.23	5.41	18.33	5.78	14.19	4.15	3.80 (74.30)**	0.80
Clarity	9.94	3.07	10.31	2.99	9.58	3.13	1.09 (83)	0.78
BI-AAQ	35.91	17.29	47.38	15.35	24.72	10.38	7.95 (71.82)**	0.94
ASI-R	3.31	0.61	3.64	0.55	2.97	0.47	5.98 (83)**	0.85
Self-Evaluative Salience	3.10	0.72	3.50	0.63	2.70	0.58	6.11 (83)**	0.88
Motivational Salience	4.88	3.62	3.85	0.6	3.39	0.39	4.18 (70.63)**	0.74
PSS	27.00	13.23	15.52	5.95	11.00	4.42	3.97(75.65)**	0.73
BDI-II[1]	9.21	5.79	10.22	5.85	8.05	5.66	1.20 (39)	0.80
YI-4-Depression Subscale[2]	8.52	4.24	10.26	3.24	7.09	4.49	2.57 (40)	0.71

**p< .001,* p < .003 (Bonferroni adjusted p-value)

RSE = Rosenberg Self-Esteem Scale, DERS = Difficulties in Emotion Regulation Scale, BI-AAQ = Body-Image Acceptance and Action Questionnaire, ASI-R = Appearance Schemas Inventory-Revised, PSS= The Perceived Stress Scale , BDI-II = Beck Depression Inventory II, YI-4 = Youth Inventory Scale-4

[1] For BDI-II, the sample size for high risk participants was n=22 and for low risk participants was n=19

[2] For YI-4 Depression subscale, the sample size for high risk participants was n=19 and for low risk participants was n=23

Table 4-2. Pearson's r correlations among measures used in the study (N=85)

	1	2	3	4	5	6
1.Rosenberg Self-Esteem Scale						
2.Difficulties in Emotion Regulation Scale	-0.52**					
3.Appearance Schemas Inventory-Revised	-0.35**	0.45**				
4.Body-Image Acceptance and Action Questionnaire	-0.40**	0.55**	0.73**			
5.Beck Depression Inventory II[1]	-0.58**	0.43	0.35*	0.26		
6.Youth Inventory Scale-4-Depression Subscale[2]	-0.54**	0.53**	0.55**	0.51**		
7.Perceived Stress Scale	-0.53**	0.53**	0.38**	0.42**	0.48**	0.48**

** $p < .01$, *$p < .05$

[1] For BDI-II, the sample size for high risk participants was n=22 and for low risk participants was n=19 (Total N=41)

[2] For YI-4 Depression subscale, the sample size for high risk participants was n=19 and for low risk participants was n=23 (Total N=42)

1.Emotional reactivity to negative affect

1.1.Data Screening

Initial data screening and more specifically the boxplot function of SPSS suggested a number of extreme scores (outliers) on each of the physiological measures. These values were removed from the dataset (pairwise deletion). Extreme values were removed from three participants for Heart Rate (HR) and four participants for skin conductance (SCL). Removal of the extreme values in the above mentioned variables restored normality of the data based on non-significant values of Kormogorov-Smirnov and Shapiro-Wilk tests. For corrugator activity, technical issues caused loss of data from 17 participants that were removed from the dataset. The remaining data presented with violations of normality. Considering that Repeated Measures ANOVA to be conducted in the following analyses is a robust test (Glass et al., 1972 in Field, 2009), we decided not to perform transformations and used the raw (untransformed) data for analyses.

1.2.Manipulation checks

1.2.1. Physiological Measures

To examine whether our film-clips were successful in emotion induction, the physiological responses of the sample during the three different types of Film clips (film-viewing condition) were compared over baseline (average of the last 2.5mins of the baseline

period at the start of the experiment). Separate Repeated Measures ANOVAs for each physiological measure were conducted with Clip [(Baseline vs. Clip (Neutral, General Negative, Pathology specific)] as a within subject factor (see Table 4-3 for means and SDs). T-tests with Bonferroni corrected p value were conducted to examine possible differences between the two neutral film-clips on all three physiological measures (adjusted p=0.02) and self-reported affect (adjusted p=0.08). These analyses yielded no significant differences between the two neutral clips in any of the above mentioned measures therefore an average score of the two neutral clips was computed for each measure and used in the Repeated Measures Analysis. The results of the separate Repeated Measures ANOVAs are reported below.

For HR, Mauchly's test showed that the assumption of sphericity was violated χ^2 (5)=34.33, p= 0.001, therefore degrees of freedom were corrected with Greenhouse-Geisser estimates of sphericity (ε= 0.75). The results showed that there was a significant effect of the clip ($F_{(2.26, 158.47)}$=38.24, p< .001, η_p^2=0.33). Pairwise comparisons showed that participants had significantly (p< .001) higher HR at baseline than during the neutral clips (M_{DIFF}=2.43, 95%CI [1.53, 3.32]), during *The Champ* (M_{DIFF}=3.54, 95%CI [2.32, 4.75]), and during the *Documentary* (M_{DIFF}=2.94, 95%CI [1.77, 4.10]).

Regarding skin conductance levels (SCLs), the assumption of sphericity was violated χ^2 (5)=112.62, p< 0.001, therefore degrees of freedom were corrected with Greenhouse-Geisser estimates of sphericity (ε= 0.50). The results showed that there was a significant effect of clip ($F_{(1.51, 106.03)}$=33.81, p< .001, η_p^2=0.23) on SCLs. Pairwise comparisons showed that participants had significantly reduced skin conductance during baseline than during the neutral clips (M_{DIFF}=-0.50, 95%CI [-0.77, -0.22]), *The Champ* (M_{DIFF}=-0.86, 95%CI [-1.27, -0.45]), and the *Documentary* (M_{DIFF}=-0.97, 95%CI [-1.35, -0.58]). The neutral clips, as expected, elicited significantly lower skin conductance mean scores than the general negative clip *The Champ* (M_{DIFF}=-0.36, 95%CI [-0.56, -0.16]) and *The Documentary* (M_{DIFF}=-0.47, 95%CI [-0.65, -0.29]).

Regarding corrugator activity, the assumption of sphericity was violated χ^2 (5)=85.09, p= 0.001, therefore degrees of freedom were corrected with Greenhouse-Geisser estimates of sphericity (ε= 0.48). The results showed that there was no significant effect of clip ($F_{(1.45, 66.94)}$=1.98, p=0.16, η_p^2=0.04). However, pairwise comparisons showed that there was a

significant difference between *The Champ* and the *Documentary* (M_{DIFF}=1.40, 95%CI [0.01, 2.78]) with *The Champ* producing higher corrugator activity.

In conclusion, heart rate and skin conductance measures were significantly different between baseline and all film-clips suggesting that our manipulation strategy (Film-viewing condition) was successful.

1.2.2. *Affect Ratings*

To examine whether our film-clips were successful in emotion induction, the affect ratings during the two negative affect clips (i.e. *The Champ* and *The Documentary*) were compared against the average score of the two neutral clips (since no affect ratings were administered during the baseline period of the experiment). Separate Repeated Measures ANOVAs for each affect rating were conducted with Clip (Neutral vs. General Negative vs. Pathology specific) as the within subject factor (see Table 4-3 for means and SDs). The results of the separate Repeated Measures ANOVAs are reported below.

Regarding PANAS Negative Affectivity Score, the assumption of sphericity was violated χ^2 (2)=17.88, p= 0.001, therefore degrees of freedom were corrected with Greenhouse-Geisser estimates of sphericity (ε= 0.83). The results showed that there was a significant effect of the clip ($F_{(1.66, 129.23)}$=35.51, p< .001, η_p^2=0.29). Pairwise comparisons showed that participants reported significantly (p< .001) lower negative affect during the neutral clips than during *The Champ* (M_{DIFF}=-7.62, 95%CI [-11.48, -3.76]), and during the *Documentary* (M_{DIFF}=-11.94, 95%CI [-14.69, -9.18]).

Regarding SUDS 1 (valence), the assumption of sphericity was violated χ^2 (2)=10.34, p= 0.01, therefore degrees of freedom were corrected with Greenhouse-Geisser estimates of sphericity (ε= 0.87). The results showed that there was a significant effect of the clip ($F_{(1.77, 134.65)}$=160.34, p< .001, η_p^2=0.68). Pairwise comparisons showed that participants reported feeling significantly more pleasant (p< .001) during the neutral clips than during *The Champ* (M_{DIFF}=4.08, 95%CI [3.41, 4.76]), and *The Documentary* (M_{DIFF}=3.50, 95%CI [2.86, 4.14]).

For SUDS 2 (arousal), the assumption of sphericity was violated χ^2 (2)=140.07, p= 0.001, therefore degrees of freedom were corrected with Greenhouse-Geisser estimates of sphericity (ε= 0.54). The results showed that there was a significant effect of the clip ($F_{(1.09, 83.62)}$=28.85, p< .001, η_p^2=0.27). Pairwise comparisons showed that participants reported significantly (p< .001) less arousal during the neutral clips than during *The Champ* (M_{DIFF}=-4.79, 95%CI [-5.33, -4.24]), and the *Documentary* (M_{DIFF}=-5.26, 95%CI [-7.56, -2.97]).

Table 4-3. Means and S.D.s for the physiological and self-reported affect measures for each ED risk group

			High risk					Low risk		
	N	Baseline	Neutral*	The Champ	The Documentary	N	Baseline	Neutral*	The Champ	The Documentary
		M (SD)	M (SD)	M (SD)	M (SD)		M (SD)	M (SD)	M (SD)	M (SD)
Physiological Measures										
Heart Rate	39	76.91 (9.24)	73.78 (1.26)	72.73 (1.17)	73.67 (1.23)	36	73.69 (9.39)	70.04 (1.34)	68.74 (1.26)	68.97 (1.32)
Skin Conductance	38	4.55 (2.40)	4.90 (0.35)	5.40 (0.39)	5.48 (0.40)	35	3.47 (1.85)	3.88 (0.38)	4.13 (0.42)	4.24 (0.42)
Corrugator Activity	24	10.22 (7.95)	10.08 (1.89)	13.76 (1.89)	12.85 (1.97)	27	16.65 (13.64)	14.90 (1.78)	15.82 (1.79)	14.17 (1.85)
Self-reported Measures										
PANAS-Negative Affect Score	42		20.06 (0.54)	32.95 (1.36)	34.26 (1.82)	43		19.09(0.43)	29.90 (1.07)	28.14 (1.26)
SUDS 1 (Valence)	41		6.58 (0.26)	2.46 (0.24)	2.63 (0.23)	41		6.73 (0.26)	2.51 (0.24)	3.61 (0.23)
SUDS 2 (Arousal)	41		2.49 (0.20)	7.56 (0.24)	9.29 (1.23)	42		2.56 (0.20)	7.19 (0.23)	6.19 (1.21)
SUDS 3 (Anxiety)	41		1.95 (0.19)	6.49 (0.37)	6.44 (0.34)	42		2.07 (0.20)	5.71 (0.36)	5.21 (0.34)
SUDS 4 (Somatic Symptoms)	41		1.55 (0.17)	4.39 (0.40)	5.56 (0.42)	42		1.54 (0.16)	3.55 (0.39)	4.09 (0.41)
SUDS 5 (Control over reactions\)	41		7.74 (0.40)	4.78 (0.43)	5.41 (0.43)	42		7.83 (0.40)	6.45 (0.43)	6.64 (0.43)

*Note: Average score from the neutral clips used in the study.

For SUDS 3 (anxiety), results showed that there was a significant effect of the clip ($F_{(2, 154)}$=148.23, $p< .001$, η_p^2=0.66). Specifically, participants reported significantly (p< .001) less anxiety during the neutral clips than during *The Champ* (M_{DIFF}=-4.08, 95%CI [-4.74, -3.43]), and the *Documentary* (M_{DIFF}=-3.85, 95%CI [-4.53, -.3.18]).

For SUDS 4 (somatic symptoms), a significant effect of clip was again observed ($F_{(2, 154)}$=58.57, $p< .001$, η_p^2=0.43), with pairwise comparisons showing that participants reported significantly ($p< .001$) less annoying somatic symptoms during the neutral clips than during *The Champ* (M_{DIFF}=-2.42, 95%CI -3.14, -1.71]), and the *Documentary* (M_{DIFF}=-3.28, 95%CI [-4.07, -2.49]).

Finally, for SUDS 5 (control) there was a significant effect of the clip ($F_{(2, 154)}$=26.92, $p< .001$, η_p^2=0.26). Pairwise comparisons showed that participants were significantly ($p< .001$) more able to control their reaction during the neutral clips than during *The Champ* (M_{DIFF}=2.21, 95%CI [1.37, 3.05]), and the *Documentary* (M_{DIFF}=1.79, 95%CI [0.99, 2.60]).

In conclusion, affect ratings were significantly different between the neutral clips and negative affect inducing film-clips providing evidence that out experimental manipulation was effective.

Main Analyses

1.2.3. Heart rate

A Repeated Measures Factorial ANOVA was conducted with mean heart rate (BPM) for every clip (The Champ, The Documentary and Neutral –Average score) as the within subject variable, while ED risk Group (high vs. low) was the between-subject variable. The ED risk x Clip interaction did not reach significance (p=.22) but there was a significant main effect of clip ($F_{(2,146)}$=8.63, $p<0.001$, η_p^2=0.11) as well as for ED risk ($F_{(1,73)}$=5.54, p=0.02, η_p^2=0.07) with high risk participants presenting higher overall mean heart rate (M=73.39, SD=1.20) than low risk participants (M=69.25, SD=1.28). As for the effect of Clip, Bonferroni corrected post hoc tests showed that overall participants had significantly ($p<.001$) higher heart rate during the neutral clips than during *The Champ* (M_{DIFF}=-1.18, 95%CI [-1.83, -0.52]). Due to our a priori hypotheses for a different pattern of responses between groups on corrugator activity, follow-up Repeated Measures ANOVAs were conducted to examine the effect of Clip (clip: neutral, The Champ, The Documentary) for each ED risk group separately. Results showed that low risk participants presented significantly ($F_{(2, 68)}$=4.35, $p< .02$, η_p^2=0.11) higher heart rate during the neutral clip than during *The Champ* (M_{DIFF}=1.31, 95%CI [0.17, 2.44]) while high risk participants (n=40) ($F_{(2, 78)}$=6.00, $p< .005$, η_p^2=0.13) presented the same pattern of

results (M_{DIFF}=1.05, 95%CI [0.27, 1.83]) and in addition had significantly (*p*=0.02) higher heart rate during the *Documentary* than during *The Champ* (M_{DIFF}=-0.94, 95%CI [-1.75, -0.12]).

1.2.4. Skin conductance

When the same Repeated Measures Factorial ANOVA was conducted with mean skin conductance levels (SCLs) as the outcome, the interaction between ED risk x film-clip did not reach significance. However, significant main effects of both clip ($F_{(2,146)}$=26.81, *p*<0.001, η_p^2=0.27) and ED risk ($F_{(1,73)}$=4.53, *p*<0.05, η_p^2=0.06) were found, with high risk participants having higher SCLs (*M*=5.26, *SD*=0.38) than low risk (*M*=4.09, *SD*=0.40). As for Clip, Bonferroni corrected post-hoc tests showed that the neutral clips resulted in significantly (*p*<0.05) lower SCLs than *The Champ* (M_{DIFF}=0.37, 95%CI [-0.19, 0.54]) as well as in comparison to the *Documentary* (M_{DIFF}=-0.47, 95%CI [0.31, 0.62]). *The Champ* and the *Documentary* did not differ.

Despite that ED risk x film-clip interaction was not significant we examined Bonferroni corrected pairwise comparisons between the two groups on each clip. Results showed that high risk presented significantly (*p*<0.05) higher arousal on *The Champ* (M_{DIFF}=1.27, 95%CI [0.13, 2.41]) and on *The Documentary* (M_{DIFF}=1.23, 95%CI [0.07, 2.39]) than low risk participants. The difference of the two groups on the neutral clips was significant (*p*=0.05) with high risk participants presenting higher arousal (M_{DIFF}=1.02, 95%CI [-0.005, 2.05]) than low risk participants. Repeated Measures ANOVAs were also conducted to compare the effect of clip (*The Champ, The Documentary* and Neutral −Average score) for each ED risk group separately. Results showed that the effect of clip was significant for both low risk ($F_{(2, 68)}$=8.70, *p*< .001, η_p^2=0.20) and high risk participants ($F_{(2, 78)}$=19.55, *p*< .001, η_p^2=0.33). Low risk participants (*n*=35) presented significantly lower SCLs during the neutral clip than during *The Champ* (M_{DIFF}=-0.24, p=0.02, 95%CI [-0.46, -0.03]) and during the *Documentary* (M_{DIFF}=-0.36, *p*=0.001, 95%CI [-0.57, -0.15]). High risk participants (*n*=40) presented the same pattern of results with lower arousal during the neutral clip in comparison *The Champ* (M_{DIFF}=-0.49, *p*=0.001, 95%CI [-0.76, -0.22]) and the *Documentary* (M_{DIFF}=-0.57, *p*=0.001, 95%CI [-0.81, -0.33]).

1.2.5. Corrugator activity

A Repeated Measures ANOVA was conducted with mean scores on corrugator activity for every clip (*The Champ, The Documentary* and Neutral −Average score) entered as within

subject variables and ED risk as between subject variable. Due to violation of sphericity (χ^2 (2)=16.43, p= 0.001), degrees of freedom were corrected with Greenhouse-Geisser estimates of sphericity (ε= 0.77). A significant interaction between Clip and ED risk ($F_{(1.55, 75.97)}$=3.32, $p\leq0.05$, η_p^2=0.06) and main effect of clip ($F_{(1.55, 75.97)}$=5.18, $p\leq0.01$, η_p^2=0.10) were observed. Bonferroni corrected post hoc tests showed that participants presented significantly higher corrugator activity during *The Champ* (M=14.79, SD=1.30) than during the neutral clip (M=12.49, SD=1.29) (p=0.01) and the *Documentary* (M=13.51, SD=1.35) (p=0.04).

To examine the interaction effect, follow-up Repeated Measures ANOVA were conducted for each ED risk group separately with film clip (clip: neutral, *The Champ, The Documentary*) as a within subject variable. There was no significant effect of clip for the low risk participants. However, there was a main effect of clip for the high risk participants (n=24) ($F_{(1.42, 32.64)}$=5.37, $p\leq .02$, η_p^2=0.20). More specifically, high risk participants presented significantly higher corrugator activity during *The Champ* than during the neutral clips (M_{DIFF}=-3.67, p=0.01, 95%CI [-6.70, -0.64]) (Figure 4-1).

Figure 4-1. Interaction Film-Clip x Group on Corrugator Activity
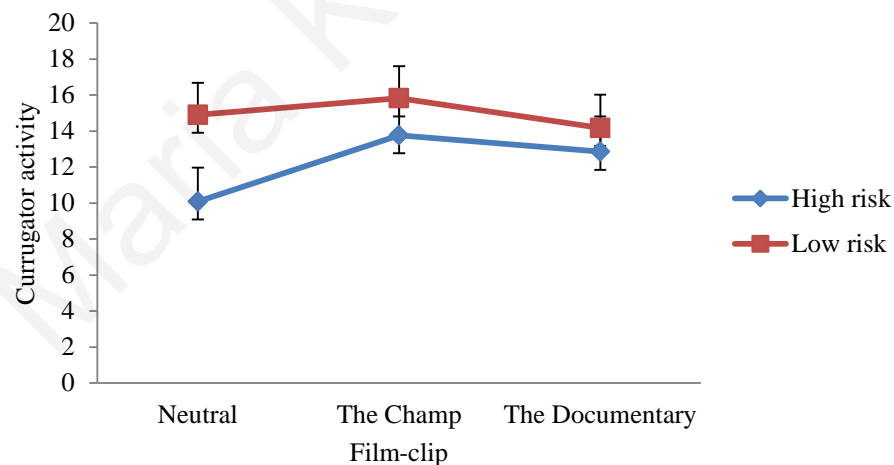
Affect Ratings

1.3.PANAS Negative Affect Score

A Repeated Measures ANOVA was conducted with mean scores on PANAS Negative Affectivity for every clip (*The Champ, The Documentary* and Neutral –Average score) entered as within subject variables and ED risk as between subject variable. Due to violation of sphericity ($\chi_{(2)}^2$=7.38, p=0.02), Greenhouse-Geisser (ε=0.92) corrected degrees of freedom

were used. A significant interaction between Clip and ED risk ($F_{(1.84, 152.84)}$=3.99, p=0.02, η_p^2=0.05) and main effect of clip ($F_{(1.84, 152.84)}$=108.91, p=0.001, η_p^2=0.57), and ED risk ($F_{(1,83)}$=6.89, p=0.01, η_p^2=0.07) were found. Bonferroni corrected post hoc tests showed that overall participants reported significantly higher scores for *The Champ* (*M*=31.43, *SD*=0.87) than during the neutral clip (*M*=19.57, *SD*=0.34) (p=0.001). Significantly higher scores were also reported during *The Documentary* (*M*=31.20, *SD*=1.10) (*p*=0.001) than during the neutral clip. No significant differences were found between the two negative inducing film-clips.

To examine the interaction effect, follow-up Repeated Measures ANOVAs were conducted for each ED risk group separately with Clip as the within subject factor (PANAS Negative Affect Score on each of the three clips: neutral, *The Champ, The Documentary*). A significant main effect of clip was found for both high risk participants ($F_{(1.73, 71.09)}$=57.77, $p\leq$ .001, η_p^2=0.58) as well as for low risk participants ($F_{(2, 84)}$=53.32, $p\leq$ .001, η_p^2=0.56). Low risk participants (*n*=43) reported significantly lower scores on the neutral clips as compared to *The Champ* (M_{DIFF}=-10.81 p=0.001, 95%CI [-13.59, -8.04]) and the *Documentary* (M_{DIFF}=-9.05, p=0.001, 95%CI [-12.07, -6.02]). High risk participants presented a similar pattern of results, reporting lower scores on the neutral clips as compared to *The Champ* (M_{DIFF}=-12.89 p=0.001, 95%CI [-15.91, -9.88]) and the *Documentary* (M_{DIFF}=-14.20, p=0.001, 95%CI [-18.45, -9.95]). In addition, we examined Bonferroni corrected pairwise comparisons between the two groups on each clip. Results showed significant group differences only on *The Documentary* with high risk participants reporting higher negative affect than low risk participants (M_{DIFF}=5.99, p=0.01, 95%CI [1.81, 10.18]) (Figure 4-2).

Subjective Units of Distress

1.3.1. SUDS 1-Valence

A Repeated Measures ANOVA with valence ratings for every clip (*The Champ, The Documentary* and Neutral –Average score) entered as within subject variables and ED risk as between subject variable. Due to violation of sphericity ($\chi_{(2)}^2$=0.86, p=0.002), Greenhouse-Geisser (ε=0.87) corrected degrees of freedom were used. The interaction between ED risk x clip was not significant.

Figure 4.2. Interaction Film-clip x Group on PANAS Negative Affect
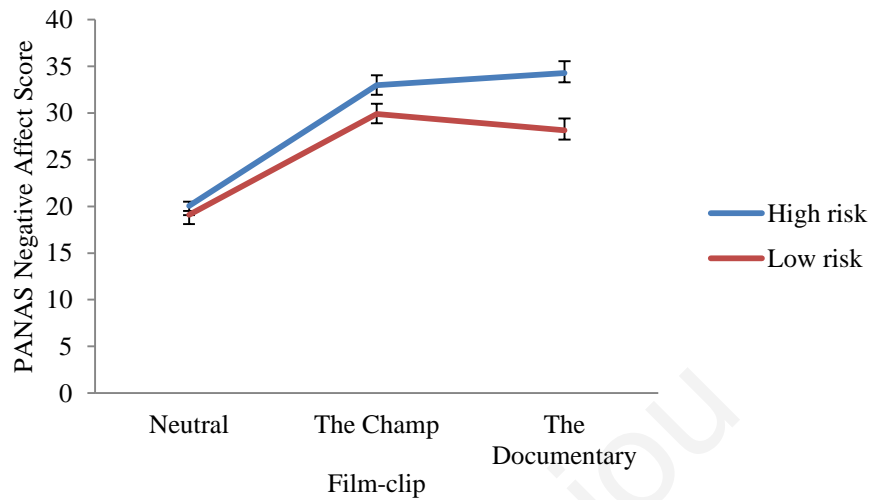
However, a significant main effect of clip ($F_{(1.75, 139.93)}$=184.56, p=0.001, η_p^2=0.70) was found. Bonferroni corrected post hoc tests showed that overall participants assessed the neutral clips (M=6.65, SD=0.19) as significantly (p=0.001) more pleasant than *The Champ* (M=2.50, SD=0.17) as well as more pleasant than the *Documentary (M*=3.12, *SD*=0.16). *The Champ* was also assessed as significantly (p=0.003) more negative compared to the *Documentary*. As for ED risk, a nearly significant main effect was observed ($F_{(1,80)}$=3.33, p=0.07, η_p^2=0.04). Bonferroni corrected comparisons between the two ED risk groups in each clip separately showed that high risk participants reported feeling significantly (p=0.003) less pleasant during the *Documentary* as compared to low risk participants (M_{DIFF}=-0.98, 95%CI [-1.61, -0.34]), but not during the other clips.

1.3.2. SUDS 2-Arousal

A Repeated Measures ANOVA was conducted with arousal ratings for every clip (*The Champ, The Documentary* and Neutral –Average score) entered as within subject variables and ED risk as between subject variable. Due to violation of sphericity ($\chi_{(2)}^2$=142.63, p=0.001), Greenhouse-Geisser (ε=0.55) corrected degrees of freedom were used. There was no significant interaction but a significant main effect of clip ($F_{(1.09, 88.44)}$=33.14, p=0.001, η_p^2=0.29) was observed. ED risk ($F_{(1,81)}$=3.47, p=0.07, η_p^2=0.04) was not significant suggesting that the two groups gave similar ratings for the clips. Bonferroni corrected post hoc tests showed that participants assessed the neutral clips (M=2.52, SD=0.14) as significantly less arousing than *The Champ* (M=7.38, SD=0.17, p=0.001) as well as less

arousing than the *Documentary* (*M*=7.74, *SD*=0.86). No significant differences were found between *The Champ* and the *Documentary.*

1.3.3. SUDS 3- Anxiety

When anxiety ratings were entered in the same Repeated Measures ANOVA, a significant interaction between ED risk x Clip ($F_{(2,162)}$=3.51, *p*=0.03, $\eta_p{}^2$=0.04), and a significant main effect of clip ($F_{(2, 162)}$=156.53, *p*=0.001, $\eta_p{}^2$=0.66), and risk ($F_{(1,81)}$=3.82, *p*=0.05, $\eta_p{}^2$=0.04) were found. Bonferroni corrected post hoc tests showed that overall participants assessed the neutral clips (*M*=2.01, *SD*=0.14) as significantly (*p*=0.001) less anxiety provoking than *The Champ* (*M*=6.10, *SD*=0.26) and the *Documentary* (*M*=5.83, *SD*=0.24).

To examine the interaction effect, follow-up Repeated Measures ANOVA was conducted to for each ED risk group separately. There was a main effect of clip for both high risk ($F_{(2, 80)}$=125.93, p=0.001, $\eta_p{}^2$=0.76) and low risk participants ($F_{(2, 82)}$=49.36, *p*=0.001, $\eta_p{}^2$=0.55). Low risk participants (*n*=42) reported significantly (p=0.001) lower anxiety scores on the neutral clips (*M*=2.07, *SD*=0.18) as compared to *The Champ* (*M*=5.71, *SD*=0.39) and the *Documentary* (*M*=5.21, *SD*=0.39). A similar pattern was observed for High risk participants (*n*=41), who reported significantly (p=0.001) lower scores on the neutral clips (*M*=1.95, *SD*=0.21) as compared to their scores for *The Champ* (*M*=6.49, *SD*=0.33) and the *Documentary* (*M*=6.44, *SD*=0.27). In addition, Bonferroni corrected pairwise comparisons were examined to detect differences between the two ED risk groups on each clip. Results showed that high risk participants reported significantly (*p*=0.01) higher anxiety during the *Documentary* as compared to low risk participants (M_{DIFF}=1.22, 95%CI [0.27, 2.18]), but no significant differences were observed for the other clips (Figure 4-3).

Figure 4-3. Interaction Film-Clip x Group on SUDS 3 (Anxiety)
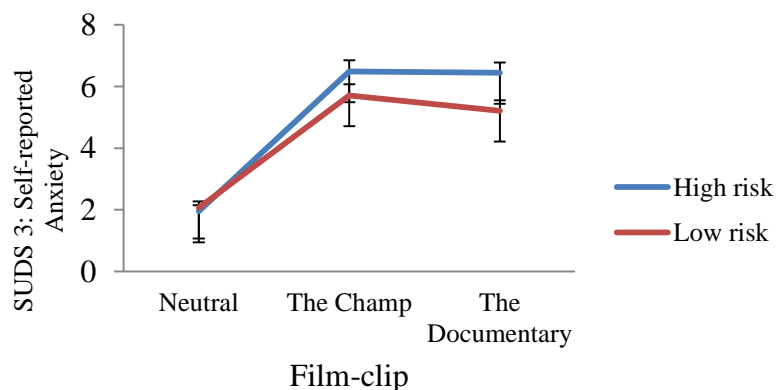
1.3.4. SUDS 4-Annoying somatic symptoms

The Repeated Measures ANOVA with SUDS − 4 scores indicated a nearby significant interaction between clip x ED risk ($F_{(2,162)}$=2.92, p=0.06, η_p²=0.03), a significant main effect of clip ($F_{(2,162)}$=63.90, p=0.001, η_p²=0.44) and of ED risk ($F_{(1,81)}$=5.20, p=0.02, η_p²=0.06). Bonferroni corrected post hoc tests showed that participants reported significantly (p=0.001) less annoying somatic symptoms during the neutral clips (*M*=1.54, *SD*=0.12) than during *The Champ* (*M*=3.97, *SD*=0.28) as well during the *Documentary* (*M*=4.83, *SD*=0.29). Furthermore, significantly (p=0.03) more annoying somatic symptoms were reported during the *Documentary* than during *The Champ*. Bonferroni corrected pairwise comparisons between the two ED risk groups showed that high risk participants reported significantly (*p*=0.01) more annoying somatic symptoms during the *Documentary* than during *The Champ* (*M_DIFF*=1.47, 95%CI [0.30, 2.63]).

1.3.5. SUDS 5-Control of reactions

The Repeated Measures ANOVA with SUDS5 scores indicated a significant interaction between ED risk and Clip ($F_{(2,162)}$=3.72, p=0.03, η_p²=0.05), and significant main effects of both clip ($F_{(2, 162)}$=29.72, p=0.001, η_p²=0.27) and ED risk ($F_{(1,81)}$=4.20, p=0.04, η_p²=0.04). Bonferroni corrected post hoc tests showed that participants felt significantly (*p*=0.001) more able to control their reactions during the neutral clips (*M*=7.79, *SD*=0.28) than during *The Champ* (*M*=6.62, *SD*=0.30) and the *Documentary* (*M*=6.03, *SD*=0.31).

Follow-up Repeated Measures ANOVAs exploring the effect of Clip for each ED risk group separately showed that the effect of Clip was significant for both high ($F_{(2,80)}$=22.24, p=0.001, η_p²=0.36; *n*=41) and low risk($F_{(2,82)}$=7.94, p=0.001, η_p²=0.16; *n*=42) groups and followed the same pattern. However, Bonferroni corrected pairwise comparisons exploring group differences for each clip separately showed that high risk participants were significantly less able to control their reactions during *The Champ* (*M_DIFF*=-1.67, *p*=0.01, 95%CI [-2.89, -0.46]) and the *Documentary* (*M_DIFF*=-1.23, *p*=0.05, 95%CI [-2.45, -0.01]) as compared to low risk participants. No group differences were observed for Neutral clips (Figure 4-4).

2. Body size estimations:

2.1.Cognition of body image distortion-Question 1:'At your present weight, how do you see yourself in the mirror?'

Spearmans rho correlations were conducted between participants' responses and their BMI category for each ED risk group separately. Higher positive correlation was found for the low

Figure 4-4. Interaction Film-clip x Group on self-reported control over reactions (SUDS 5)
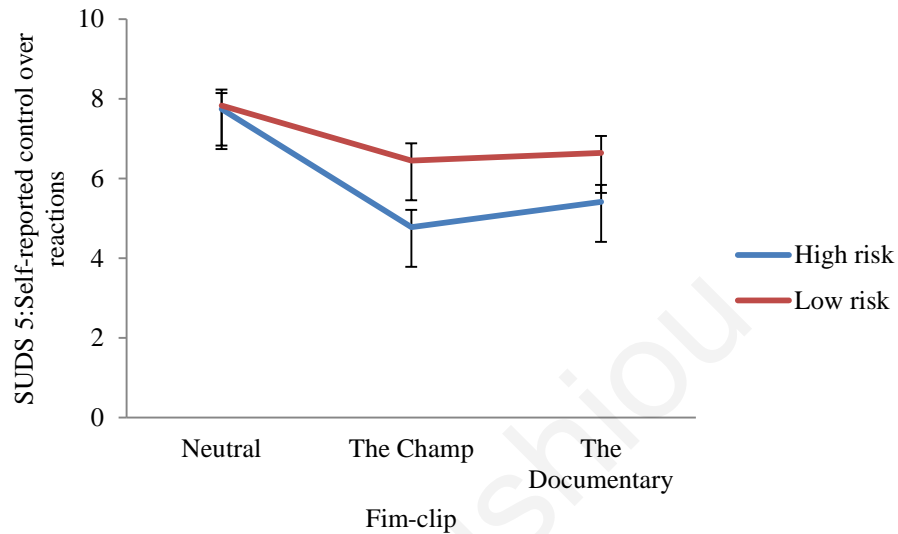
risk participants ($\rho(36)=0.638$ $p=0.001$) when compared to the high risk participants ($\rho(42)=0.44$, $p=0.003$), as expected.

A Repeated Measures ANOVA was conducted to examine the effect of clip (*The Champ, The Documentary*, Neutral-average score) on the participants' perception of weight with ED risk entered as the between subject variable. Due to violation of sphericity ($\chi(2)^2=52.76$, $p=0.001$), Greenhouse-Geisser ($\varepsilon=0.66$) corrected degrees of freedom were used. There was a significant interaction between the clip and the ED risk ($F_{(1.33, 102.63)}=6.29$, $p=0.01$, $\eta_p^2=0.08$), and a significant main effect of ED risk ($F_{(1,77)}=10.60$, $p=0.002$, $\eta_p^2=0.12$. There was no significant effect of the clip ($F_{(1.33, 102.63)}=1.01$, $p=0.34$, $\eta_p^2=0.01$). Pairwise comparisons between the two ED groups showed that high risk participants rated themselves as significantly more fat as compared to low risk participants on all three clips: after *The Champ* ($M_{DIFF}=-0.60$, $p=0.01$, 95%CI [-1.04, -0.17]), the *Documentary* ($M_{DIFF}=-0.87$, p=0.001, 95%CI [-1.35, -0.40]), and the neutral clips ($M_{DIFF}=-0.70$, $p=0.002$, 95%CI [-1.14, -0.25]).

Follow-up Repeated Measures ANOVAs were conducted to examine the effect of clip on each ED risk separately. A main effect of clip ($F_{(1.45, 61.47)}=7.55$, $p=0.03$, $\eta_p^2=0.16$) was observed only for high risk participants (Greenhouse-Geisser corrected degrees of freedom were used $\varepsilon=0.75$ due to violation of sphericity ($\chi_{(2)}^2=16.26$, $p=0.001$), who reported seeing

themselves as more fat after *The Documentary* (*M*=3.26, *SD*=0.18) than during *The Champ* (*M*=3.45, *SD*=0.15, *p*=0.02) and the neutral clips (*M*=3.38, *SD*=0.16; *p*=0.05). No significant effect of clip was found for the low risk group (*n*=37) ($F_{(1.09, 39.54)}$=0.93, *p*=0.35, η_p^2=0.02) (Figure 4-5).

Figure 4-5. Interaction Film-Clip x Group on Cognition of body-image distortion (Question1)
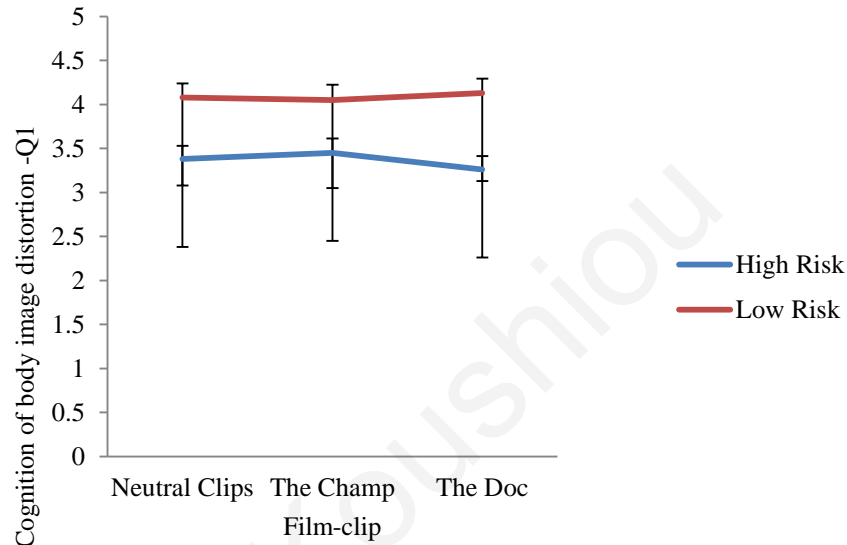
3.2. Cognition of body image distortion -Question 2: 'Referring to your inner feelings, at your present weight, how do you feel?'

The same set of analyses was conducted as above. Spearmans rhocorrelations showed that there were positive correlations between the participants' responses and their BMI category. For low risk participants (ρ(36)=0.66, *p*=0.001) there was a higher correlation as compared to their high risk cohorts (ρ(42)=0.33, *p*=0.03).

Results from Repeated Measures ANOVA showed no significant interaction ($F_{(1.32, 102.01)}$=0.04, *p*=0.90, η_p^2=0.001) and no significant effect of the clip ($F_{(1.32, 102.01)}$=0.74, *p*=0.48, η_p^2=0.01). There was a significant main effect of ED risk ($F_{(1,77)}$=9.99, *p*=0.002, η_p^2=0.11) revealing that high risk participants reported feeling significantly more fat as compared to their low risk cohorts after all film-clips.

3.   Correlations between physiological reactions and self-reported affect

Pearson r correlations were conducted between the physiological measures (heart rate, skin conductance and corrugator activity) and the affect ratings (PANAS negative score,

SUDS -1-5) as recorded during the two negative affective film stimuli, The Champ and the Documentary. The analyses were run separately for high (n=42) and low risk (n=37) participants. Results showed that there was some correspondence between the physiological measures and the affect ratings for the low risk participants. More specifically, for the low risk group heart rate during The Champ correlated positively with self-reported arousal (r=0.35, p=0.04), and negatively with self-reported control over reactions (r=-0.37, p=0.05). During the Documentary, low risk participants' heart rate correlated positively with both arousal (r=0.37, p=0.02) and annoying somatic symptoms (r=0.37, p=0.02). Also, their self-reported ability to control their reactions correlated negatively with corrugator activity (r=-0.51, p=0.05). No significant correlations were found for the high risk group in any of the two film-clips.

4. *Bogus Taste Task: Behavioral outcomes*

Independent samples t-test analysis was conducted to compare the two risk groups (high vs. low) on their level of hunger and mood as assessed before the bogus taste task. There were no significant differences between the two groups on their level of hunger ($t_{(75)}$=-1.27, p=0.21) and their mood level ($t_{(75)}$=1.52, p=0.13). Next, t-test analyses were conducted to compare the amount of calories in chocolate and chips consumed by the two groups during the bogus taste task. Again, there were no significant differences on the calories either for the chocolate ($t_{(76)}$=0.40, p=0.69) or for the chips ($t_{(76)}$=-0.27, p=0.79). Despite not reaching significance, high risk participants (n=41) had a higher mean score (M=29.35, SD=36.55) of calories for the chocolate consumption as compared to the low risk participants (n=37) (M=26.65, SD=19.50). Regarding chips consumption, high risk participants consumed less calories (M=10.93, SD=13.08) than their low risk cohorts (M=11.67, SD=10.84).

Discussion

The aim of the present study was to examine emotional reactivity to unpleasant stimuli as induced via film-clips with general and ED specific content in adolescents and youth with risk to develop ED. In addition, the differences between high vs. low ED risk participants were examined in a series of self-reported measures: level of self-esteem, cognitions on appearance, emotion regulation skills, body-image flexibility.

Hypothesis 1: Emotion regulation difficulties as indicated via self-report measures

There is growing evidence for the role of somatic-affective experience in the development of ED. Empirical evidence suggests that emotional impairment is observed in

individuals with clinical and subclinical levels of ED (Wildes, Ringham & Marcus, 2010; Merwin, Zucker, Lacy & Elliott, 2010; Racine & Wildes, 2013; Lech, Holmqvist & Andersson, 2012; Claes et al, 2012; Davies, Swan, Schmidt & Tchanturia, 2012; Rawal, Park, & Williams, 2010). Current findings confirm prior research since high risk participants in our study presented higher levels of distress as well as significant emotion regulation difficulties as compared to low risk participants. More specifically, they reported difficulties in using emotion regulation strategies flexibly in order to meet their personal goals and respond effectively to situational demands and further reported more impulse control difficulties reflecting their tendency to feel and possibly act out of control when experiencing emotions. Despite these difficulties they reported that they are aware of their emotional states and that they experience their emotions with clarity and acceptance, presenting no significant differences with their low risk counterparts. These results do not correspond with previous findings suggesting that non-acceptance of emotional states predicts higher eating pathology in ED patients (Merwin et al., 2009). It seems that this may not apply to youth in high risk for ED as at this young age and at these early stages of eating pathology. Certain aspects of their emotion regulation skills have not yet been affected, such as emotional awareness; this is a finding suggesting a qualitative difference between individuals at ED risk vs. clinical diagnosis. Nevertheless they report using maladaptive emotion regulation skills that prevents them from acting flexibly towards situational demands and personal goals (Rawal, Park, & Williams, 2010).

Emotion regulation difficulties arise in reference to disturbing thoughts and feelings about one's body image. These difficulties are conceptualized as body dissatisfaction or weight concerns and based on longitudinal studies play a key role in the development and maintenance of ED (Stice & Shaw, 2002). However, a closer look at this relation reveals that it is not negative concerns per se but rather the way they respond to them, i.e. body image inflexibility, that strongly impacts disordered eating and significantly predicts risk for ED (Sandoz, Wilson, Merwin, Kellum, 2013). Our findings provide further evidence for the role of body image inflexibility with high risk presenting more maladaptive/inflexible ways in responding to negative internal states relating to their eating and weight as compared to low risk participants.

Hypothesis 2: Cognitions

Cognitive-behavioral conceptualizations of ED support that eating and body image information are a large component of core cognitive schemas of the self (Fairburn, Cooper, & Shafran, 2003; Fairburn, Shafran, & Cooper, 1998). As a result self-worth is defined by body-image and appearance creating a dysfunctional schematic thinking. This pattern of thinking is evidenced based on the present results since participants in high risk for ED reported more dysfunctional appearance schemas as compared to low risk participants. In addition significantly lower levels of self-esteem among high-risk participants in comparison the low risk group support the hypothesis about the negative impact of appearance on self-worth. It is thus concluded that even at a subclinical level, self-worth is heavily defined by appearance. This maladaptive schematic thinking is supported as one main mechanism for the maintenance of ED since it is associated with a dysfunctional preoccupation with eating, shape and weight and the ability to control them on a cognitive level as well as on a behavioral level (Fiarburn, Cooper, & Shafran, 2003). High-risk participants seem to over-evaluate eating, body weight and shape on a cognitive level but present less eating disordered behaviors (in both frequency and severity). Based on these findings, an important emerging question for future research is: what are the differences (qualitative and quantitative) in appearance schematic thinking between individuals at high risk for ED and individuals with a diagnosis for ED and what are the characteristics of this type of schematic thinking that can lead to eating disordered behaviors?

Hypothesis 3: Experimental Findings: Autonomic responses and affect ratings

The present findings support that the unpleasant film-clips used in the study successfully induced negative affect as assessed via both physiological and self-reported measures. In regards to the physiological measures, unpleasant film-content modulated Heart rate (HR) and skin conductance levels (SCLs) during film-viewing. The two unpleasant clips induced greater HR deceleration compared to the baseline period while higher SCLs were observed in response to both unpleasant clips compared to the neutral clips. In regards to SCL, an increase in SCLs signifies the expected sympathetic response to the unpleasant clips in comparison to the neutral clips. On the other hand, the HR changes during film-viewing conditions might be associated with the participants' efforts to orient and sustain attention rather than specific affective content as in a study by Codispoti, Surcinelli, Baldaro (2008) who reported a similar pattern of results in healthy university students.

An unexpected finding was that corrugator activity responses were not modulated by clip. An inspection of the corrugator average scores though suggested high variance at baseline and subtle differences within clips in the low risk group. In the high risk group there was a significant difference with higher scores noted on *The Champ* as compared to the neutral clips. The absence of variation in the film-viewing condition for the low risk group might account for the overall absence of a significant effect of clip on the corrugator activity. These plausible explanations must be interpreted with caution in the light of the technical problems encountered in the collection of corrugator activity data. Due to these problems a number of participants' responses on corrugator activity were excluded from the analyses. This reduction in sample size may have compromised the effects of negative affect on this specific valence index.

Main analyses focused on the modulation of the physiological responses by each film-clip type in relation to ED risk. Based on previous research, it was expected that the content of negative affect and especially the pathology-specific one will have a differential impact on high risk participants as compared to the low risk group. Results supported our hypothesis with high risk participants presenting higher HR in response to pathology-specific content in comparison to general content clip. This pattern of results was not observed in the low risk group. Prior research has shown that negative affect induces significant deceleration of HR in bulimic patients when they are exposed to pictures of food vs. control pictures; a response that indicates enhanced attention to food cues and corresponds to their cravings (Laberg, Wilson, Eldredge, & Nordbym 1991). In contrary, our findings do not confirm HR deceleration in response to pathology-specific content. This divergence from prior research might be attributed either to the fact that HR deceleration is not as pronounced at subclinical levels of ED as it is in ED patients or to the methodological differences since in our study mood induction and exposure to pathology-relevant stimuli (food, body-image) were conducted concurrently and not consecutively as in Laberg and colleagues (1991). Last, our results show that pathology-specific content shown through film-clips is more efficient in inducing HR changes in high ED risk females in comparison body-related word reading that was found to be unrelated to ED risk among female students (Herbert, Kubler, & Vogele, 2013). This is thus the first study reporting physiological evidence on the effect of pathology specific negative affect on cardiac response among high ED risk females.

Based on prior research there is evidence supporting that ED patients do not show differential sympathetic responses (skin conductance levels) when viewing food stimuli (see Giel et al., 2011 for a review) or when confronted with their body image (Vocks et al., 2007) in comparison to controls. These results show that psychophysiological methods pose several challenges into capturing reactions such as sympathetic arousal in ED patients. Our results confirm these challenges partially. Even though the content of the film-clips did not induce different SCLs between the two ED risk groups, high risk participants overall showed higher SCLs as compared to low risk participants in all clips. This heightened arousal indicates higher levels of anxiety or an increased emotionality/hyperarousal in general (Merwin, 2011) that is assumingly encountered in individuals at the first stages of ED.

In regards to corrugator activity (as an indicator of negative valence), high risk participants did not differ from low risk participants. However, they showed the expected higher corrugator activity during the general content clip (The Champ) than during the neutral clips. This supports previous findings that corrugator activity is related with an emotional response towards unpleasant stimuli (Hubert & Jong-Meyer, 1990). Our findings fail to replicate results on increased corrugator activity from patients with BN when exposed to food pictorial stimuli as in the study of Mauler and colleagues (2006), which suggests that the hyper-reactivity of valence-specific physiological indices may not be evident at a subclinical manifestation of ED, but seems to develop with illness progression.

Evidence from the participants' self-evaluations was assessed and convergence with their physiological responses as outlined above was examined. First, both unpleasant film-clips were perceived as significantly more negative in all affective ratings in comparison to the neutral clips by all participants. However, the two unpleasant clips differed in terms of pleasantness and ability to control reactions with the general content clip assessed as less pleasant and the pathology-specific clip as relating to less ability to control reactions. These results overall show that the film-clips were effective in inducing negative affect. Secondly, our results showed that high risk participants evaluated pathology-specific content as more unpleasant, anxiety-provoking and reported higher negative affect and being less able to control their reactions in comparison to low risk. These reactions imply that pathology-specific content (food, body-related) is perceived as threatening hence the increased negative emotionality and reported loss of control. Studies on attentional deployment as well as neuro-

imaging studies confirm that ED patients perceive food stimuli as dangerous or threatening and thus present responses of disengagement and avoidance (Giel et al., 2011).

A more comprehensive examination on the convergence between objective (physiological) and subjective reactions to film-clips confirmed the overall emotional deficits of high risk participants. More specifically, significant correlations were only found for the low risk group. More specifically, HR was related with arousal, ability to control reactions and annoying somatic symptoms showing that low risk participants notice and report their emotional experience with relative accuracy. High risk participants' physiological reactions however, did not correspond to their self-reported ratings; an indication of less awareness or avoidance of their emotional experience. However, affective ratings of the high risk participants in the pathology-specific clip seem to follow the direction of their physiological responses (heightened HR, increased SCLs). This is not however observed in the general content-clip. These observations albeit preliminary indicate that high risk participants are not aware of their physiological reactions to negative affect in general but they can report their emotions more accurately when these correspond to pathology-specific information. This information seems to activate self-schemata that are more readily accessible through appearance-related primes (Vitousek & Hollon, 1990; Williamson, Muller, Reas, Thaw, 1999). Top-down (schematic) effects are thus assumed to influence reported emotionality rather than bottom-up (experiential).

In conclusion, there seems to be an overall autonomic hyper-activity in response to negative affect in high risk females as indicated via arousal-specific physiological indices such as HR and SCL. This hypersensitivity to negative affect is evident in both general and pathology-specific contexts. High risk participants also present an overall lack of awareness in regards to their emotional state/autonomic responses. However, their self-reported affect is at the same direction as their autonomic responses in the pathology-specific context.

Hypothesis 4: Behavioral Responses: Body Size Estimation and Food consumption

The effects of negative affect were examined in relation to body estimation and food consumption that are among the most common behavioral manifestation of eating pathology. Based on our results, low risk participants overall gave more accurate body size estimation corresponding to their actual BMI as compared to their high risk counterparts. More importantly, high risk participants reported over estimation of their body size after viewing the pathology-specific clip in comparison to the other clips. This effect was not present in the

low risk group. These results confirm previous research showing that both clinical and subclinical sample present with higher body image disturbance and provide over-estimations of their body size after mood induction procedures (Fox et al., 2013; Taylor & Cooper, 1991). Our results however extend these findings and suggesting that a synergy between negative affect and pathology-specific context influence body over-estimation. We propose that this effect is probably evident through the activation of body-related schemas in ED high risk participants; a mechanism that remains to be examined in future research via experimental as well as longitudinal designs.

 In regards to food consumption, no differences were detected between the two ED risk groups on the amount of calories consumed after the mood induction procedure. Previous research supports disinhibition in food consumption in individuals with BED after mood induction procedures supporting a specific impulsivity related to food that is more pronounced in this population (Schag, Schönleber, Teufel, Zipfel, & Giel, 2013). Our results do not replicate these findings, which may be due to the fact that food impulsivity (or severe restriction) is associated with clinical manifestations of ED and therefore less observed in ED high risk individuals. Also, the heterogeneous sample of this study comprising of high risk individuals with no specification on their ED risk type, binge vs. restrictive, might account for the present findings taking into account the possibly effects of completing this task under experimental conditions.

Though the present study provides initial empirical evidence on the autonomic hypersensitivity to negative affect in a non-clinical ED sample, further studies are needed to systematically explore these autonomic responses with the addition of more physiological measures, especially valence specific measures, like the eye blink startle reflex, in samples with subclinical and clinical manifestations of ED. Also, an important limitation of the present study is that we explored negative affect in general, without specifications as to the dominant (basic) negative emotions elicited via the pathology-specific clip. Therefore, our findings need to be further replicated taking into account the specific basic emotions that may be induced via pathology-specific film-clips. It's important also that these findings are further examined in unpleasant clips that are equivalent in terms of arousal and valence induced. In our case, different results might have emerged if we had used a less potent general content clip (*The Champ*) in comparison to the pathology-specific clip Last but not least, more research is needed to examine autonomic responses of ED populations in studies with longitudinal

designs providing thus a deeper understanding of the nature of emotion dysregulation encountered in this population with illness progression.

Conclusions

Participants at high risk for ED present a distinct profile regarding the way they experience negative affect and regulate their emotional responses when compared to their low risk cohorts. More specifically, they present an increased physiological reactivity to unpleasant stimuli both general and pathology-specific. Also, they exhibit an absence of convergence between their subjective affect ratings and their physiological responses, which provides a strong indication of their emotion regulation difficulties and psychological inflexibility. This lack of convergence may reflect a lack of emotional awareness or an avoidance of emotional experience where individuals suppress or avoid their body signals and emotions. Importantly, the current study showed using an experimental manipulation how emotional difficulties can have a direct impact on eating pathology behaviors like body size estimations. More specifically, negative affect within a pathology-specific context seems to prime dysfunctional appearance-focus schemas resulting in over-estimations of their body size. These characteristics encountered in high risk individuals provide further support to the model proposed by Merwin (2011) initially for AN, conceptualizing eating pathology as a disorder of psychological flexibility. Present findings suggest that emotion regulation difficulties and psychological inflexibility are important aspects of dysfunction that impact ED symptoms even at a subclinical stage and stresses out the importance of interventions targeting emotion regulation skills as well as third-wave behavioral interventions with the aim to enhance psychological flexibility.

Chapter 5: A preliminary investigation of Eating Disorders Risk: The effects of hypersensitivity to negative affect and body-image inflexibility

Introduction

  Eating Disorder (ED) risk factors have gained a great deal of empirical attention in an effort to comprehend the mechanisms underlying the development of pathology. Despite that the research literature has been relatively consistent in recognizing certain risk factors associated with subclinical ED our understanding of the underlying mechanism leading to the development of ED is compromised due that the vast majority of research using cross-sectional data. The aim of the present study is to develop and assess an expanded theoretical model for predicting risk for ED integrating data from a combination of our earlier cross-sectional and experimental research (see Chapter 3) conducted in the same pool of participants. The theoretical perspective that leads our research conducted with female adolescents and young adults is that hypersensitivity (physiological and self-reported) to negative affect and body image inflexibility (difficulty to openly and mindfully experience negative internal states in relation to one's body) are the predisposing factors increasing ED risk (Leon, Fulkerson, Perry, Keel, Klump,1999). In addition, we assume that other empirically supported factors such as depression, emotion regulation skills, cognitions on appearance, self-esteem and Body Mass Index will also increase the strength of ED risk prediction within the context of the factors described above.

  Empirical research has consistently shown that increased negative affect is one of the most robust longitudinal predictors of eating disorder symptomatology and more specifically it is classified as a causal risk factor for body dissatisfaction and binge eating in two meta-analyses (Stice, 2002; Jacobi et al., 2004). Relatedly, in a longitudinal study by Jacobi and colleagues (2011) showed that a history of depression, an indication of increased negative affect, was among the most robust predictors of ED onset in a sample of college women aged 18-30 years. For a review of the literature on the physiological indices and subjective expression of negative affect in relation to eating pathology see Chapter 4.

  A meta-analytic review by Stice (2002) suggests that overall elevated Body Mass is another important risk factor that may not increase negative affect or predict eating pathology directly but nevertheless is associated with perceived pressure to be thin, dieting and body dissatisfaction. Longitudinal studies confirm that critical comments on eating are among the

factors predicting ED onset among college women (Jacobi et al., 2011). It thus concluded that Body Mass Index (BMI) might promote other risk factors directly linking to eating pathology but does not directly predict ED (Stice, 2002).

Another important identified risk factor is low self-esteem. Low self –esteem has been recognized as a strong predictor of ED symptoms among female adolescents (Button, Sounga-Barke, Davies, Thompson, 1996) and college women (Tylka & Subich, 1999) and at the same time accounts for body-image disturbances (Griffiths & McCabe, 2000). Furthermore, cognitive theories of ED highlight the importance of self-esteem on the maintenance of eating pathology. More specifically, individuals whose self-esteem focuses only or mostly on appearance are more likely to engage in severe dieting (Fairburn et al.,1997). Indeed, examining bulimic women showed that the relation between cognitions, over-evaluation of appearance, and binge eating is mediated by dieting (Fairburn, et al, 2003). The strong impact of body-related cognitions on eating pathology is further supported by findings from a pilot study with clinical ED samples supporting that reductions of such cognitions lead to reductions in binge eating episodes (Legenbauer, Schutt-Stromel, Hiller, & Vocks, 2011).

Further investigations in clinical as well as non-clinical ED samples have also highlighted the contributions of cognitive-affective processes on ED attitudes and behaviors. More specifically, emotion regulation difficulties have been consistently found to related with ED in both clinical and subclinical levels (Wildes, Ringham & Marcus, 2010; Merwin, Zucker, Lacy & Elliott, 2010; Racine & Wildes, 2013; Lech, Holmqvist & Andersson, 2012; Claes et al, 2012; Davies, Swan, Schmidt & Tchanturia, 2012; Rawal, Park, & Williams, 2010). More specifically, rumination of eating and body related information has unique and contribution on ED symptoms in a non-clinical as well as in clinical (AN) sample even above and beyond the contributions of depression and anxiety (Cowdrey & Park, 2012). Thought suppression another type of cognitive processing of emotional information, is considered a form of experiential avoidance, and along with low mindfulness (present moment awareness) significantly predict bulimic symptoms in both male and female adults (Lavender, Jardin, & Anderson, 2009). It thus evident that dysfunctional emotion regulation and experiential avoidance (that is avoidance of unpleasant cognitions, emotions and bodily states such as hunger, satiety) in particular are associated with disordered eating among high school and college women (Bourke, Taylor, Parker, & Bagby, 1992; Tylka & Subich, 1999).

The tendency to avoid internal states (experiential avoidance) and limited mindfulness are dimensions of psychological inflexibility (Hayes et al., 2006) that has been examined in the context of ED through specific measures such as the Body-Image Inflexibility (Sandoz, Wilson, Merwin, Kellum, 2013) Interestingly, body-image inflexibility has been found to mediate the relation between disordered eating cognitions and disordered eating behavior in a non-clinical female sample (Moore, Masuda, Hill, & Goodnight, 2014). Body-image inflexibility is emerging as one robust construct corresponding to pathology-specific deficits and can differentiate both clinical and subclinical symptoms.

Overall, the difficulty to tolerate unpleasant emotions, cognitions and bodily signals as well as the lack of responsivity to these states is well established among populations with ED symptoms. There is however little knowledge on the underlying somatic-affective mechanisms that explain the maladaptive regulation of these internal states. Based on Merwin (2011) it is assumed that hypersensitivity to affective-somatic signals might exacerbate the unpleasantness of internal states and thus account for the escape or avoidance efforts observed in ED populations. This is contrasted with the hyposensitivity to somatic-affective experience that it is assumingly developed with ED-illness progression due to prolonged starvation and reinforced avoidance behaviors that impact the ability to detect and effectively respond to bodily signals including emotions. The results from the present dissertation project (see Chapter 4 for more information) show that individuals at high risk for EDs present a heightened emotionality to negative affect as evidenced by increased physiological arousal compared to their low risk cohorts. These findings yield further support for the assumption of hypersensitivity to affective experience as the mechanism underlying eating pathology at a sub-clinical level.

While sensitivity to negative affect was replicated in mainly cross-sectional studies showing high neuroticism and negative emotionality among ED patients, there is limited understanding on underlying somatic-affective mechanisms. This was attributed to the dearth of experimental studies or the combination of cross-sectional and experimental studies that could potentially reveal the inter-correlation between risk factors leading to eating pathology (Merwin, 2011). Furthermore, experimental research that examines high risk factors in subclinical samples is still at its infancy.

The aim of the present study is to identify the most potent factors amongst the ones examined associated with ED risk in a non-clinical sample of female adolescents and young

adults. In contrast to the majority of previous cross-sectional research, our study relies on data emerging from a combination of experimental and cross-sectional research previously conducted in high vs. low risk participants for ED (see Chapter 4). More specifically, experiential factors such as emotional reactivity as indicated via physiological hypersensitivity (Heart Rate and Skin Conductance Levels) and self-reported affect (PANAS Negative Affect) in response to negative affect induced via film-clips are examined in relation to ED risk. Concurrently, the impact of self-reported measures with an emphasis either on cognitions/self-beliefs such as the level of self-esteem, cognitions on appearance, or on functional components and affective states such as body-image inflexibility, emotion regulation skills, and depression levels were examined in relation to ED risk. The role of Body Mass Index was also examined. Logistic and a series of hierarchical regression analyses were performed to explore the relative contributions of these factors on risk for ED.

Method

  Participants

    Eighty-five female participants (M_{age}=18.14, SD=2.74) were selected based on the following inclusion criteria: a) females aged 14-24 years, b) voluntary participation (and parental consent for ages below 18 years), c) good working knowledge of the Greek language and d) score either above or below 52 on the Weight Concerns Scale (WCS; Killen, Taylor, Hayward, Wilson, Simmonds, Robinson, Litt, Varady, & Kraemer, 1994, see more information further). Participants not meeting the above inclusion criteria and/or meeting criteria to warrant an ED diagnosis based on the Eating Disorders Diagnostic Scale (EDDS; Stice, Telch, & Risvi, 2000) were excluded from the study. Two groups were formed: a) the group at high risk (M_{age}=18.38, SD= 2.71) for developing an Eating Disorder (n=42) who scored above the threshold ($\geq$52) on the WCS, and b) the group at low risk (M_{age}=17.88, SD=2.79) for developing an Eating Disorder (n=37) who scored below the above mentioned threshold on the WCS. For more information on group assignment see Chapter 4.

  Materials

    E-Prime 1.0 (Schneider, Eschman & Zuccolotto, 2002) was used to run the experiment and BIOPAC MP150 for Windows and AcqKnowledge 3.9.0 data acquisition software (Biopac Systems Inc, Santa Barbara, CA) were used for the collection and processing of physiological measures. Physiological data were collected using Ag/AgCl shielded electrodes

that were placed on participants' face and arms according to standard procedures (Fridlund & Cacioppo, 1986).

Affective Stimuli: Mood was induced in this study via the presentation of either neutral, general negative or pathology specific film clips (see Chapter 3 for the selection and validation of the film-clips used in the study). All film-clips used in the study had duration of 2.5 minutes and had no sound. For the purposes of this study, only the two unpleasant clips were selected, that is general content film-clip (an excerpt from the film-clip *The Champ)* and pathology-specific clip (an excerpt from a TV documentary on Binge Eating Disorder hereafter referred to as *The Documentary*) during which the participants' reactions to negative affect were registered. The neutral clip is not included in the current study. For a comprehensive review of the materials and stimuli used see Chapter 4.

Measures

A number of self-reported and physiological measures were included in this study as selected based on the findings of Chapter 4.

1. Experimental Measures were recorded during the mood induction procedure that was used during the experimental phase of the study as described in detail in Chapter 3.

a. *PANAS Negative Affect Score*: The Positive and Negative Affect Schedule (PANAS; Watson, Clark, and Tellegen, 1988) is a self-reported adjective checklist consisting of two 10-items subscales assessing positive affect (PA: active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong) and negative affect (NA: afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, and upset). Participants are asked to use a 5-point Likert Scale (*very slightly*, *a little bit*, *moderately*, *quite a lot*, *very much*) to indicate the extent to which each adjective describes how they feel at the moment (state). For the purposes of the present study only the NA subscale was used. An average score of this measure completed by participants after viewing the two unpleasant film-clips (with general and pathology-ED specific content) was computed.

b. *Skin Conductance Level (SCL)*: Mean scores for SCL were computed for the duration of the film-clips (2.5 minutes). An average score of SCLs during the two unpleasant film-clips used was computed for all participants.

c. *Heart Rate (HR)*: Mean scores for HR were computed for the duration of the film-clips (2.5 minutes). An average score of SCLs during the two unpleasant film-clips used was computed for all participants.

2. *Self-reported Measures*

a. *The Eating disorder diagnostic scale (EDDS;* Stice, Telch, & Risvi, 2000) is a 22 item self-report measure answered on a 0-6 Likert scale, assessing the presence of ED. Answers can be used to provide a composite score for ED, a possible diagnosis for AN, BN and BED and the corresponding subthreshold syndromes based on the DSM-IV criteria. The scale was included in the present study to identify individuals with an ED diagnosis and subthreshold syndromes.

b. *The Weight Concern Scale* (Killen, Taylor, Hayward, Wilson, Simmonds, Robinson, Litt, Varady, & Kraemer, 1994) is a 5-item self-report questionnaire assessing fear of weight gain, worry about weight and body shape, importance placed on weight, diet history, and perceived fatness. It has been associated with ED onset in female adolescents over a 4-year period (Killen et al., 1996). A score of greater than 52 is indicative of higher risk for developing ED. It was included in the study to identify individuals at high and low risk for ED.

c. *Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1965) assesses global self-esteem by asking respondents to rate their agreement on a 0-3 scale (ranging from 0 = *not at all true* to 3 = *definitely true*) with 10 statements reflecting their feelings about themselves (e.g. ''I feel that I have a number of good qualities'' etc.). Higher scores indicate a more positive self-evaluation.

d. *Body Image – Acceptance and Action Questionnaire (*BI-AAQ; Sandoz, Wilson, Merwin, & Kellum, 2013) assesses cognitive flexibility and acceptance in relation to body image. More specifically the questionnaire consists of 12 statements assessing the impact of body image concerns on psychological flexibility. Greater summed scores indicate greater body image inflexibility.

e. *The Difficulties in Emotion Regulation Scale* (DERS; Gratz, & Roemer, 2004) is a 36 item self-report questionnaire assessing emotion regulation. Items are rated on a 5-point scale from 1=almost never to 5=almost always. Higher total score indicates greater difficulties with emotion regulation.

f. *Appearance Schemas Inventory-Revised (*ASI-R; Cash, Melnyk, & Hrabosky, 2003): assesses dysfunctional schemas about ones' appearance and its impact in one's life. It comprises of 20 items rated on a 5-point scale from strongly disagree to strongly agree and has two factor subscales, Self-Evaluative Salience and Motivational Salience. The former subscale reflects the degree that physical appearance determines the participant's sense of self

and the latter measures the investment into one's appearance as in engaging in grooming behaviors etc.

g. *The Beck Depression Inventory-II* (BDI-II; Beck, Steer, & Brown, *1996)* is a 21-item questionnaire of the current intensity of depressive symptoms. This questionnaire was administered to university students that participated in the experimental stage of the present study.

h. *The Youth Inventory-4* (YI-4; Kenneth, Gadow, & Sprafkin, 2012) is used to assess clinical symptoms in adolescents of 18 diagnostic entities. For the purposes of the present study, only the 9-item Depression subscale was used. Items are assessed on a Likert scale from 0-absence of symptoms to 3-strong presence of symptoms. Higher total scores indicate greater depression levels. This questionnaire was used to measure the depression levels of the adolescents in the present study.

i. The *Body Mass Index* (BMI) was computed based on the participants' objective measures of weight and height.

Procedure

Prior to the experiment, participants completed the battery of self-reported measures mentioned above which are also included in the following analysis in order to examine their impact on ED risk. Later, negative mood was induced via film–clips presented in two experimental blocks. Each experimental block consisted of a neutral film-clip followed by either a general content film-clip or a pathology specific negative film-clip. The block order was counter-balanced between participants (in both high and low risk group). After each film-clip, participants completed affect ratings (including PANAS). Physiological measures of Heart Rate, skin conductance and corrugator activity were recorded throughout the film-clips presentation. For the purposes of the present study, PANAS Negative Affect Subscale, HR and SCL were included in the following analysis in order to investigate their contribution to ED risk. Due to technical problems encountered with corrugator activity during the experiment we decided to exclude this measure from the following analysis. For a detailed description of the procedure of the study see Chapter 4.

Results

Participants Characteristics:

ED high risk participants presented significantly higher Body Mass Index (*M*=23.02, *SD*=2.95) than low risk participants (*M*=21.02, *SD*=4.54) (*t*(76)=-2.33, *p*=0.02). Significant

differences were detected as expected between the two groups on their WCS scores with high risk participants reporting more ED symptoms (*M*=66.15, *SD*=13.52) than low risk (*M*=26.0, *SD*=15.16) (*t*(77)=-12.41, *p*=0.0001).

Correlations among measures

Pearson-product moment correlations were conducted to examine the associations between the constructs assessed in this study (see Table 5-1). A negative correlation was found between self-esteem level and HR in response to unpleasant film-clips and furthermore, a significant correlation between HR and Difficulties in Emotion Regulation skills. Finally, significant inter-correlations were found between emotion regulation skills, body image inflexibility, and dysfunctional cognitions on appearance, self-esteem level, and depression levels while body image inflexibility had a significant positive correlation with BMI.

Table 5-1. Pearson Correlation Coefficients between physiological and behavioral measures used in this study (N=79)

	1	2	3	4	5	6	7	8	9
1. HR									
2. SCL	0.09								
3. PANAS NA	0.13	-0.20							
4. RSE	-0.30*	-0.11	-0.04						
5. ASI-R	0.15	-0.01	0.27*	-0.38**					
6. DERS	0.26*	0.14	0.18	-0.52**	0.45**				
7. BI-AAQ	0.21	0.13	0.23*	-0.42**	0.71**	0.56**			
8. BDI-II[1]	.028	-0.19	0.40*	-0.58**	0.35*	0.43*	0.26		
9. YI-4 Depression[2]	0.24	-0.12	0.26	-0.66**	0.49*	0.55**	0.47*		
10. BMI	0.09	0.15	-0.13	-0.12	0.13	0.20	0.43**	0.14	-0.17

** $p < .01$, *$p < .05$

HR= Heart Rate, SCL= Skin Conductance Level, PANAS NA= PANAS Negative Affect Scale, RSE = Rosenberg Self-Esteem Scale, ASI-R = Appearance Schemas Inventory-Revised, DERS = Difficulties in Emotion Regulation Scale, BI-AAQ = Body-Image Acceptance and Action Questionnaire, BDI-II = Beck Depression Inventory II, YI-4 = Youth Inventory Scale-4, BMI=Body Mass Index
[1] For BDI-II, the sample size was n=41, [2] For YI-4 Depression subscale, the sample size was n=36

Prediction of Eating Disorder Risk

Finally, a series of regression analyses were conducted to determine: (i) which of all the variables measured via this study were the *strongest* predictors of the risk to develop ED. To do this a multivariate logistic regression was conducted where the dichotomous variable high/low ED risk was used as the dependent varibale and the remaining variables were pitted against each other by being inserted simultaneously as independent variables; (ii) to test which are the stongest risk factors of the likelihood to develop ED. This was done by testing (via linear regressions) which of the remaining variables predicted the strongest risk factors.

i) *Which are the strongest predictors of ED risk?*

One multivariate logistic regression was conducted with ED risk as the dependent variable and the the following variables as the independent variables: Heart Rate (HR; average score for the tow unpleasant clips), Skin Conductance Level (SCL; average score for the two unpleasant film-clips), PANAS Negative Affect Score (average score for the two unpleasant clips), Depression (total scores based on the BDI-II and YI-4 used for the university students and the adolescents respectively), Self-esteem level (total score on Rosenberg Self-esteem scale), Appearance Schemas Inventory-Revised (ASI-R) total score, Difficulties in emotion regulation scale total score, Body Image Inflexibility (BI-AAQ) total score and BMI. Z scores were used in the analysis for all independent measures that were measured in different metric system. Table 5-2 presents the Logistic Regression results.

Table 5-2. Logistic Regression Results: Risk factors (N=75)

	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
HR	1.05*(0.43)	1.23	2.85	6.65
SCL	1.03*(0.51)	1.04	2.81	7.61
PANAS NA	-0.48 (0.49)	0.24	0.62	1.61
BI-AAQ	2.11*(0.91)	1.39	8.26	49.04
Depression levels (BDI-2, YI-4)	0.61 (0.58)	0.58	1.83	5.76
RSE	0.17 (0.61)	0.38	1.20	3.89
ASI-R	0.91 (0.53)	0.88	2.48	6.97
DERS	-0.64 (0.65)	0.15	0.53	1.89
BMI	-0.63 (0.51)	0.69	1.88	5.12
Constant	0.72 (0.41)		2.06	

R^2 = .52 (Cox & Snell), .69 (Nagelkerke). Model $\chi^2(8)$ = 53.77, $p \leq$ .001. *$p \leq$ .01
HR: Heart Rate; SCL: Skin Conductance Level, PANAS NA: PANAS Negative Affect Score, BI-AAQ = Body-Image Acceptance and Action Questionnaire, BDI-II = Beck Depression Inventory II, YI-4 = Youth Inventory Scale-4, RSE = Rosenberg Self-Esteem Scale, ASI-R = Appearance Schemas Inventory-Revised, DERS = Difficulties in Emotion Regulation Scale.

The logistic regression model was statistically significant $\chi^2(8) = 53.77$, $p \leq .01$. The model explained 69% of the variance (Nagelkerke R^2) of ED risk and correctly classified 89.20% of the participants. As for the sensitivity, the model allowed us to correctly classify 87.50% of the participants for whom ED high risk was observed. In regards to specificity, the model allowed us to correctly classify 91.20% of the participants where ED risk was not observed (low risk). As shown in Table5- 2, of all variables tested as predictors of ED risk, the ones that came out as significant predictors (over and above the remaining variables) were: Heart Rate, Skin Conductance level and Body Image Inflexibility. Participants were significantly more likely to present high risk for ED when they had higher mean HR responses (Exp(B)= 2.86, p= .02) and higher SCLs (Exp(B)= 2.81, p= .04) during the unpleasant clips. In addition, participants with higher Body Image Inflexibility were more likely to be at high risk for EDs (Exp(B)= 8.26, p= .02).

These suggest that hypersensitivity to negative emotion as measured via higher SCL and HR and Body image inflexibility are significant risk factors for Eating Disorder among female adolescents and young adults. These factors are thus recognized as the strongest and most direct predictors of ED risk in this study.

Self-reported negative affect, depression levels, self-esteem, cognitions on appearance, difficulties in emotion regulation and BMI were not found to not directly predict ED risk. They were, however, in the second leg of this analysis tested as possible distal predictors of ED by checking whether they significantly predicted at least one of the strongest risk factors (i.e., SCL, HR, and body image inflexibility).

ii) Which are the factors promoting ED risk?

To determine which of the remaining variables predicted the main risk factors, three Hierarchical Regression Analyses were conducted, one for each of the (three) identified risk factors whereby the strongest predictor was inserted as a dependent variable and the remaining variables as independent variables. In Model 1, Body Image Inflexibility was entered as the outcome measure and PANAS Negative Affect Score (PANAS NA), Depression levels (measured via the Beck Depression Inventory – II and the Youth Inventory – 4 -Depression Scale for adults and adolescents respectively), Rosenberg Self-esteem scale total score (RSE), Appearance Schemas Inventory-Revised (ASI-R) total score, Difficulties in Emotion Regulation Scale (DERS) total score, HR, SCL and BMI were entered as predictors. In Model 2, we examined the influence of PANAS NA, Depression levels, RSE, ASI, DERS,

Body Image Inflexibility and BMI on HR. In Model 3, we examined the predictive effect of PANAS NA, Depression levels, RSE, ASI, DERS, Body Image Inflexibility, HR and BMI on the SCL. Scores from all the measures entered in the analysis were standardized (i.e. z-scores). Table 5-3 presents the Multiple Regression results for each model.

Table 5-3. Multiple Regression Results (N=75)

	B	SE B	β	95%CI
Model 1				
Dependent Variable: Body Image Inflexibility				
(Constant)	0.03	0.07		-.10, .16
PANAS Negative Affect Score	0.01	0.07	0.09	-.05, .25
Depression levels (BDI-II, YI-4)	-0.12	0.09	-0.11	-.31, .07
Rosenberg Self-Esteem Scale	-0.01	0.09	-0.01	-.28, .08
Appearance Schemas Inventory-Revised	0.58	0.08	0.58**	.43, .73
Difficulties in Emotion Regulation Scale	0.18	0.08	0.18*	.01, .35
Heart Rate	0.06	0.07	0.06	-.10, .16
Skin Conductance Level	0.05	0.07	0.05	-.08, .19
BMI	0.41	0.08	0.35**	.26, .57
Model 2				
Dependent Variable: Heart Rate				
(Constant)	-0.10	0.11		-.32, .11
PANAS Negative Affect Score	0.18	0.12	0.19	-.06, .43
Depression levels (BDI-II, YI-4)	-0.08	0.16	-0.33	-.44, .19
Rosenberg Self-Esteem Scale	-0.33	0.15	-0.34*	-.61, -.02
Appearance Schemas Inventory-Revised	-0.14	0.17	-0.15	-.49, .20
Difficulties in Emotion Regulation Scale	0.06	0.15	0.06	-.23, .35
Skin Conductance Level	0.08	0.12	0.09	-.15, .32
Body Image Inflexibility	0.17	0.20	0.17	-.24, .58
BMI	-0.25	0.15	-0.22	-.55, .06
Model 3				
Dependent Variable: Skin Conductance Level				
(Constant)	0.03	0.12		-.20, .27
PANAS Negative Affect Score	-0.18	0.13	-0.20	-.46, .06
Depression levels (BDI-II, YI-4)	-0.21	0.17	-0.20	-.55, .13
Rosenberg Self-Esteem Scale	-0.05	0.16	-0.05	-.37, .28
Appearance Schemas Inventory-Revised	-0.13	0.18	-0.13	-.50, .24
Difficulties in Emotion Regulation Scale	0.18	0.15	0.18	-.12, .49
Heart Rate (ECG)	0.09	0.13	0.09	-.17 .36
Body Image Inflexibility	0.17	0.22	0.17	-.26, .61
BMI	0.05	0.17	0.04	-.28, .39

Model 1: R²= 0.72, Model 2: R²=0.18 Model 3: R²=0.13,
*p< .05, **p< .001

As results show, difficulties in emotion regulation, appearance schemas and BMI were significant predictors of body image inflexibility in Model 1 (F(8)=21.33, $p \leq .001$). Even though, the model tested for HR was not statistically significant (F(8)=1.75, $p=.10$), self-esteem emerged as a significant predictor. There was no significant predictors of SCL in the third model tested (F(8)=1.25, $p=.29$).

Discussion

The aim of the present study was at first to determine the factors that significantly and directly predict ED risk and then explore the constructs that promote these risk factors. The most potent risk factors that were found to have a direct contribution to ED risk was hypersensitivity to negative affect as indicated via Heart Rate and Skin Conductance Level and body image inflexibility, accounting for 69% of the variance among female adolescents and young adults. This is the first study that confirms that emotional reactivity as indicated via physiological hyperarousal has a significant and a direct impact on ED risk. These findings provide preliminary evidence in favor of the hypothesis for the hypersensitivity to negative affect as an important affective mechanism accounting for the development of ED at the early stages of the illness. This mechanism was previously suggested but not adequately examined via experimental research addressing subclinical ED (Merwin, 2011). Heightened negative affect and high neuroticism as trait characteristics of individuals with ED have been replicated in cross-sectional studies (Jacobs et al., 2009; Cassin & von Ranson, 2004). The physiological underpinnings of heightened negative emotionality are scarcely explored. The present findings thus complement the limited evidence on autonomic dysfunction in non-clinical ED samples (Green, Hallengren, Davids, Riopel & Skaggs, 2009) and further extend them with the addition of other significant factors such as body-image inflexibility that allow for a more comprehensive understanding of ED risk.

Participants at high risk for ED present a reactivity to negative affect and this is an indication that they experience negative affect more intensely especially in the context of pathology-specific stimuli (for more information see Chapter 4). This might in turn relate with their inflexible way of responding to negative internal states in relation to their body shape and weight. Body Image inflexibility reflecting their inability to mindfully experience negative thoughts in relation to their own body has a significant impact on ED risk. This finding corresponds with prior research that has shown that non-acceptance of internal states,

including unpleasant body/eating-related cognitions and emotions, and low mindfulness are associated with disordered eating (Lavender et al., 2009; Moore et al., 2014; Masuda, Price & Latzman, 2011). These findings point to the significance of functional components in the development of ED risk supporting that a maladaptive relation that one holds with his own body-related emotions and cognitions contributes in the development of ED symptoms.

Based on the present findings appearance cognitions, general emotion regulation skills and BMI significantly contribute to the overall model promoting risk factors which are directly associated with ED risk. These findings are again consistent with previous empirical research that supports the association between disordered eating cognitions and ED behaviors in non-clinical samples (Cooper, Rose & Turner, 2006; Stice et al., 1998) as well as the link between dysfunctional emotion regulation (such as lack of emotional awareness and expression etc.) and eating pathology (Racine & Wildes, 2013; Lech, Holmqvist & Andersson, 2012; Claes et al, 2012; Davies, Swan, Schmidt & Tchanturia, 2012). Finally, the important role of BMI in the development of eating disturbances as indicated by the present findings confirms prior empirical evidence suggesting elevated body mass promotes risk factors that are directly fostering ED risk (Stice, 2002).

In conclusion, maladaptive cognitions on appearance, an overall dysfunctional emotion regulation style and BMI appear to be significant predictors of ED risk and provide fertile ground where eating pathology can grow with the significant and direct contribution of body image inflexibility. It is therefore assumed that body image inflexibility is the functional construct that captures emotion, cognition and behavior regulation processes that are specific in the context of eating disturbances (Sandoz et al., 2013). The measures with a cognitive focus such as beliefs on self-worth and appearance schemata play a significant role but it is the relation with these constructs, as captured via body-image inflexibility that determines ED risk. Further research is however needed to test the inter-relations of these constructs in relation to ED risk through more sophisticated statistical analyses such as Structural Equation Modeling.

In addition, the present findings provide support for the buffering role of self-esteem against distress since higher levels of self-esteem predicted lower heart rate as measured in response to negative affect that in turn had a significant impact on ED risk. Self-esteem has been found to work as a security net for people providing them with feelings of safety when exposed to perceived stressors (Martens et al., 2008) and enhancing their ability for effective

coping. Experimental evidence supports that self-reported self-esteem significantly impacts resting cardiac vagal tone in healthy populations (Martens et al, 2010). This psychological - physiological relation among self-esteem and heart rate under conditions of distress (Heart rate measured under conditions of induced negative affect) receives further support in the context of ED risk based on the present findings. More investigations are required to explore the nature of and the implications of this relation in ED populations.

The preliminary results of the present study should be interpreted in light of some limitations. The current results provide some indications about the significant predictors of ED risk but it's important that their interactions are also explored in a more systematic approach in larger ED risk samples and replicated in samples with different ED typologies (binge vs restrictive) and with various symptoms severity. Also, the examination of ED risk predictors in longitudinal studies will provide a robust understanding of the risk factors and/or interactions among factors that consistently and longitudinally contribute to ED risk either as proximal or distal factors.

In conclusion, our study highlights the importance of body image flexibility in the context of addressing disordered eating behaviors and attitudes in individuals at risk. Since the hypersensitivity to negative affect seems to increase the risk for ED there is an imminent need to address the modulating affective processes incorporated into acceptance and mindfulness CBT models that aim to enhance overall psychological flexibility. However, more research is needed to examine body image flexibility as the mechanism of change in therapeutic interventions for ED risk. Furthermore, the continuation of the current research study with a focus on the examination of the identified risk factors in relation to other constructs such as personality traits, heritability and parental psychopathology and attachment style will allow us to develop more comprehensive models explaining the development of eating pathology and the context where this is emerging.

Chapter 6: General Discussion

Empirical literature has signified some fundamental difficulties in emotion regulation and cognitive processes in individuals with Eating Disorders (ED) at a clinical or subclinical level. Little is however known on the specifics of these processes. For example, it is not yet well understood how individuals with ED experience somatic and affective sensations and whether they are hyper or hypo sensitive to such sensations (Merwin, 2011). More, interestingly the affective contexts where these affective processes take place are not adequately examined and thus our understanding on the functional significance of such processes in relation to ED symptoms is compromised. Affective processes of course provide only one piece of the puzzle in the multifactorial etiology of ED. Based on prior research, other factors have been consistently linked with the development of ED and were thus recognized as significant risk factors (Stice, 2002). Among these factors are cognitions on appearance, level of self-esteem, emotion regulation skills, body-image inflexibility, depression levels and Body Mass Index (BMI) that are selected for the purposes of the present study and examined as predictors of ED risk.

The aim of the present doctoral project was to examine the assumption on hypo vs. hyper sensitivity to negative affective cues in female adolescents and young adults in high vs. low risk for ED. Sensitivity to negative affect was examined via physiological and subjective measures of affect in two affective contexts that were induced via general and pathology-specific film-clips. The effects of negative affect induced were measured with two behavioral tasks that are body-size estimations and food consumption. Emotional reactivity as measured in the two affective contexts was contrasted with a number of other self-reported factors with either cognitive or functional focus, as mentioned earlier, in order to elucidate potent and significant risk factors that increase the likelihood of ED. Finally, the present study aimed to integrate data from multiple sources that is from both physiological and self-report measures as well as behavioral outcomes in order to provide a robust understanding of the cognitive and emotional aspects underlying ED onset.

Our first study (Chapter 1) aimed to identify high and low risk participants among adolescents and young adults. The findings from this study provided a detailed snapshot of the situation regarding ED in the Greek-Cypriot population providing indices on the prevalence of ED risk, sub-threshold ED and full symptom ED. Prevalence rates were examined separately for middle/high school students and university students and overall converge with

prior epidemiological studies conducted with dimensional measures (i.e. questionnaires) in other countries while slightly reduced rates were noticed in relation to similar studies conducted in Cyprus. This might be related to the increase number of available services on ED prevention and therapy that have been established recently. Factors contributing to ED risk were examined again separately for the two age cohorts. Gender, dieting and present-to-ideal weight discrepancy were among the most potent predictors of ED risk for both adolescents and young adults while exercise was found to have a protective role against ED risk only for young adults. However, present to ideal weight discrepancy had a differential effect on risk with a smaller discrepancy influencing high risk for adolescents (i.e. 6 kg) in comparison to a larger discrepancy influencing risk in young adults (11kg). It seems that young adults are better able to cope with present-to-ideal weight discrepancy when this remains at a certain level (below 11kg) in comparison to adolescents. The divergence of present-to-ideal weight provides thus an index of body dissatisfaction that should be further explored in relation to ED risk. Most importantly, this study provides some preliminary data on cut offs of body dissatisfaction in terms of weight loss goals in two different age cohorts that could be used to develop age-specific screening tools including questions on weight loss goals that could potentially predict ED risk. In conclusion, this is the first study that provides a comprehensive view of ED risk in the Cypriot population that at the same time reports on factors associated with ED risk and can therefore inform the development of age-specific screening tools and primary prevention programs. Our findings may be useful in structuring primary prevention programs that will provide education and support for healthy eating behaviors and attitudes and flexible ways of responding to body dissatisfaction to youth before development of any ED risk.

In the second study (Chapter 3) affective film-stimuli were examined and preliminary data were presented on the most effective negative affect inducing film-clips. This is the first study to examine emotion induction through film-clips in a Greek-Cypriot college population and furthermore provides evidence on the efficacy of film-clips with pathology-specific content in the area of ED. ED related content is more self-relevant for individuals at high risk for ED and can thus induce intense emotional reactions. Based on the current findings a film-clip with general content (*The Champ*) and one with pathology-specific content (*The Documentary*) were selected as the most effective in inducing negative affect and were then used for the purposes of the next study included in the present thesis. Similar to previous

studies (e.g. Gross & Levenson, 1995) *The Champ* was associated with the highest negative response and assessed as the most distressing since it depicts scenes of death and loss; themes that are universally associated with human pain and sadness. Among the pathology-specific clips, *The Documentary* was assessed as the most potent affective clip especially in participants with higher eating disorder concerns since it clearly depicted the adverse effects of a binge eating episode for a young woman. It was thus concluded that pathology-specific content can prime intense emotional responses among individuals at risk for ED. Therefore, this study provides preliminary evidence on a pathology-specific affective stimulus that can be used as a tool in further research to examine negative affect elicitation in relation to eating pathology.

The study presented in Chapter 4 aimed to assess the physiological and subjective emotional responses of participants in high vs. low risk for ED in two affective contexts induced via film clip with general and pathology-specific content. Findings (Chapter 4) provide important indications as to the somatic-affective experience of individuals at the early stages of eating pathology. More specifically, females at high risk for ED present an overall autonomic hyper-activity as indicated via arousal-specific physiological indices such as Heart Rate and Skin Conductance Level. This hypersensitivity to negative affect is evident in both general and pathology-specific context but it is more pronounced in the second context. In regards to the subjective affect ratings, females at high risk for ED present an overall lack of awareness in regards to their emotional state/autonomic responses as observed via their self-reported affect ratings. It is therefore assumed that individuals at high risk for ED present an overall impaired ability to detect somatic-affective cues signaling physiological changes in their body, which leads to an inaccurate expression of emotion. However, their self-reported affect seem to correspond more with their autonomic responses in the pathology-specific context that possibly primes appearance schemas. Body-size overestimations that were observed in high risk participants and followed the pathology specific clip might thus be accounted by the activation of such schemas. It is therefore concluded that the experience of unpleasant affect relates more to top-down sources of appearance schemas rather than bottom-up (experiential) sources of somatic information in this population. Neuro-imaging studies further support this pattern of results suggesting a divergence between the activation of brain areas relating to emotional processing and subjective anxiety reported by AN patients when confronted with body-related pictures (Frienderich et al., 2010). The novel findings of the

present thesis provide additional indications of difficulties in emotional awareness even at a sub-clinical level and further point to the possible top-down effects of appearance cognitions accounting for the subjective emotionality observed in females at high risk for ED.

The aim of the fifth Chapter was to examine factors included in the previous study (see Chapter 4) and further determine the most potent and significant risk factors increasing the likelihood of ED onset. Hypersensitivity to negative affect and body-image inflexibility as indicated based on the findings of the study were the most potent risk factors that significantly and directly increase the likelihood of ED. These factors capture the main difficulties related to ED risk that seem to be mainly related with experiential (i.e., physiological hyperarousal to negative affect) and functional components (i.e., body-image inflexibility). It seems that individuals at high risk for ED have intense emotional reactions reflecting a general hypersensitivity to negative affect. It is possible that this heightened emotionality may be related to attempts to down regulate or suppress intense emotional responses (Sloan, 2004). It is thus not surprising that high-risk participants have an impaired ability to tolerate and effectively regulate food related, body shape, and weight related emotions and cognitions and present increased body-image inflexibility. The significant role of cognitive content (i.e., appearance cognitions, beliefs on self-worth), general emotion regulation skills and BMI was also recognized in the prediction of ED risk. These findings correspond with previous research that encompasses the most significant and empirically supported factors associated with ED risk. The novelty of the present findings concerns the addition of hypersensitivity to negative affect in the prediction of ED risk, previously neglected and omitted from similar ED risk models. In order to be certain about the role of somatic-affective processes in ED risk, further empirical support and especially longitudinal examinations on how these processes are developed with the confounding effects of illness progression.

An integration of the results from the present set of studies, supports that high risk participants present increased body dissatisfaction and declare their attempts to control their body weight through dieting and setting unrealistic weight loss goals (in young adults exceeding 10 kg). In addition, a dysfunctional relation is proposed between somatic-affective experience and ED risk. More specifically, high risk females present a hypersensitivity to negative affect and an impaired ability to "read" somatic-affective cues signaling physiological changes in their body. However, they seem to rely on top-down sources of information pertaining to appearance and eating schemas that in turn determine their

subjective emotional experience. It is therefore concluded that even at subclinical ED levels, it seems that cognitions on eating and body shape/weight lie at the core of individuals' emotional experiences. Interestingly though it is the difficulty to mindfully experience unpleasant cognitions and emotions regarding body and/or eating as well as the hypersensitivity to negative affect that have the strongest impact on ED risk.

Based on the current findings, mindfulness and acceptance-based interventions (e.g. Acceptance and Commitment Therapy) seem to address deficits of individuals at risk for Eating Disorders as outlined above. Despite that intervention programs may not change vulnerabilities such as heightened sensitivity to negative affect they can nevertheless provide guidance on more flexible ways to respond to painful or negative internal experiences. Emotional regulation difficulties are targeted in therapies such as ACT that use acceptance and mindfulness strategies to enhance willingness to experience internal events, increase behaviors related to life values and improve overall psychological flexibility (Juarascio, Shaw, Forman, Timko, Herbert, Butryn, Bunnell, Matteucci, & Lowe, 2013). Preliminary data on ACT's efficacy from patients diagnosed with subclinical ED, suggest strong effects in reducing problem eating behaviors (Juarascio, Forman, Herbert, 2010; Berman et al., 2009). Further research is needed to replicate these results in clinical populations. However, the process through which therapeutic change is achieved is an empirical question.

Further research is needed to investigate the ways through which the affective context triggers increased negative emotionality. More specifically the inter-correlations of physiological responses and self-relevant schemata activated in memory needs to be more closely examined in individuals with eating pathology in different types of affective context, varying in content, emotional valence and arousal produced. Also our studies show that high risk participants provide more inaccurate (over) estimations of their body-size when they are exposed to pathology-specific negative affect. What drives this behavior? Is this behavior the result of physiological, emotional and/or cognitive processes triggered by the affective value or the content of the stimuli? Are these processes modulated outside conscious awareness signifying diminished interoceptive awareness? How do these processes differ in comparison to healthy controls or with populations presenting district psychopathologies that share similar emotional deficits? There is no clear understanding of nature and implications of these processes in relation to ED symptoms. The present findings provide some preliminary indices

that allow us to scratch the surface of how these processes modulate eating pathology. The depths of this relation is yet to be explored via experimental and other studies.

In conclusion, future studies need to delineate the somatic-affective and cognitive processes through which hypersensitivity to negative affect influences disordered eating in order to further understand the function of ED symptoms, the topography where they occur and the conditions that trigger such symptoms. This will allow us to accurately identify individuals at risk for ED and further assist in tailoring and optimizing psychological treatments.

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Screening Questionnaires

Δημογραφικό Ερωτηματολόγιο	Αρ.
Συμμετέχοντα:..........................	

Όνομα: ....

Σχολείο:……………………………………………………..

Οδηγίες: Παρακαλούμε απαντήστε στις παρακάτω ερωτήσεις. Βεβαιωθείτε ότι δεν αφήσατε κάποια ερώτηση αναπάντητη. Δεν υπάρχουν σωστές ή λάθος απαντήσεις και το ερωτηματολόγιο είναι απόλυτα εμπιστευτικό.

Απαντήστε τις ερωτήσεις που ακολουθούν με ειλικρίνεια συμπληρώνοντας ή κυκλώνοντας την απάντηση που σας αντιπροσωπεύει καλύτερα.

1) Φύλο: α) Αγόρι β) Κορίτσι	2) Ηλικία: _____

3) Φοιτώ στην: ☐ Α τάξη   ☐ Β τάξη   ☐ Γ τάξη

4) α) Πιο πρόσφατο βάρος (Kg): ___
   β) Μέγιστο βάρος που είχες ποτέ ήταν: ___
   γ) Το χαμηλότερο βάρος που είχες ήταν: ____
   δ) Ιδανικό βάρος που θα ήθελες να έχεις; ____
   ε) Ποιο είναι το βάρος που θα σε απογοήτευε; _____

5) Αντιμετώπισες ή αντιμετωπίζεις κάποιο πρόβλημα υγείας;
       α) Όχι   β) Ναι (Διάγνωση _____)

6) Έχεις επισκεφτεί ποτέ κάποιο ειδικό υγείας (διατροφολόγο, επαγγελματία ψυχικής υγείας) για προβλήματα που σχετίζονται με το βάρος σου ή/και το φαγητό;
       α) Όχι   β) Ναι. Παρακαλώ εξηγήστε _____

7) Γυμνάζεσαι; α) Όχι   β) Ναι.
                Εάν ναι, πόσες φορές την εβδομάδα γυμνάζεσai;   α) 1-2 φορές   γ) 3-4 φορές   δ) 5-7 φορές   ε) 7+ φορές

8) Συνήθως για πόση ώρα γυμνάζεσαι κάθε φορά;   _____λεπτά

9) Στην οικογένεια σου ακολουθείται κάποιο συγκεκριμένο πρότυπο διατροφής;
 α) Όχι   β) Ναι   Εάν ναι, προσδιόρισε τι είδος διατροφής (μεσογειακή, χορτοφαγική, κτλ)
_____

10) Πόσες ώρες την εβδομάδα βλέπεις προγράμματα/σειρές στην τηλεόραση που αφορούν τη μόδα;
☐ 0   ☐ 1-2 ☐ 3-6 ☐ 7-10 ☐ 11-14 ☐ 15-19 ☐ 20+

11) Πόσες ώρες την εβδομάδα διαβάζεις περιοδικά μόδας;
☐ 0   ☐ 1-2 ☐ 3-6 ☐ 7-10 ☐ 11-14 ☐ 15-19 ☐ 20+

Weight Concern Scale (WCS) - **Κλίμακα Ανησυχίας Βάρους**

Για όλες τις παρακάτω ερωτήσεις, κυκλώστε μόνο έναν αριθμό

1. Πόσο περισσότερο ή λιγότερο αισθάνεσαι να ανησυχείς για το βάρος σου και το σχήμα του σώματος σου σε σχέση με άλλες γυναίκες της ηλικία σου;
        1. Ανησυχώ πολύ λιγότερο από ότι άλλες γυναίκες.
        2. Ανησυχώ λίγο λιγότερο από ότι άλλες γυναίκες.
        3. Ανησυχώ περίπου το ίδιο με άλλες γυναίκες.
        4. Ανησυχώ λίγο περισσότερο από ότι άλλες γυναίκες.
        5. Ανησυχώ πολύ περισσότερο από ότι άλλες γυναίκες

2. Πόσο φοβάσai να αποκτήσεις 1.5 κιλά;

(1)	(2)	(3)	(4)	(5)
Δεν Φοβάμαι	Φοβάμαι Λίγο	Φοβάμαι Μέτρια	Φοβάμαι Πολύ	Τρομάζω

3. Πότε ήταν η τελευταία φορά που ξεκίνησες δίαιτα;
        1. Δεν έχω πάει κάνει ποτέ δίαιτα
        2. Ήμουν σε δίαιτα περίπου πριν ένα χρόνο
        3. Ήμουν σε δίαιτα περίπου πριν 6 μήνες.
        4. Ήμουν σε δίαιτα περίπου πριν 3 μήνες.
        5. Ήμουν σε δίαιτα περίπου πριν 1 μήνα.
        6. Ήμουν σε δίαιτα λιγότερο από πριν 1 μήνα.
        7. Είμαι τώρα σε δίαιτα

4. Σε σύγκριση με άλλα πράγματα στη ζωή σου, πόσο σημαντικό είναι το βάρος σου για να εσένα;
        1. Το βάρος μου δεν είναι σημαντικό σε σύγκριση με άλλα πράγματα στη ζωή μου.
        2. Το βάρος μου είναι λίγο πιο σημαντικό από μερικά άλλα πράγματα στη ζωή μου.
        3. Το βάρος μου είναι πιο σημαντικό από ό, τι τα περισσότερα, αλλά όχι από όλα, τα πράγματα στη ζωή μου.
        4. Το βάρος μου είναι το πιο σημαντικό πράγμα στη ζωή μου

5. Αισθάνεσαι ποτέ χοντρός/η;

(1)	(2)	(3)	(4)	(5)
Ποτέ	Σπάνια	Μερικές φορές	Συχνά	Πάντα

Eating disorder diagnostic scale – EDDS

Κατά τους τελευταίους 3 μήνες ...	Καθόλου			Λίγο			Παρά πολύ
1. Έχεις αισθανθεί χοντρός/ή;	0	1	2	3	4	5	6
2. Φοβάσαι ότι θα μπορούσες να πάρεις βάρος ή να γίνεις χοντρός/ή;	0	1	2	3	4	5	6
3. Μήπως το βάρος σου επηρέασε τον τρόπο που σκέφτεσαι (κρίνεις) τον εαυτό σας ως άτομο;	0	1	2	3	4	5	6
4. Μήπως το σχήμα του σώματος σου επηρέασε τον τρόπο που σκέφτεσαι (κρίνεις) τον εαυτό σου ως άτομο;	0	1	2	3	4	5	6

5. Κατά τη διάρκεια των τελευταίων 6 μηνών έχουν υπάρξει φορές που αισθάνθηκες ότι έχεις φάει τέτοια ποσότητα φαγητού που άλλοι άνθρωποι θα θεωρούσαν ως ασυνήθιστα μεγάλη ποσότητα (π.χ. ένα κιλό παγωτό);	ΝΑΙ	ΟΧΙ
6. Κάποια στιγμή που έφαγες μια-ασυνήθιστα μεγάλη ποσότητα φαγητού, αισθάνθηκες ότι είχες χάσει τον έλεγχο (αισθάνθηκες ότι δεν μπορούσες να σταματήσεις να τρώς ή να ελέγξεις την ποσότητα που έτρωγες);	ΝΑΙ	ΟΧΙ

Κατά μέσο όρο ...							
7. Κατά μέσο όρο, πόσες ΜΕΡΕΣ την εβδομάδα, κατά τη διάρκεια των τελευταίων 6 μηνών, έχεις φάει μια ασυνήθιστα μεγάλη ποσότητα φαγητού και αισθάνθηκες ότι χάνεις τον έλεγχο;	1	2	3	4	5	6	7
8. Κατά μέσο όρο, πόσες ΦΟΡΕΣ την εβδομάδα, κατά τη διάρκεια των τελευταίων 6 μηνών, έχεις φάει μια ασυνήθιστα μεγάλη ποσότητα φαγητού και-αισθάνθηκες ότι χάνεις τον έλεγχο;	1	2	3	4	5	6	7

Κατά τη διάρκεια αυτών των επεισοδίων υπερφαγίας και απώλειας ελέγχου μήπως ...

9.Τρως πολύ πιο γρήγορα από το κανονικό;	ΝΑΙ	ΟΧΙ
10. Τρως μέχρι να αισθανθείς πλήρης;	ΝΑΙ	ΟΧΙ
11. Τρως μεγάλες ποσότητες φαγητού, όταν δεν αισθάνεσαι σωματικά πεινασμένος;	ΝΑΙ	ΟΧΙ
12. Τρως μόνο γιατί ένιωσες στενοχωρημένος/η από το πόσο έχεις φάει;	ΝΑΙ	ΟΧΙ
13. Νιώθετε αηδιασμένος/η με τον εαυτό σας, κατάθλιψη ή πολύ ένοχος/η μετά το επεισόδιο υπερφαγία;	ΝΑΙ	ΟΧΙ
14. Αισθάνεσαι πολύ αναστατωμένος/η για τα ανεξέλεγκτα επεισόδια υπερφαγίας ή και το αποτέλεσμα των επεισοδίων που είναι η αύξηση του σωματικού βάρους;	ΝΑΙ	ΟΧΙ

15. Κατά μέσο όρο, πόσες φορές την εβδομάδα για τους τελευταίους 3 μήνες έχετε κάνει εμετό για να αποτρέψετε την αύξηση του σωματικού βάρους ή να αντισταθμίσετε τις επιπτώσεις της κατανάλωσης του φαγητού που έχετε φάει;	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

16. Κατά μέσο όρο, πόσες φορές την εβδομάδα για τους τελευταίους 3 μήνες έχετε χρησιμοποιήσει καθαρτικά ή διουρητικά για την πρόληψη αύξηση του σωματικού βάρους ή να αντισταθμίσετε τις επιπτώσεις της κατανάλωσης του φαγητού που έχετε φάει;	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

17. Κατά μέσο όρο, πόσες φορές την εβδομάδα για τους τελευταίους 3 μήνες έχετε νηστέψει (παραλείψατε τουλάχιστον 2 γεύματα σε σειρά) για να αποτρέψετε την αύξηση του σωματικού βάρους ή να αντισταθμίσετε τις επιπτώσεις της κατανάλωσης του φαγητού που έχετε φάει ;	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

18. Κατά μέσο όρο, πόσες φορές την εβδομάδα για τους τελευταίους 3 μήνες έχετε κάνει υπερβολική άσκηση ειδικά για την αντιμετώπιση των επιπτώσεων υπερφαγικών επεισοδίων;	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

19. Πόσο ζυγίζεις; Αν δεν γνωρίζεις , παρακαλούμε ανάφερε την καλύτερη εκτίμηση που μπορείς να κανείς	**...kg**

20. Πόσο ύψος έχεις;	……...................................... cm

21. Κατά τους τελευταίους 3 μήνες, πόσες εμμηνορύσεις έχετε χάσει;	0 1 2 3 4

22. Παίρνετε αντισυλληπτικά κατά τους τελευταίους 3 μήνες;	ΝΑΙ ΟΧΙ

Ευχαριστούμε για τη συμμετοχή σας!
Παρακαλώ επιστρέψετε τα ερωτηματολόγια στους ερευνητές.
Αν θέλετε να συμμετέχετε στη συνέχεια της έρευνας και να λάβετε μέρος στη δεύτερη
πειραματική φάση παρακαλώ σημειώστε το τηλέφωνο και το email σας εδώ.
E-MAIL:_____ ΤΗΛ.:_____

Για επίσημη χρήση μόνο

BMI :_____   WCS : _____   EDDS: _____

Εισηγήσεις :   Παραπομπή

Appendix B

Measures of the experimental study

Rosenberg Self-Esteem Scale (RSE): Οι επόμενες ερωτήσεις έχουν να κάνουν με την εικόνα που έχεις για τον εαυτό σου. Κύκλωσε τον αριθμό που εκφράζει το τι ισχύει στην περίπτωση σου.				
	Διαφωνώ πολύ	Διαφωνώ	Συμφωνώ	Συμφωνώ πολύ
1. Γενικά είμαι ευχαριστημένος/η και ικανοποιημένος/η με τον εαυτό μου.	0	1	2	3
2. Κατά διαστήματα νομίζω ότι δεν είμαι καθόλου καλός/ή.	0	1	2	3
3. Αισθάνομαι ότι έχω έναν αριθμό καλών χαρακτηριστικών.	0	1	2	3
4. Είμαι ικανός/ή να κάνω πράγματα εξίσου καλά όπως οι περισσότεροι άνθρωποι.	0	1	2	3
5. Νοιώθω ότι δεν έχω πολλά πράγματα για τα οποία να νοιώθω περήφανος/η.	0	1	2	3
6. Υπάρχουν στιγμές που νοιώθω τελείως άχρηστος/η.	0	1	2	3
7. Αισθάνομαι ότι είμαι τουλάχιστον εξίσου άξιος/α με άλλα άτομα.	0	1	2	3
8. Εύχομαι να είχα περισσότερο σεβασμό για τον εαυτό μου.	0	1	2	3
9. Γενικά αισθάνομαι ότι είμαι αποτυχημένος/η.	0	1	2	3
10. Έχω μια θετική στάση προς στον εαυτό μου	0	1	2	3

The Difficulties in Emotion Regulation Scale (DERS)

Οδηγίες: Παρακαλώ αναφέρε πόσο συχνά ισχύουν οι ακόλουθες δηλώσεις σε εσένα γράφοντας τον κατάλληλο αριθμό (1-5) δίπλα από κάθε δήλωση

1	2	3	4	5
Σχεδόν ποτέ (0-10%)	Μερικές φορές (11-35%)	Περίπου τις μισές φορές (36-65%)	Τις περισσότερες φορές (66-90%)	Σχεδόν πάντα (91-100%)

1.	Είμαι ξεκάθαρος/η για τα συναισθήματά μου
2.	Δίνω προσοχή στο πώς αισθάνομαι
3.	Βιώνω τα συναισθήματα μου ως αφόρητα και ανεξέλεγκτα
4.	Δεν έχω ιδέα πως αισθάνομαι
5.	Δυσκολεύομαι να κατανοήσω τα συναισθήματά μου
6.	Είμαι προσεκτικός ως προς τα συναισθήματά μου
7.	Γνωρίζω ακριβώς πως αισθάνομαι
8.	Νοιάζομαι για το τι αισθάνομαι
9.	Είμαι συγχυσμένος για το πώς αισθάνομαι
10.	Όταν είμαι αναστατωμένος/η, αναγνωρίζω τα συναισθήματά μου
11.	Όταν είμαι αναστατωμένος/η, θυμώνω με τον εαυτό μου για το πως αισθάνομαι
12.	Όταν είμαι αναστατωμένος/η, έχω αμηχανία για το πως αισθάνομαι
13.	Όταν είμαι αναστατωμένος/η δυσκολεύομαι να ολοκληρώσω τις δουλειές μου
14.	Όταν είμαι αναστατωμένος/η, βγαίνω εκτός ελέγχου
15.	Όταν είμαι αναστατωμένος/η, πιστεύω ότι παραμείνω έτσι για πολύ καιρό
16.	Όταν είμαι αναστατωμένος/η, πιστεύω ότι θα καταλήξω να είμαι πολύ θλιμμένος/η
17.	Όταν είμαι αναστατωμένος πιστεύω ότι τα συναισθήματά μου είναι βάσιμα/ισχύουν και είναι σημαντικά
18.	Όταν είμαι αναστατωμένος/η δυσκολεύομαι να συγκεντρωθώ σε άλλα πράγματα
19.	Όταν είμαι αναστατωμένος/η αισθάνομαι ότι είμαι εκτός ελέγχου
20.	Όταν είμαι αναστατωμένος/η, μπορώ να ολοκληρώσω τα πράγματα που κάνω
21.	Όταν είμαι αναστατωμένος/η, ντρέπομαι για το πως αισθάνομαι
22.	Όταν είμαι αναστατωμένος/η,ξέρω ότι μπορώ να βρω έναν τρόπο για να αισθανθώ καλύτερα
23.	Όταν είμαι αναστατωμένος/η, αισθάνομαι ότι είμαι αδύναμος/η
24.	Όταν είμαι αναστατωμένος/η, αισθάνομαι ότι μπορώ διατηρήσω τον έλεγχο των συμπεριφορών μου
25.	Όταν είμαι αναστατωμένος/η, αισθάνομαι ένοχος για το πως αισθάνομαι
26.	Όταν είμαι αναστατωμένος/η, δυσκολεύομαι να συγκεντρωθώ
27.	Όταν είμαι αναστατωμένος/η, δυσκολεύομαι να ελέγξω τις συμπεριφορές μου
28.	Όταν είμαι αναστατωμένος/η, πιστεύω ότι δεν υπάρχει τίποτα που μπορώ να κάνω για να νιώσω καλύτερα
29.	Όταν είμαι αναστατωμένος/η, εκνευρίζομαι με τον εαυτό μου για το πως αισθάνομαι
30.	Όταν είμαι αναστατωμένος/η, ξεκινώ να αισθάνομαι πολύ άσχημα για τον εαυτό μου
31.	Όταν είμαι αναστατωμένος/η, πιστεύω ότι το μόνο που μπορώ να κάνω είναι βουλιάξω μέσα σε αυτό
32.	Όταν είμαι αναστατωμένος/η, χάνω τον έλεγχο της συμπεριφοράς μου
33.	Όταν είμαι αναστατωμένος/η, δυσκολεύομαι να σκεφτώ οτιδήποτε άλλο
34.	Όταν είμαι αναστατωμένος/η, περνώ λίγο χρόνο για να καταλάβω τι πραγματικά αισθάνομαι
35.	Όταν είμαι αναστατωμένος/η, μου πέρνει πολλή χρόνο για να νιώσω καλύτερα
36.	Όταν είμαι αναστατωμένος/η, νιώθω ότι τα συναισθήματα μου είναι αφόρητα

Body Image – Acceptance and Action Questionnaire (BI-AAQ)

Οδηγίες: Ποιο κάτω θα βρείτε μια λίστα δηλώσεων. Παρακαλώ αξιολογήστε σε ποιο βαθμό η κάθε δήλωση ισχύει για εσάς.							
	Ποτέ δεν Ισχύει	Πολύ Σπάνια Ισχύει	Σπάνια Ισχύει	Μερικές φορές Ισχύει	Ισχύει συχνά	Ισχύει σχεδόν πάντοτε	Ισχύει πάντοτε
1. Το να ανησυχώ για το βάρος μου με δυσκολεύει να ζήσω μια αξιόλογη ζωή	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. Νοιάζομαι υπερβολικά για το βάρος μου και το σχήμα του σώματος μου.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3. Κλείνομαι στον εαυτό μου όταν αισθάνομαι άσχημα για το σχήμα του σώματος μου ή το βάρος μου	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4. Οι σκέψεις και τα συναισθήματά μου για το βάρος μου και το σχήμα του σώματος μου πρέπει να αλλάξουν πριν κάνω σημαντικά βήματα στη ζωή μου/ή πριν λάβω σημαντικές αποφάσεις για τη ζωή μου	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. Ξοδεύω πάρα πολύ από το χρόνο μου ανησυχώντας για το σώμα μου	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6. Αν αρχίσω να αισθάνομαι χοντρός/η προσπαθώ να σκεφτώ κάτι άλλο	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7. Πριν να ξεκινήσω να κάνω κάποια σοβαρά πλάνα για την ζωή μου, θα πρέπει να αισθάνονται καλύτερα με το σώμα μου.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8. Θα έχω καλύτερο έλεγχο της ζωή μου, αν μπορώ να ελέγξω τις αρνητικές σκέψεις για το σώμα μου	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9. Για να ελέγχω τη ζωή μου, πρέπει να ελέγχω το βάρος μου	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10. Το να αισθάνομαι χοντρός/η μου προκαλεί προβλήματα στη ζωή μου	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11. Όταν ξεκινήσω να σκέπτομαι το μέγεθος και το σχήμα του σώματός μου, μου είναι δύσκολο να κάνω οτιδήποτε άλλο	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12. Οι σχέσεις μου θα ήταν καλύτερες αν το σωματικό βάρος μου ή/ και το σχήμα του σώματος μου δεν με ενοχλούσε	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Appearance Schemas Inventory-Revised (ASI-R σύντομη μορφή)

Οδηγίες: Οι παρακάτω προτάσεις είναι πεποιθήσεις που οι άνθρωποι μπορεί να έχουν ή μπορεί να μην έχουν σχετικά με τη σωματική τους εμφάνιση και την επιρροή της στη ζωή τους. Αποφασίστε σχετικά με το βαθμό στον οποίο εσείς προσωπικά

συμφωνείτε ή διαφωνείτε με κάθε δήλωση και βάλτε έναν αριθμό από το 1 έως το 5 στο χώρο που βρίσκεται στα αριστερά. Δεν υπάρχουν σωστές ή λάθος απαντήσεις. Απλά να είστε ειλικρινείς σχετικά με τις προσωπικές σας

πεποιθήσεις.

1 Διαφωνώ απόλυτα	2 Διαφωνώ	3 Ούτε συμφωνώ ούτε διαφωνώ	4 Συμφωνώ	5 Συμφωνώ απόλυτα

	1. Ξοδεύω λίγο χρόνο στη σωματική μου εμφάνιση.
	2. Όταν βλέπω εμφανίσιμους ανθρώπους, αναρωτιέμαι πως συγκρίνεται η δική μου εμφάνιση με αυτούς.
	3. Προσπαθώ να είμαι όσο πιο σωματικά ελκυστικός/η όσο μπορώ να είμαι.
	4. Ποτέ δεν έχω δώσει μεγάλη έμφαση στο πώς φαίνομαι.
	5. Σπάνια συγκρίνω την εμφάνισή μου με εκείνη των άλλων ανθρώπων που βλέπω
	6. Συχνά ελέγχω την εμφάνισή μου στον καθρέφτη για να σιγουρευτώ πως φαίνομαι καλά.
	7. Όταν κάτι με κάνει να νιώθω θετικά ή αρνητικά για την εμφάνισή μου, έχω την τάση να εμμένω και να το σκέφτομαι συνεχώς
	8. Αν μου αρέσει το πώς φαίνομαι σε μια δεδομένη ημέρα, είναι εύκολο να αισθάνομαι ευτυχής και για άλλα πράγματα
	9. Αν κάποιος είχε μια αρνητική αντίδραση για την εμφάνισή μου, δεν θα με ενοχλούσε καθόλου.
	10. Όταν πρόκειται για την εμφάνισή μου, έχω υψηλές απαιτήσεις
	11. Η σωματική μου εμφάνιση είχε μικρή επίδραση στη ζωή μου.
	12. Το να ντύνομαι καλά δεν αποτελεί προτεραιότητα για μένα
	13. Όταν συναντώ ανθρώπους για πρώτη φορά, αναρωτιέμαι τι σκέφτονται για την εμφάνισή μου
	14. Στην καθημερινή μου ζωή, πολλά πράγματα συμβαίνουν που με κάνουν να σκεφτώ την εμφάνισή μου
	15. Αν δεν μου αρέσει το πώς φαίνομαι σε μια δεδομένη μέρα, είναι δύσκολο να αισθάνομαι ευτυχής για άλλα πράγματα.
	16. Φαντάζομαι πώς θα ήταν η ζωή μου αν ήμουν πιο ελκυστικός/η απ' ότι είμαι τώρα.
	17. Πριν βγω έξω, βεβαιώνομαι ότι η εμφάνισή μου είναι τόσο καλή όσο μπορεί να είναι.
	18. Η εμφάνιση μου είναι πολύ σημαντικό μέρος του ποιος/α είμαι.
	19. Με τον έλεγχο της εμφάνισής μου, μπορώ να ελέγχω πολλά από τα κοινωνικά και συναισθηματικά γεγονότα στη ζωή μου.
	20. Η εμφάνισή μου ευθύνεται για πολλά πράγματα που μου συνέβησαν στη ζωή μου

Youth Inventory-4				
Σημείωσε Χ στον κύκλο με τον αριθμό που περιγράφει καλύτερα τη συμπεριφορά σου. Απάντησε την κάθε ερώτηση όσο καλύτερα μπορείς.				
1. Νιώθω κουρασμένος/η, σαν να μην έχω ενέργεια να κάνω οτιδήποτε	⓪	①	②	③
2. Είμαι γκρινιάρης/α ή ιδιότροπος/η	⓪	①	②	③
3. Δυσκολεύομαι να κοιμηθώ	⓪	①	②	③
4. Νιώθω δυστυχισμένος/η ή λυπημένος/η	⓪	①	②	③
5. Νιώθω ότι δεν θέλω να κάνω τίποτα	⓪	①	②	③
6. Τρώω πολύ	⓪	①	②	③
7. Κοιμάμαι πολύ	⓪	①	②	③
8. Δυσκολεύομαι να συγκεντρωθώ	⓪	①	②	③
9. Αποφεύγω γεύματα και τρώω πολύ λίγο	⓪	①	②	③

The Perceived Stress Scale (PSS-10)					
Οδηγίες: Οι παρακάτω ερωτήσεις σας ρωτούν για τα συναισθήματα και τις σκέψεις σας κατά τη διάρκεια του <u>τελευταίου μήνα</u>. Στη κάθε περίπτωση, παρακαλώ δείξτε με έναν σταυρό (Χ) πόσο συχνά αισθανθήκατε ή σκεφτήκατε κατά τον συγκεκριμένο τρόπο. **0=Ποτέ 1=Σπάνια 2=Μερικές φορές 3=Αρκετά συχνά 4=Πολύ Συχνά**					
1. Τον τελευταίο μήνα, πόσο συχνά αναστατωθήκατε επειδή κάτι συνέβη απροσδόκητα;	0	1	2	3	4
2. Τον τελευταίο μήνα, πόσο συχνά νοιώσατε ανίκανος(η) να ελέγξετε τα σημαντικά πράγματα στη ζωή σας;	0	1	2	3	4
3. Τον τελευταίο μήνα, πόσο συχνά νοιώσατε νευρικός(η) και "αγχωθήκατε";	0	1	2	3	4
4. Τον τελευταίο μήνα, πόσο συχνά νοιώσατε σιγουριά για την ικανότητα σας να χειριστείτε προσωπικά προβλήματα;	0	1	2	3	4
5. Τον τελευταίο μήνα, πόσο συχνά νοιώσατε ότι όλα πήγαιναν όπως τα θέλετε;	0	1	2	3	4
6. Τον τελευταίο μήνα, πόσο συχνά νοιώσατε ότι δεν θα μπορούσατε να αντιμετωπίσετε όλα όσα έπρεπε να κάνετε;	0	1	2	3	4
7. Τον τελευταίο μήνα, πόσο συχνά νοιώσατε ικανός να ελέγξετε διάφορα ερεθίσματα (προκλήσεις) στη ζωή σας;	0	1	2	3	4
8. Τον τελευταίο μήνα, πόσο συχνά νοιώσατε ότι είστε "κύριος" των καταστάσεων;	0	1	2	3	4
9. Τον τελευταίο μήνα, πόσο συχνά οργιστήκατε επειδή τα πράγματα ξέφυγαν από τον έλεγχο σας;	0	1	2	3	4
10. Τον τελευταίο μήνα, πόσο συχνά έχετε νοιώσει ότι συσσωρεύτηκαν τόσες δυσκολίες σε σημείο που δεν θα μπορούσατε να τις ξεπεράσετε;	0	1	2	3	4

The Positive and Negative Affect Schedule (PANAS): Οι πιο κάτω εκφράσεις περιγράφουν συναισθήματα. Βάλτε στη γραμμή δίπλα από την κάθε έκφραση το βαθμό στον οποίο ΑΥΤΗ ΤΗ ΣΤΙΓΜΗ αισθάνεστε έτσι με βάση την πιο κάτω κλίμακα.

1	**2**	**3**	**4**	**5**
ελάχιστα/ καθόλου	**λίγο**	**μέτρια**	**αρκετά**	**πάρα πολύ**

_____	Αίσθημα ενδιαφέροντος	_____	Εμπνευσμένος/η
_____	Συντετριμμένος/η	_____	Νευρικός/η
_____	Ενθουσιασμένος/η	_____	Αποφασισμένος/η
_____	Αναστατωμένος/η	_____	Προσηλωμένος/η
_____	Δυνατός/η	_____	Ταραγμένος/η
_____	Ένοχος/η	_____	Ενεργητικός/η
_____	Τρομαγμένος/η	_____	Φοβισμένος/η
_____	Εχθρικός/η	_____	Λυπημένος/η
_____	Ενθουσιώδης	_____	Θυμωμένος/η
_____	Περήφανος/η	_____	Έκπληκτος/η
_____	Εκνευρισμένος/η	_____	Αγχωμένος/η
_____	Σε εγρήγορση	_____	Αίσθημα αηδίας
_____	Ντροπιασμένος/η	_____	Αίσθημα Ανίας/Βαρεμάρας

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Subjective Units of Distress (SUDS)

Πόσο ευχάριστα ή δυσάρεστα ένιωσες καθώς παρακολουθούσες το απόσπασμα της ταινίας που μόλις προβλήθηκε;
                   1---2---3---4---5---6---7---8---9---10
          Πάρα πολύ δυσάρεστο   Πάρα πολύ ευχάριστο

Πόση διέγερση ή ένταση σου προκάλεσε το απόσπασμα της ταινίας που μόλις προβλήθηκε;
                   1---2---3---4---5---6---7---8---9---10
          Ηρεμία/Χαλάρωση   Διέγερση/Ενταση

Πόση δυσφορία ή άγχος αισθάνθηκες μόλις τώρα καθώς παρακολουθούσες το απόσπασμα της ταινίας που μόλις προβλήθηκε;
                   1---2---3---4---5---6---7---8---9---10
          Καθόλου Δυσφορία   Υπερβολική Δυσφορία

Σε ποιό βαθμό η σκηνή σας προκάλεσε ενοχλητικά σωματικά συμπτώματα;
                   1---2---3---4---5---6---7---8---9---10
          Καθόλου   Πάρα πολύ

Πόσο μπορούσες να ελέγξεις τις αντιδράσεις σου καθώς παρακολουθούσες το απόσπασμα της ταινίας που μόλις προβλήθηκε;
                   1---2---3---4---5---6---7---8---9---10
          Καθόλου   Απόλυτα

Cognition of body image distortion
Παρακαλώ απαντήστε τις πιο κάτω ερωτήσεις σημειώνοντας Χ στο κατάλληλο κουτί

	Πολύ χοντρή	Χοντρή	Λίγο χοντρή	Κανονική	Λίγο λεπτή	Λεπτή	Πολύ λεπτή
Με το παρόν/σημερινό σας βάρος, πώς βλέπετε τον εαυτό σας στον καθρέφτη;							
Με το βάρος που έχετε σήμερα, πώς αισθάνεστε;							