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The moderating role of body image inflexibility in the relation between weight concerns and symptoms of eating disorders in Cypriot University students

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Abstract

Objectives: Eating Disorder symptoms are highly prevalent and persistent among university students, especially in societies that place high emphasis on body image and in countries where the weather conditions result in body revealing clothing such as Cyprus. The aim of this study is to investigate whether body image inflexibility moderates the relationship between weight concerns and eating disorder symptoms in a sample of Cypriot University students.

Methodology: 440 students responded to a survey including measures of weight concerns, (WCS), body image inflexibility (BIAAQ) and symptoms of eating disorders (EAT-26). Moderation analyses were conducted using the PROCESS Macro for SPSS.

Results: The moderation model showed a significant interaction between weight concerns and body image inflexibility (95% CI .004 - .007).

Discussion: Higher body image inflexibility seems to exacerbate the risk from weight concerns augmenting the experience of eating disorders symptoms. The findings suggest that interventions targeting body image inflexibility might help prevent and alleviate eating disorders symptoms.

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1. Introduction

Eating Disorders (ED) constitute a serious public health issue with a lifetime diagnostic prevalence of 8.4% and 2.2% for women and men, respectively. When assessed using broader tools that encompass sub-clinical forms, the lifetime prevalence rates increase to 19.4% for women and 13.8% for men (Galmiche et al., 2019). 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 (Peck & Lightsey, 2008). Early adulthood is

considered as a critical period for the development of ED, especially among females (Lipson & Sonnevile, 2017). ED symptoms may also be triggered by the transition to adulthood - which is associated with college entry in most western countries- and the concomitant challenges of university life, such as attending academic responsibilities and adapting to the social pressures of campus (Delinsky & Wilson, 2008; Taylor et al., 2006).

The prevalence of sub-threshold EDs among adults aged 18 years and older from six European countries was 0.72% for Binge Eating Disorder (BED) and 2.15% for any other binge eating (Preti et al., 2009). Among US college students, 13.5% of females and 3.6% of males presented with higher risk for developing an ED (Eisenberg et al., 2011). Recent studies show that over 56% of students in the US are in high risk for ED or have a clinical/subclinical ED (Fitzsimmons-Craft et al., 2019). Despite these alarming rates, screenings for EDs on university campuses are lacking with only one fifth of universities offering year-round screening programs (National Eating Disorders Association, 2013).

Body image is of great concern among university students and might result in eating risk behaviours when in combination with other stress factors encountered in academic life, i.e., living away from home etc. (Barker & Galambos, 2007). Body image disturbance is associated with inaccurate perceptions of one's body weight and shape, weight and shape concerns, devaluation of physical appearance and associated distress (Garner & Garfinkel, 1980). This kind of disturbance might increase the risk of engaging in unhealthy behaviours such as restrictive eating, body-checking and avoiding body-image anxiety provoking situations (Rosen et al., 1991), while it is found to predict poor overall psychological well-being in both sexes (Ganem et al., 2009).

Youth living and studying in Cyprus might be more prone to the development of ED, with evidence suggesting that eating pathology is highly prevalent and persistent in societies that place high emphasis on body image and in countries where the weather conditions result in body revealing clothing (Argyrides & Kkeli, 2015; Sloan, 2002) Cyprus is one of the warmest nations in Europe and more revealing clothes are necessary, which might have led to an overemphasis on appearance and body-image ideals. In addition, the collectivistic society in Cyprus, which is characterized by low levels of autonomy and high levels of embeddedness, might make individuals more vulnerable to appearance ideals such that the opinion of others has been found predictive of disordered eating behaviours among Greek-speaking female students in Cyprus (Zeeni et al., 2013). Previous research conducted in Cyprus, shows that an overall 9.11% of university students reported clinical symptoms pertaining to one of the three ED diagnosis (AN BN or BED), while 30.50% were screened as high risk for developing an ED (Koushiou et al., 2019).

These prevalence estimates provide substantial evidence regarding the presence of sub-clinical EDs among youth in higher education institutions. Most of these youth have concerns about their appearance and body shape and weight upon their induction to the university. However, the mechanisms leading from appearance related concerns to clinical ED symptoms remains to be explained/understood.

Emotion regulation difficulties have been consistently related with ED in both clinical and subclinical levels (Craparo et al., 2020; Davies et al., 2012; Rawal et al., 2010). One of the most prominent, empirically supported theories suggests a heightened level of arousal experienced by individuals with ED, especially Anorexia Nervosa (AN), in response to afferent information and the perception of such arousal as negative or threatening (Koushiou et al., 2019; Merwin, 2011). The response to such threatening sensations differs between typologies of ED where individuals who binge eat engage in strategies such as emotional eating, while individuals with AN engage in emotional non-eating (i.e., more caloric restriction and/or excessive exercise; Harrison et al., 2009). Both responses are conceptualized to result in negative affect avoidance (Oldershaw et al., 2019; Schmidt & Treasure, 2006). Further research has shown that difficulties in accepting internal states including emotions are predictive of dietary restraints (Merwin et al., 2010).

The tendency to avoid internal states (experiential avoidance), limited mindful awareness and a lack of capacity to modulate behaviour according to context in the service of personal values are dimensions of psychological inflexibility (Hayes et al., 2006) that have been examined in the context of ED through specific measures such as the Body-Image Inflexibility (Sandoz et al., 2013). Body-Image Inflexibility is conceptualized as efforts to avoid, suppress or alter distressing thoughts, feelings or sensations about one's body, even at the expense of meeting valued ends, such as achieving one's goals and living with what is personally meaningful for the individual (Sandoz et al., 2013). For example, individuals with eating disorder symptoms might not be able to fully and openly experience negative body-image thoughts without acting out on them or effortfully trying to alter or avoid them (e.g. through calorie restrictions, excessive exercise, etc.) at the expense of personally meaningful goals (e.g., maintaining physical health, and a healthy weight that would improve functionality and quality of life).

Body-image inflexibility has been found to: mediate the relation between disordered eating cognitions and disordered eating behaviour in a non-clinical female sample (Moore et al., 2014); partially mediate the relation between ED risk factors (such as body dissatisfaction) and the severity of eating pathology among female college students (Trindade & Ferreira, 2014); and to moderate/mediate the relation between eating cognitions and BED (Ferreira et al., 2011; Lucena-Santos et al., 2017).

1.1 The Current Study

Body-image inflexibility is emerging as one robust construct that can accelerate ED development such that increasing body-image inflexibility can possibly account for the relation between weight / shape concerns and ED symptoms. This study, therefore, aims to examine the moderating role of Body-Image Inflexibility in the relation between weight concerns and ED symptoms among university students.

2. Method

2.1 Participants

Potential participants were any students over the age of 18 capable of providing informed consent attending the University of Nicosia, in Cyprus during the Fall semester of 2019. The final sample included 448 participants, however due to missing data on the BI-AAQ from 8 participants, analyses were only carried on 440 participants. The sample was predominantly female (N=297; 67.5%) and studying at undergraduate level (N=373; 84.8%). The average age of participants was 21.87 (SD=3.63, ranging between 18-52) and their nationalities were Cypriot (N=175; 39.8%), Greek (N=141; 32.0%) or other (N=124; 28.2%).

2.2 Procedure

The data of the present study was collected during a two-week campaign titled “Mind your Body, embrace your Mind” aimed at raising awareness on psychological well-being, body-image and eating-related concerns in the academic community. Questionnaire administration was conducted (in Greek or in English) online and at specific locations on campus as well as during class time under the supervision of the campaign’s research assistants. Participation was exclusively voluntary and no incentives were provided.

The project was approved by the Cyprus Bioethics Committee and by the University’s Social Sciences Ethics Review Board.

2.3 Measures

The Eating Attitudes Test-26 (EAT-26; Garner et al., 1982) is a 26-item measure assessing symptoms of eating disorders via a 6-point Likert scale (1=always to 6=never). The EAT-26 is a validated screening measure for EDs (Douka et al., 2009; Garfinkel & Newman, 2001) that had previously also been adapted to the Greek language showing satisfactory internal consistency ($\alpha=.87$; Loutsiou-Ladd et al., 2011). Higher total scores show greater risk for eating pathology.

The Weight Concern Scale (Killen et al., 1994) is a 5-item self-report questionnaire that assesses fear of weight gain, worry about weight and body shape, the importance of weight, diet history,

and perceived fatness. A threshold score of 52 and above is indicative of higher risk for developing ED. Adequate psychometric properties have been previously reported (Killen et al., 1994, 1996) and satisfactory internal consistency ($\alpha=.80$) has been shown in Greek-Cypriot youth samples (Koushiou et al., 2019).

The Body Image – Acceptance and Action Questionnaire (BI-AAQ; Sandoz et al., 2013) measures body image inflexibility defined as the inability to experience the ongoing internal events, including sensations, emotions, thoughts that are related with one's body. The 12 items assess the impact of body image concerns on psychological flexibility, with greater summed scores indicating greater body image inflexibility. The BI-AAQ has been shown to have excellent internal consistency in its original development ($\alpha=.92$; Sandoz et al., 2013) and in the Greek version ($\alpha=.95$; Karekla et al., 2019).

2.4 Data Analysis

The data was analysed using SPSS v25. For correlation analyses, Spearman's rho was used due to departures from normality from all measures. Model 1 of the PROCESS macro (v3.4, model 1, Hayes, 2017) for SPSS, was used to assess the moderating effect of body image flexibility in the association between weight concerns and ED Symptoms. Preliminary analyses showed that all variables significantly correlated with each other in theoretically expected directions, and that all measures had a satisfactory to excellent internal consistency. The internal consistency, means, standard deviations and inter-correlation scores across all measures are shown in table 1.

Table 1. Cronbach's alpha, means, standard deviations, and Spearman rho inter-correlation scores across the measures (N=440).

	α	M	SD	1	2	3
1.ED Symptoms	.82	11.05	9.18	1		
2.Weight Concerns	.75	37.04	23.28	.57**	1	
3.Body Image Inflexibility	.94	30.21	16.44	.54**	.73**	1

** $p<.001$

3. Results

3.1 The moderating effect of Body image flexibility on the association between weight concerns and ED symptoms

Table 2 presents the unstandardized coefficients (B) and standard errors (SE) of the variables (independent variable – weight concerns; moderator – body image flexibility; and interaction – Weight concerns X body image flexibility) of the moderation model, and the model summary.

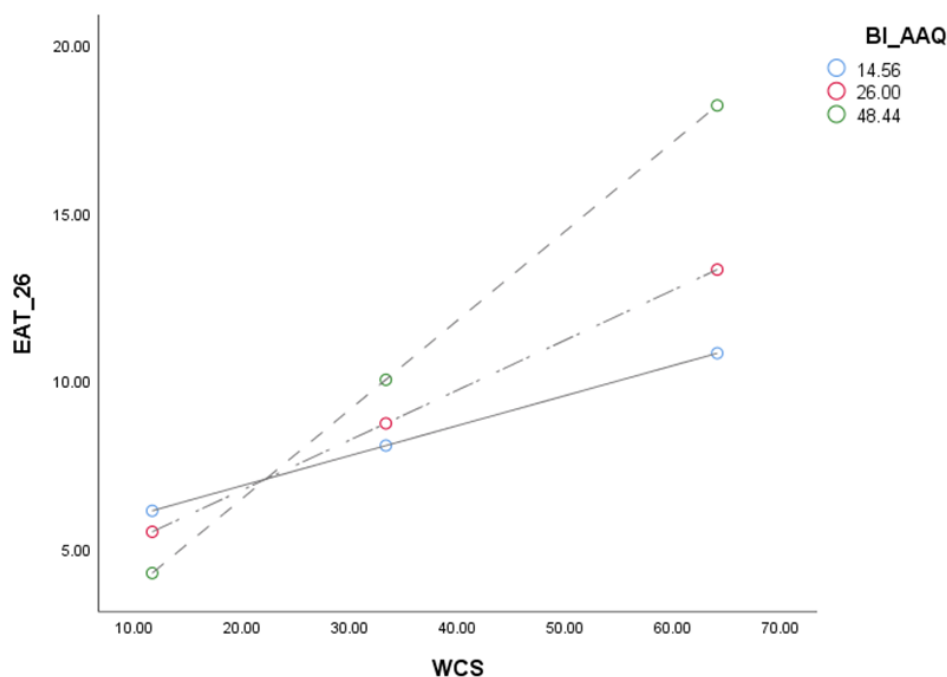
Table 2. Moderation effect of Body image flexibility on the relation between weight concerns and ED symptoms (n=440)

	ED symptoms						
	<i>B</i>	SE	T	p	LLCI	ULCI	Δ R2
Weight Concerns	.014	.031	.444	.657	-.047	.075	
Body Image Flexibility	-.116	.051	-2.260	.024	-.216	-.015	
Interaction	.005	.001	6.454	.000	.004	.007	.049
Total R ²			.487				
F (final model)			138.469				

In the final model the conditional effect of weight concerns on ED symptoms was non-significant whilst, the conditional effect of body image inflexibility on ED symptoms was significant. The interaction term was significant ($B = .005$, $SE = .001$) and accounted for 4.9 % of incremental variance in ED symptoms. The total model explained 48.7% of the variance of ED symptoms. Overall, these results point out to body image inflexibility being a full moderator of the relationship between weight concerns and ED Symptoms.

Significant conditional effect of weight concerns at the 16th, 50th and 84th percentile levels of the moderator indicate that Body Image inflexibility seems to exert a buffer protective effect. That is, people who exhibit lower levels of body image inflexibility seem to have a weaker relationship between their weight concerns and ED symptoms (Figure 1).

Figure 1 - The moderating role of body image inflexibility (BI-AAQ) on the association between weight concerns (WCS) and eating disorders symptoms (EAT-26).



4. Discussion

Findings from the present study with university students in Cyprus support previous empirical evidence suggesting that psychological inflexibility has a significant moderating role in the relationship between weight concerns and ED symptoms. More specifically, the moderation model tested supports the buffering role of psychological inflexibility in the experience of ED symptoms. It appears that the progression from weight concerns to ED symptoms might be inhibited in students who experience lower levels of psychological inflexibility.

These findings are in accordance with previous evidence suggesting that psychological inflexibility moderates the association between disordered eating cognition and disorder eating behaviour among women (Moore et al., 2014) and the relation between thin-ideal internalization and disordered eating among college women (Morton et al., 2020). More importantly, Morton et al. (2020) point to specific behavioural components of psychological inflexibility that moderate this relation, that is, cognitive fusion, lack of present moment awareness, lack of values and lack of values-based action. In addition, Mancuso (2016) shows that body-image inflexibility does not only mediate the relation between body- image evaluation and maladaptive body-image coping strategies (such as appearance-fixing behaviors) in a nonclinical community sample but also the relation between body-image evaluation and experiential avoidance in general. Body-image inflexibility also fully mediates the relation between general feelings of shame and eating pathology severity while it partially mediates the relation between unfavourable social comparison based on appearance and severity of eating pathology among young women (Mendes et al., 2021). On the opposite end of the spectrum, body-image acceptance is also found to reduce the impact of body-image dissatisfaction on disordered eating behaviors, such as restrictive eating and thinness seeking in both males and females in the general population (Ferreira et al., 2011). The powerful impact of psychological inflexibility in the relation between several risk factors and eating pathology is evidenced in several other cross-sectional studies (Cardoso et al., 2020; Duarte & Pinto-Gouveia, 2016; Hill et al., 2013). Finally, review studies support that body image inflexibility emerges as a significant moderator and mediator in explaining eating pathology (see Rogers et al., 2018).

To our knowledge, this is the first study supporting that psychological inflexibility fully moderates the relation between weight concerns and ED symptoms and can thus, act as a potential catalyst in the development eating pathology among high ED risk, University students studying in Cyprus. It is thus assumed that body-image psychological inflexibility conceptualized as a category of dysfunctional emotional and behavioural processes involving experiential avoidance related to body-image and inability to follow actions congruent to one's personal

values, can potentially accelerate transition from mere weight concerns to ED symptoms. This finding provides additional empirical support to newer reconceptualizations of EDs as disorders of psychological inflexibility (see Merwin et al., 2010a; Merwin, 2011).

In light of these findings, psychological inflexibility emerges as a potential target for ED screening and intervention programs among students presenting with weight concerns and higher levels of psychological inflexibility. Research shows that third-wave behavioural approaches that aim to increase mindfulness and self-compassion decrease eating pathology and body-image inflexibility in populations with clinical ED symptoms (Pinto-Gouveia et al., 2017). In adult populations with subclinical ED symptoms, interventions that aim to enhance psychological flexibility and incorporate mindfulness, body-image acceptance and values-based action (e.g., Heffner et al., 2002), show large effects in reducing body dissatisfaction and weight concerns (Pearson et al., 2012).

Additional empirical evidence is needed to delineate which components of psychological inflexibility are directly related to the experience of ED symptoms. In addition, further research is necessary to examine psychological inflexibility as a potential mechanism of change in interventions targeting students with high weight concerns who live in contexts such as Cyprus, where ED are highly prevalent and persistent.

4.1 Present study's limitations

Some limitations should be noted in the present study. Firstly, the use of cross-sectional data does not allow for any type of causal relation inference. Secondly, the static nature of cross-sectional design data could lead to the moderator effect found in this study, however, body image inflexibility can be conceptualized as dialogic – a response rather than a cause. Therefore, depending on the context, body image inflexibility can be seen as transactional rather than static (Hayes et al., 2006). Thirdly, unaccounted exogenous variables could still lead to epiphenomenal associations such as those observed in our results. Forthly, the use of a non-clinical university student population sample curtails any definitive clinical recommendations. Therefore, future studies could look at differences in the applicability of this model across university students with diagnosed ED, sub-threshold ED and no ED diagnosis. Finally, a strength of the study could be the larger sample size, however, given the single site of recruitment, the possibility of generalizability to the wider student community in Cyprus is limited.

Despite these limitations, the present study makes a contribution to the understanding of the role of body image inflexibility as a contextual factor in the relationship between weight concerns and ED symptomatology. To our knowledge, this is the first study to provide preliminary evidence of how a contextual factor such as body image inflexibility moderates the

impact of a learned, culturally derived cognitive experience such as weight concerns in the context of EDs. The findings from this study might suggest that those individuals who are most likely to struggle with weight concerns are potentially those who could benefit the most of an intervention targeting body image inflexibility as a way to prevent or treat ED symptomatology. However, further more robust longitudinal studies are needed to replicate these preliminary findings and to inform the development of interventions that target EDs.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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