

# Intuitive Heuristics Linking Perfectionism, Control, and Beliefs Regarding Body Shape in Eating Disorders

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**Abstract** A number of correlational studies have established a clear association between perfectionism, control and beliefs regarding body shape in eating disorders (EDs). The aim of this study is to test the effectiveness of the above-mentioned associations in exploring the presence of intuitive heuristics. Intuitive heuristics can be conceived as as mental shortcuts, cognitive processes that are highly susceptible to irrational biases. Forty one non clinical female controls and 27 inpatient females with an ED diagnosis participated in an experimental task that tested whether participants would show an intuitive rather than a logically based link between perfectionism in different domains (study, work, hygiene) and a thin body shape. In the healthy female participants the occurrence of proposed link was noted in the hygiene domain only, while ED participants showed this intuitive association in all the domains explored: study, work, and hygiene. The study confirms in clinical ED sample a wider employment of heuristics associating perfectionism and thinness that is based on purely intuitive irrational reasoning.

**Keywords** Body shape • Eating disorders • Heuristics • Perfectionism

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## Introduction

Many maladaptive cognitive beliefs have been proven in scientific literature to be risk factors which may cause eating disorders (EDs). Among the most prominent are low self-esteem and perfectionism. A large body of research has shown an association between perfectionism or low self-esteem and anorexia nervosa (Fairburn & Harrison, 2003; Halmi et al. 2000; McLaren et al. 2001), bulimia nervosa (Davis, 1997; Fairburn & Harrison, 2003; Vohs et al. 1999), and even maladaptive attitudes towards eating in non-clinical individuals (Button et al. 1996; Sassaroli & Ruggiero, 2005).

Perfectionism is a multidimensional construct. One of the most widely used definitions of perfectionism is provided by Frost et al., (1990) who individuated six dimensions: personal high standards, concern over mistakes, parental criticism, parental expectations, doubts, and organization. According to these authors, concern over mistakes is the distinguishing feature of pathologic perfectionism. Pathologic perfectionists allow little room for making mistakes and perceive even minor ones as likely to lead to a future final failure. Thus, pathologic perfectionists never feel that anything is done completely enough or well enough, and their actions are always accompanied by feelings of self-criticism and a sense of ineffectiveness.

In addition, individuals with EDs often pathologically seek a sense of control (Bruch, 1973; Button, 1985, 2005; Surgenor et al. 2002). They obtain this by continuously monitoring their eating and body weight and shape (Fairburn & Harrison, 2003). Hence, EDs can be described as disorders in which low self-esteem is combined with perceptions of low levels of control over one's own life that are displaced and become perceptions of low levels of control over eating, weight and fat (Fairburn et al. 1999; Katzman & Lee, 1997; Williams et al. 1990). Sassaroli et al. (2008) have shown that controlling behavior is a general attribute of the ED personality.

Starting from the above cited literature it is likely that patients with eating disorders employ specific cognitive

representations associating perfectionistic traits, high self-esteem and high perception of personal control to body thinness. Beyond these specific cognitive contents, it seems also plausible that heuristics, more than formal logic, may be the cognitive representational format underlying these maladaptive beliefs in ED.

Heuristics are intuitive forms of reasoning intended as cognitive shortcuts not totally rational which are fast, time-saving and economical in terms of day-to-day reasoning and decision-making (Tversky and Kahneman, 1983;). On the one hand, heuristics may be effective and adaptive cognitive strategies (Gigerenzer et al. 1999), on the other hand in some cases they may lead to systematic errors and cognitive biases (Kahneman et al. 1982).

According to Tversky and Kahneman, a comprehensive list of heuristics includes representativeness, anchoring and availability heuristics. The representativeness heuristic is an assessment of the degree to which an instance or a sample can be representative of an appropriate category or population (Kahneman & Tversky, 1972, 1973; Tversky & Kahneman, 1982). Representativeness heuristics do not conform to the extensional logic of probability theory. Therefore, if instances of a specific category are easier to retrieve than instances of a more inclusive category, then, independently of the formal rules of probability, a conjunction can be assessed as being more representative and more probable than one of its constituent parts.

In Tversky and Kahneman's classic experimental task (1983), representativeness was investigated by asking people which one of two professions was more representative of a given personality. The participants were provided with a description of 'Linda' who reflects the stereotype of a feminist. The participants were then asked to evaluate the probability of her being a feminist, the probability of her being a bank teller and the probability of her being both a bank teller and a feminist. Probability theory dictates that the probability of being both a bank teller and feminist (the conjunction of two sets) must be less than the probability of being either a feminist or a bank teller. However, the participants judged the conjunction (bank teller and feminist) as being more probable than that of being a bank teller alone. Therefore, in judging the probability that Linda was both a bank teller and a feminist, individuals employed the psychological heuristic principles of representativeness rather than the extensional logic of probability.

The presence of heuristic cognitive processes has been empirically investigated in many domains, including social cognition, medical judgment, predicting the outcome of soccer matches and risky decision-making (Kahneman et al. 1982; Dawson & Arches, 1987). However, a lack of literature has to be acknowledged for the study of heuristics as cognitive processes possibly involved in emotional and psychiatric disorders, from anxiety to mood disorders, to ED. In this last case, heuristics may plausibly be the cognitive representational

substrate of the association between personal perceptions of perfectionistic personality and body shape beliefs of thinness.

Moreover, a possible problem with all the aforementioned correlational studies (Sassaroli et al. 2008; Fairburn & Harrison, 2003; Halmi et al. 2000; McLaren et al. 2001; Davis, 1997; Vohs et al. 1999; Button et al. 1996; Sassaroli & Ruggiero, 2005) may be that they use correlational methodologies and self-reporting instruments in order to confirm the hypothesis that perfectionism, control and low self-esteem are cognitive factors underlying EDs. Field and Davey (2005) specifically state that with regard to clinical psychiatric research; correlational research, while it has many advantages including generally high levels of ecological validity and ease of data collection, suffers from the absence of the systematic manipulation of independent variables and a control group. Therefore, an experimental or quasi-experimental approach may offer different benefits by identifying psychopathological mechanisms and ED theory-building.

Up until now no study has empirically confirmed the presence of heuristic processes facilitating the association between perfectionism, control and beliefs regarding body shape, either in clinical ED or healthy samples. In other words, our research questions are two: 1) do cognitive representations of the perfectionist personality – constituted by personal high standards and concern over mistakes (Fairburn et al. 1999) and by controlling attitudes and behaviours (Sassaroli, Gallucci & Ruggiero, 2007) – involve also beliefs of body features of thinness? 2) Are these cognitive associations to be considered heuristics and not rational forms of reasoning?

The aim of this study is to test the presence of intuitive heuristics binding pathological perfectionism, control and beliefs regarding body shape as relevant variables in EDs. We hypothesized that healthy female participants, when imagining a woman who is a perfectionist, would consider it more likely that she would be thin than overweight. This hypothesis, when confirmed, would reasonably suggest that even healthy female individuals employ intuitive and not rational forms of reasoning when attributing a thin body shape to a perfectionist personality, in addition to controlling attitudes and behaviour.

In addition, we tested the hypothesis that, when imagining a perfectionist personality, sentences regarding controlling attitudes and behaviours would be evaluated as being more probable than body shape-related sentences, as they are consistent with the perfectionist profile. We also hypothesized that a clinical sample of ED patients would show the heuristic association between perfectionism and thin body shape in a wider and more pervasive range of domains compared to healthy volunteers.

The empirical investigation of existing heuristic processes that facilitates the association between body shape beliefs and pathological perfectionist personality stereotypes may therefore provide strong support for theory-building processes concerning the psychopathology of EDs offering useful

insights for the nature of cognitive representational formats and processes involved in ED.

## Method

### Participants

Forty-one healthy female individuals without any psychiatric disorders participated in this study after giving their informed consent. Their ages ranged from 18 to 30 years old (mean:  $22.7 \pm 5.4$ ). The inclusion criteria required that the participants were at least 18 years old, female and had never been diagnosed with an ED.

Twenty seven in-patient female individuals with an ED diagnosis (15 individuals had restricting type anorexia, 5 had binge-eating/purging anorexia, 6 had purging type bulimia, and 1 had not otherwise specified eating disorder) were included in the study after collecting their informed consent. Their age range was from 15 to 53 years old (mean:  $29.8 \pm 9.8$ ). The diagnostic processes included SCID I and II (First & Gibbon, 1997a; First & Gibbon, 1997b). The inclusion criteria consisted of: ED diagnosis, female gender, minimum age 15 years old, maximum age 60 years old. Exclusion criteria were: mental retardation, psychosis. Comorbidity with DSM IV TR Axis-II diagnosis of personality disorders was accepted. Ethical approval was obtained from Casa di Cura Villa Margherita Arcugnano (VI) and from the ‘Studi Cognitivi’ Research Committee. All procedures were performed in compliance with the rules of the aforementioned committees.

### Experimental Task

The task involved three female personality sketches which mirrored the prototype of pathological perfectionism as defined by Frost and colleagues (Frost et al. 1990) and which focused on two dimensions of this construct: Concern over Mistakes and high standards.

One personality sketch represented perfectionism in the domain of work (‘Veronica’), one represented perfectionism in the cleaning, hoarding and hygiene domain (‘Sylvia’), and one represented perfectionism in the study and school domain (‘Marta’). The task consisted of assigning a probability score to 10 sentences (from 1=most probable to 10=least probable).

One sentence was rationally consistent and logically inferable from the specific personality sketch presented and conveyed attitudes and behaviours associated with control (e.g., repeatedly cleaning the house). Two sentences expressed information about the subject’s body shape (e.g., thin vs. fat) and two sentences expressed both the rational cue (controlling tendencies) and the body shape (e.g., repeatedly cleaning the

house and being thin; repeatedly cleaning the house and being fat). The other five sentences were added as distractor items in order to hidden to the participants the focus (beliefs regarding body shape) of our experimental task.

After reading each of the three personality sketches, the participants were asked to assign probability scores between 1 and 10 to all of the 10 sentences (1=most probable to 10=least probable). An example of a personality sketch and the related sentences is reported below.

“Sylvia is in her thirties and she is employed in a multinational corporation. She does not tolerate untidiness and dirt at home or in the office; she likes to have everything organized and exactly tidy. Sylvia’s house looks like an advertisement of interior design. For Sylvia, being extremely tidy, clean and organized is crucial for being a worthy person.”

Sylvia cannot stop tidying her house perfectly

Sylvia is overweight

Sylvia is thin

Sylvia is overweight and cannot stop to perfectly tidying her house

Sylvia is thin and cannot stop tidying her house perfectly

The task is a modified version of the Tversky and Kahneman experimental task (Tversky & Kahneman, 1983) that aims to verify the employment of the representativeness heuristic for evaluating beliefs related to EDs. In our task, the personality sketches did not include any information regarding the physical appearance or body shape of the individual being described, providing only a description of a prototypical perfectionist in a specific daily domain. Moreover, the task entailed the inclusion of a sentence that was rationally consistent with the profile provided (e.g., “Sylvia cannot stop to perfectly tidying her house” is rationally consistent with Sylvia’s perfectionist profile) as one of the sentences to be ranked in terms of probability.

All of the personality sketches were validated using a sample of healthy female adults who verified their prototypicality in terms of perfectionism. All of the personality sketches and the sentences relating to each personality sketch were randomized using a free online randomizing tool ([www.random.org](http://www.random.org)) for each participant.

### Questionnaires

We chose the Drive for Thinness and Body Dissatisfaction subscales of the Eating Disorders Inventory version III (EDI-3, Garner, 2004). The Drive for Thinness is a seven items subscale that assesses a cardinal feature of EDs and is useful for screening for EDs (Abood & Black, 2000; Engström et al. 1999; Garner, 1991, 2004). According to Garner (1991, 2004), the Drive for Thinness is subscale constituted by 7 items that assess excessive concern with dieting, preoccupation with weight and fear of weight gain. Polivy and Herman (1987)

found that high Drive for Thinness scores for female college students reflected a preoccupation with weight that was as severe as that of individuals with EDs. The Drive for Thinness subscale is derived from clinical conceptualizations by Hilde Bruch (1973, 1982) and Gerald Russell (1970). The body dissatisfaction is a subscale of EDI-III (Garner, 2004) with 9 items measuring the level of dissatisfaction with one's physical appearance. The EDI-3 consists of 91 questions including three subscales of eating disorder symptoms. The reliability of these index scores collected from eating disorder patients appears excellent (Cronbach's  $\alpha=0.90-0.97$ ; test-retest  $r=0.98$ ) (Garner 2004; Wildes et al. 2010). The EDI-3 revision yields adequate convergent and discriminant validity (Cumella 2006). According to Clausen and colleagues (Clausen et al. 2011) the EDI-3 is a valuable instrument to measure ED.

The Multidimensional Perfectionism Scale (MPS; Frost et al. 1990) is a 35-item self-report questionnaire based on theories of perfectionism. The MPS measures six dimensions of perfectionism, including concerns over mistakes, personal standards, parental expectations, parental criticism, doubting of actions and organization. It uses a five-point Likert-type scale. Psychometric studies have shown that the MPS and the subscale of Concern over Mistakes have adequate levels of reliability (Cronbach's alphas higher than 0.7) (Frost et al. 1990; Parker & Adkins, 1995). In our study we administered two subscales of the MPS, related to 'Concern over Mistakes' and 'Personal Standards'.

## Procedure

After giving their informed consent, all of the healthy volunteers and patients were introduced to the task with brief instructions being given in a silent room. The participants were required to perform the modified version of the Tversky and Kahneman (1983) experimental task described in the previous paragraph. The participants were instructed to imagine the person described within each profile. After reading each personality sketch regarding a pathological perfectionist personality (featuring high standards and Concern over Mistakes), they were asked to evaluate the probability of the truth of sentences regarding body shape, attitudes and behaviors.

After this experimental task, the MPS ('concern over mistakes' and 'personal standards' subscales) and EDI-3 ('Drive for Thinness' and 'Body Dissatisfaction') questionnaires were administered to the participants.

At the end of the experimental session, post-experimental debriefing interviews were conducted. The experimenter asked the participants: "How did you find the task and the completion of the questionnaires?" in order to carry out the post-experimental debriefing session. The experimenter recorded their answers in note form.

## Results

### Non-clinical Sample

We used a non-parametric Wilcoxon sign-rank test to analyze the data in order to verify significant differences in the subjective probability attributed to each sentence by the healthy participants.

With regard to the personality sketches describing perfectionism in the domains of work ("Veronica") and school/studying ("Marta"), the healthy participants considered the sentence as conveying controlling attitudes and forms of behaviour which were rationally consistent with the profile, e.g., "Veronica usually spends a lot of time precisely reviewing each document in detail" to be significantly more probable than the other sentences regarding beliefs relating to body shape (see Table 1). However, no significant differences were found between the probability attributed to sentences regarding body shape beliefs (thin or overweight), their combinations with the rational cue and the rational cue itself.

With regard to the personality sketch which described perfectionism in the domain of hygiene ("Sylvia"), the probability of the rational cue "Sylvia cannot stop to perfectly tidying her house," as assessed by the participants, was significantly higher than the probability attributed to the sentences "Sylvia is thin" ( $Z=-3.801$ ; sig.=0.002), "Sylvia is overweight" ( $Z=-3.935$ ; sig.=0.000) and "Sylvia cannot stop to perfectly tidying her house and she is overweight" ( $Z=-4.026$ ; sig. = 0.000). On the other hand, the probability attributed to the rational cue "Sylvia cannot stop tidying her house perfectly" was not significantly different from the combination of the rational cue with the belief that the subject is thin: "Sylvia cannot stop to perfectly tidying her house and she is thin" ( $Z=-1.405$ ; sig.=0.296).

**Table 1** Significant differences between subjective probability attributed to each sentence regarding the Perfectionism in work (i.e., the "Veronica" profile) and in school (i.e., the "Marta" profile) domains by the healthy participants

	Z	Sig.
Perfectionism in work domain		
Veronica controls -Veronica thin	-4.903	0.000
Veronica controls -Veronica overweight	-5.011	0.000
Veronica controls -Veronica thin & control	-4.235	0.000
Veronica controls -Veronica overweight & control	-4.199	0.000
Veronica thin - Veronica thin & control	-2.929	0.003
Veronica overweight -Veronica overweight & control	-2.106	0.035
Perfectionism in school domain		
Marta controls - Marta thin	-5.182	0.000
Marta controls - Marta overweight	-5.5	0.000
Marta controls - Marta thin & controls	-4.973	0.000
Marta controls - Marta overweight & controls	-5.198	0.000
Marta thin - Marta thin & controls	-2.332	0.020



Interestingly, the sentence “Sylvia is thin” was scored as being significantly more probable than the sentence “Sylvia is overweight” ( $Z=-3.574$ ;  $\text{sig.}=0.000$ ). Similarly, the probability scores attributed to the sentence “Sylvia is thin” were significantly higher than the scores attributed to the sentence combining the rational cue with the belief that the subject is overweight: “Sylvia is overweight and cannot stop tidying her house perfectly” ( $Z=-3.238$ ;  $\text{sig.}=0.001$ ). Moreover, “Sylvia is thin and cannot stop tidying her house perfectly” was evaluated as being significantly more probable than “Sylvia is overweight and cannot stop tidying her house perfectly” ( $Z=-3.854$ ;  $\text{sig.}=0.000$ ). In other words, when given the same rational cue, the healthy participants conceived a thin body shape as being more probable than an overweight body shape.

Finally, the sentence “Sylvia is thin and cannot stop tidying her house perfectly” was assessed as being significantly more probable than “Sylvia is thin” ( $Z=-3.142$ ;  $\text{sig.}=0.002$ ).

Bivariate correlations (Kendall’s tau) were assessed between the probability scores attributed to each sentence and the subscores of the EDI and MPS in healthy volunteers. More specifically, scores for the Bulimia, Body Dissatisfaction, Drive for Thinness, High Standards and Concern over Mistakes subscales were assessed.

A significant correlation was found between the probability scores attributed to the sentence “Veronica is thin” (perfectionism in the working domain) and body dissatisfaction (Kendall’s tau- $b=-0.407$ ;  $\text{sig.}=0.019$ ). Higher scores on the Body Dissatisfaction subscale were correlated to a greater probability being attributed to the sentence “Veronica is thin,” with regard to perfectionism at work.

Other significant correlations were found concerning the profile that featured perfectionism in studying (‘Marta’). More specifically, the probability scores attributed to the sentence “Marta is overweight/eats a lot of snacks” were positively correlated to Bulimia scores (Kendall’s tau- $b=-0.354$ ;  $\text{sig.}=0.035$ ) and negatively correlated to concern over mistakes scores (Kendall’s tau- $b=0.342$ ;  $\text{sig.}=0.041$ ). Therefore, healthy individuals with higher scores on the Bulimia subscale perceived the subject of the profile which featured perfectionism in studying as being more likely to be “overweight” or to “eat a lot of snacks.” In addition, participants with lower scores on the Concern over Mistakes subscale attributed greater probability to the sentence: “Marta is overweight/eats a lot of snacks,” whereas participants with higher scores on the Concern over Mistakes subscale attributed lower probability scores to the same sentence.

### Clinical ED Sample

We used the non-parametric Wilcoxon sign-rank test to analyze the data in order to verify significant differences in the subjective probability attributed to each sentence by the clinical sample of women with an eating disorder diagnosis.

Similarly to the control sample, concerning the personality sketches describing perfectionism in the domains of work (‘Veronica’) and school/studying (‘Marta’), ED patients considered the sentence conveying controlling attitudes and behaviour, which was rationally consistent with the profile, e.g., “Veronica usually spends a lot of time precisely reviewing each document in detail” to be significantly more probable than the other sentences regarding beliefs relating to body shape (see Table 2).

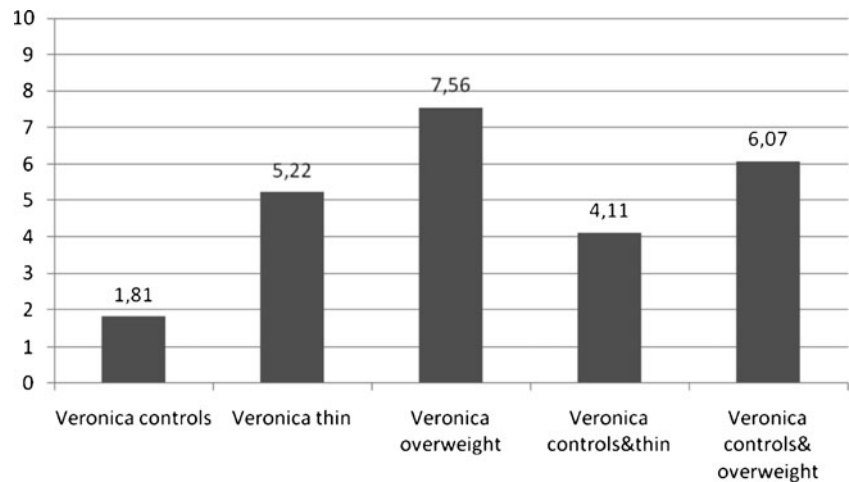
Regarding the domain of perfectionism at work, the sentence “Veronica is thin” was scored as being significantly more probable than the sentence “Veronica is overweight” by ED patients ( $Z=-2.62$ ;  $\text{sig.}=0.009$ ). Similarly, the sentence “Veronica is thin and usually spends a lot of time precisely reviewing each document in detail” was evaluated as being more probable than “Veronica is overweight and usually spends a lot of time precisely reviewing each document in detail” ( $Z=-1.999$ ;  $\text{sig.}=0.046$ ) and “Veronica is thin” ( $Z=-2.23$ ;  $\text{sig.}=0.026$ ). As expected, patients attributed greater probability to the sentence “Veronica is thin and usually spends a lot of time precisely reviewing each document in detail” than “Veronica is overweight” ( $Z=-3.04$ ;  $\text{sig.}=0.002$ ) (Fig. 1).

When considering the profile of perfectionism in school and studying patients included in our clinical sample consistently saw the sentence “Marta is thin” as being significantly more probable than “Marta is overweight” ( $Z=-3.997$ ;  $\text{sig.}=0.000$ ), but less probable than the sentence combining thinness in body shape with the rational cue “Marta is thin and controls (prepares very detailed and precise notes and repeats them countless times)” ( $Z=-3.104$ ;  $\text{sig.}=0.020$ ). Also, the sentence “Marta is thin and controls” has been evaluated by our clinical sample as being more probable than the sentences

**Table 2** Significant differences between subjective probability attributed to each sentence regarding the Perfectionism in work (i.e., the “Veronica” profile) and in school (i.e., the “Marta” profile) domains by the clinical participants

	Z	Sig.
Perfectionism in work domain		
Veronica controls - Veronica thin	-3.353	0.001
Veronica controls - Veronica overweight	-4.374	0.000
Veronica controls - Veronica thin & control	-2.913	0.004
Veronica controls - Veronica overweight & control	-4.105	0.000
Veronica thin - Veronica thin & control	-2.233	0.026
Veronica overweight - Veronica overweight & control	-3.237	0.001
Perfectionism in study domain		
Marta controls - Marta thin	-4.315	0.000
Marta controls - Marta overweight	-4.396	0.000
Marta controls - Marta thin & controls	-2.309	0.021
Marta controls - Marta overweight & controls	-4.563	0.000
Marta thin - Marta thin & controls	-3.104	0.002

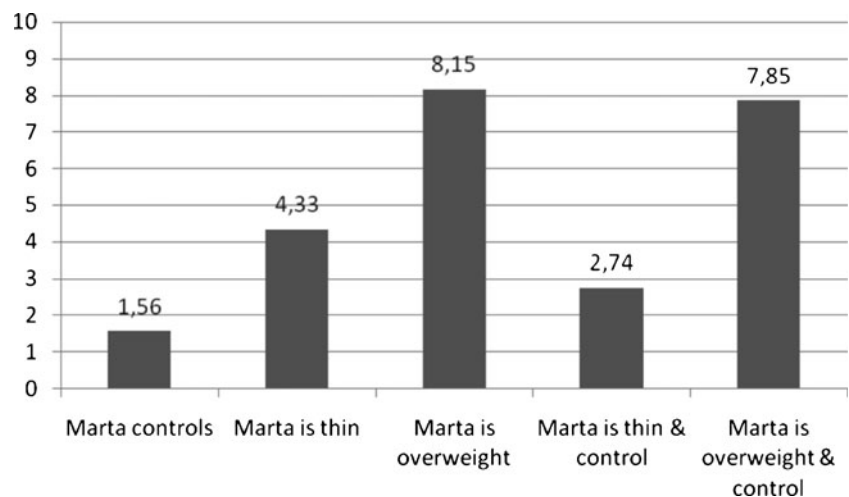
**Fig. 1** Mean probability assigned by the clinical ED sample to each sentence of the working perfectionist profile. Lower scores indicates greater assigned probability



“Marta is overweight” ( $Z=-4.316$ ;  $\text{sig.}=0.000$ ), “Marta is overweight and controls” ( $Z=-4.554$ ;  $\text{sig.}=0.000$ ). Finally, ED patients assessed as more probable the body shape of thinness “Marta is thin” than the sentence combining the body shape of overweight with the rational cue “Marta is overweight and controls” ( $Z=-3.593$ ;  $\text{sig.}=0.000$ ) (Fig. 2).

When asked to evaluate the probability of sentences related to the profile of perfectionism in cleaning and hygiene the clinical sample evaluated the sentence “Sylvia is thin” as being more probable than “Sylvia is overweight” ( $Z=-3.373$ ;  $\text{sig.}=0.001$ ) and “Sylvia is overweight and controls” ( $Z=-2.722$ ;  $\text{sig.}=0.006$ ), but less probable than the sentence combining body shape of thinness with the rational cue “Sylvia is thin and controls” ( $Z=-2.636$ ;  $\text{sig.}=0.008$ ). Moreover, the sentence “Sylvia is thin and controls” was assessed as being more probable than “Sylvia is overweight and controlling” ( $Z=-3.865$ ;  $\text{sig.}=0.000$ ). Also “Sylvia is overweight” was evaluated as being significantly less probable than “Sylvia is thin and controlling” ( $Z=-3.882$ ;  $\text{sig.}=0.000$ ) and “Sylvia is overweight and controlling” ( $Z=-2.369$ ;  $\text{sig.}=0.018$ ) (Figs. 3 and 4).

**Fig. 2** Mean probability assigned by the clinical ED sample to each sentence related to the profile of schooling and studying perfectionism. Lower scores indicates greater assigned probability



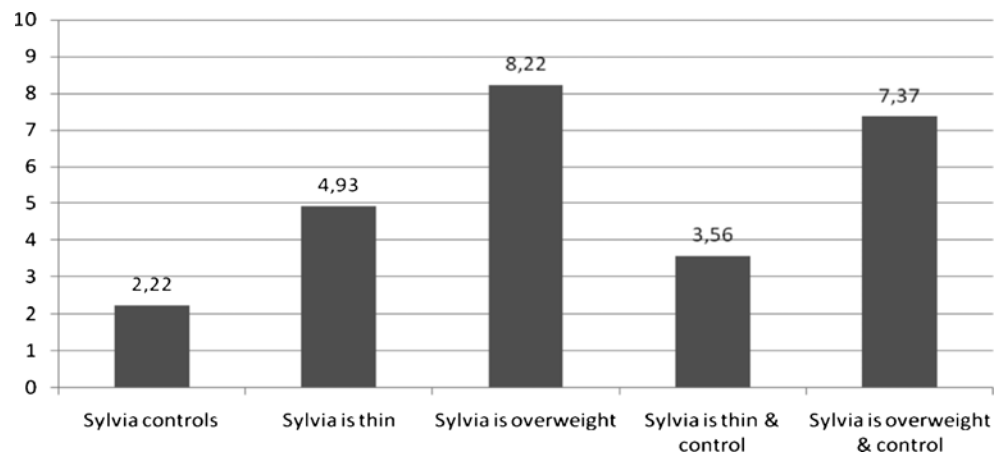
### Comparisons Between Clinical ED Patients and Non Clinical Volunteers

We used a non-parametric Mann–Whitney Test test to analyze the data in order to verify significant differences between healthy participants and patients with eating disorders with regard to the subjective probability attributed to each sentence.

ED patients showed that it was significantly more probable that the body shape of thinness was associated with the profile of perfectionism at work compared to healthy control subjects ( $p=0.056$ ). No significant differences were found regarding the probability attributed to the body shape of overweight and to the sentences combining the rational cues with overweight and thinness of body shape.

Regarding the profile of perfectionism at school, our clinical ED sample attributed a significant lower probability to the body shape of overweight to those with a perfectionist personality compared to healthy volunteers ( $p=0.003$ ). Moreover, ED patients of our clinical sample attributed significantly greater probability to the sentence combining

**Fig. 3** Mean probability assigned by the clinical ED sample to each sentence related to the profile of perfectionism in the domain of cleaning and hygiene. Lower scores indicates greater assigned probability



thinness with the rational cue conveying attitude and control behaviour (“Marta is thin and controls”) compared to the healthy group ( $p=0.019$ ). Similarly, ED patients considered the sentence combining the rational cue to the overweight body shape (“Marta is overweight and controls”) less probable when compared to healthy volunteers (sig.  $p=0.004$ ).

No significant differences between healthy volunteers and clinical ED patients in attributing probability to the sentences regarding the profile of perfectionism in the cleaning and hygiene domain were detected.

## Discussion

The results of this study seem to support the conclusion that both non clinical participants and clinical ED individuals tend to use heuristic processes linking perfectionistic attitudes and thinness in place of formal reasoning. In particular, non clinical participants showed this stereotypical and intuitive link only within the domain of cleaning and hygiene, while clinical ED participants also showed this link in the other two domains of work and study.

This interpretation is based on the result that all participants were significantly more likely to connect the description of a person who is primarily concerned with having everything perfectly clean and tidy to one with a thin body shape than to one who is overweight, even without being given any information regarding the body shape of the person described in the profile.

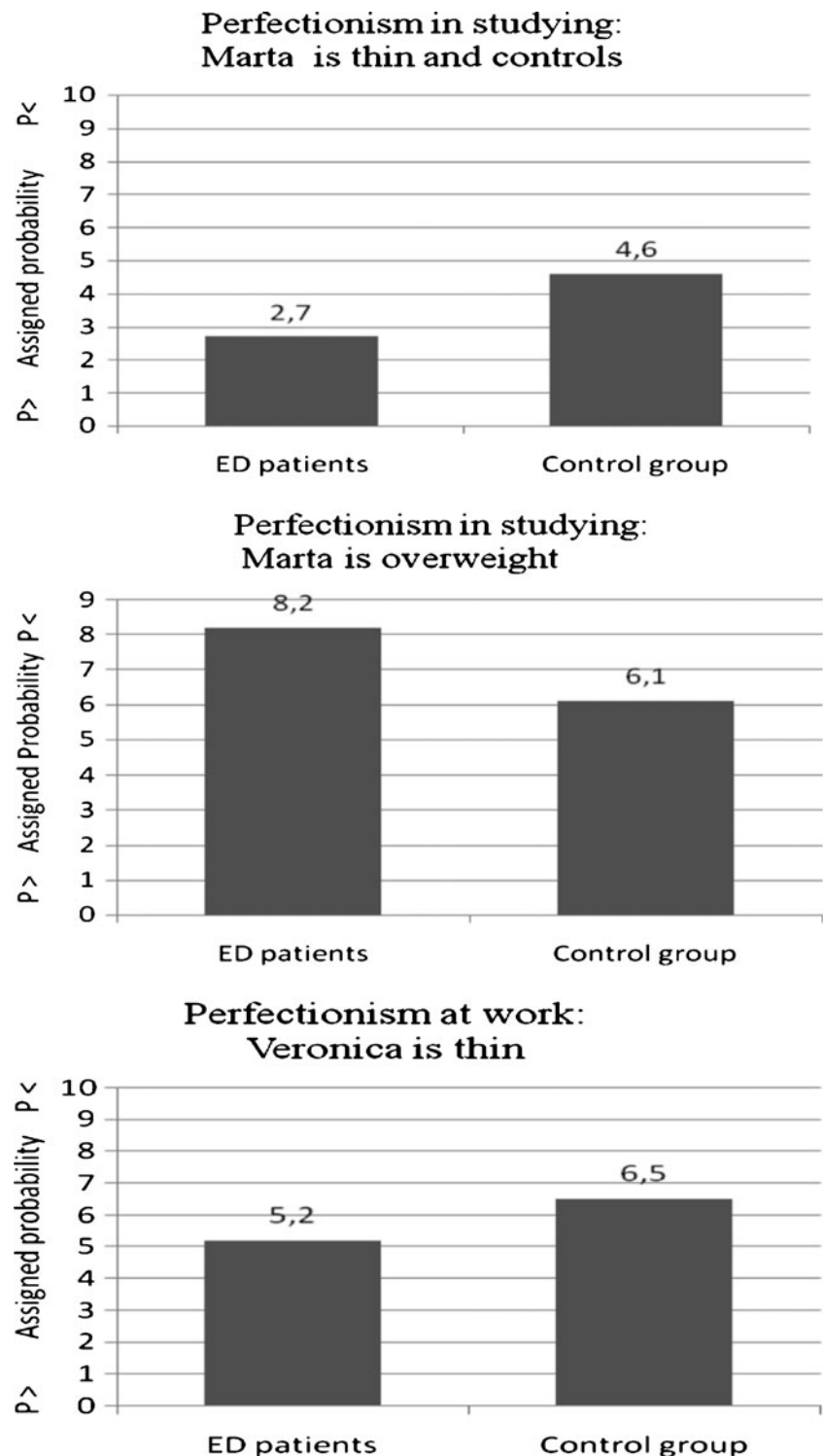
Another result that supported this interpretation is that the sentence containing only the rational cue “Sylvia cannot stop tidying her house perfectly” was not scored as being significantly more probable than the sentence combining both the rational cue and the belief about body shape: “Sylvia is thin and she cannot stop tidying her house perfectly.” As the individuals used intuitive heuristics and not formal logic, they evaluated the truth of the aforementioned sentences as being equally probable.

The absence of formal extensional reasoning and the violation of the conjunction probability rule is showed by the fact that the participants did not consider the sentence “Sylvia cannot stop to perfectly tidying her house” (which is constituted by a single feature that is rationally consistent with Sylvia’s profile) as being more probable than the combination of two features (namely the rational cue and the belief about body shape).

In addition, our participants showed a form of conjunction fallacy (Tversky & Kahneman, 1983) based on the representativeness heuristic: the association between being “thin and being unable to stop to perfectly tidying her house” was evaluated by participants as being more representative of the perfectionist profile than the single feature relating to the tendency to control “cannot stop to perfectly tidying her house”. This could suggest that extensional formal reasoning is not employed when the conjunction of two features is perceived as being more probable than one single feature.

Interestingly, our data show that a higher probability score was attributed to the belief about body shape ‘thin’ than to the sentence that associated being ‘overweight’ and the inability to stop tidying (“cannot stop tidying up her house perfectly”). This result highlights how, even in the presence of a clear and explicit rational cue, when this cue is combined with the notion of being overweight, healthy and clinical ED individuals assess the single feature ‘thin’ (which does not have any rational connection with the profile) as being more probable. Therefore, the underlying cognitive mechanism entails that the association between being ‘thin’ and perfectionism leads to an underestimation of information that is rationally consistent with the perfectionist profile when it is combined with the opposing notion of being ‘overweight’. Hence, it appears that the rational cue regarding the tendency to control (“cannot stop tidying her house perfectly”) was not evaluated as being probable when it was linked to being ‘overweight’. This suggests that the belief that the subject is ‘overweight’ is highly unrepresentative of perfectionism in healthy females’ minds.

**Fig. 4** Mean probability assigned by the clinical ED sample and control group respectively to sentences regarding body shape of thinness, overweight and control in the domain of perfectionism at work and study. Lower scores indicates greater assigned probability



Therefore, we discovered that there were intuitive heuristic processes binding perfectionism and the belief of thin body shape in the domain of cleaning and hygiene in both healthy and clinical samples. This result may be explained in the light of evidence highlighting relevant phenotypic similarities between specific aspects of obsessive-compulsive disorder

(OCD) and anorexia nervosa (Halmi et al. 2003). In fact, the aforementioned study revealed that the anorexic patients did not differ from the OCD controls in the frequency of their obsessions, in the symmetry and somatic categories or in the compulsion categories of ordering and hoarding, while in all of the other categories, such as the auto- and hetero-



aggressive, sexual and religious categories, the anorexic subgroup had a significantly lower frequency of obsession compared to the OCD group. Similarly, Bastiani et al. (1996) found that more than half of the patients with an anorexia nervosa diagnosis had cleaning and ordering compulsions. Therefore, it seems plausible that in healthy female individuals, the heuristic association between thinness and perfectionism is more evident and salient in the domain of cleaning and hygiene.

The most interesting feature of ED individuals was that they linked thinness and perfectionism not only in the cleaning domain, as non clinical individuals did, but also in the work and studying domains. This interpretation is based on the result that ED participants were significantly more likely to connect all the three profiles (e.g., the profile of being perfectionistic at cleaning, the profile of being perfectionistic at study, and the profile of being perfectionistic at work) to a thin body shape than to being overweight, even without any information regarding the body shape of the person described in the profile.

Therefore, while non clinical individuals seemed to use the heuristic linking thinness and perfectionism only in the cleaning and hygiene domains, ED patients seemed to use it in a wider range of domains.

This result confirms similar conclusions drawn in previous correlational studies (Bulik et al. 2003; Sassaroli et al. 2008; Fairburn & Harrison, 2003; Davis, 1997; Button et al. 1996; Sassaroli & Ruggiero, 2005). For example using self-report measures Bulik and colleagues (Bulik et al. 2003) showed that a specific aspect of perfectionism –the concern over mistakes – is particularly associated with eating disorders and not generically predictive of different forms psychopathology. Sassaroli et al. (2008) highlighted the effects of perfectionism on drive for thinness, bulimia, and body dissatisfaction moderated by low perception of control and low self-esteem. Similarly, other studies showed that body dissatisfaction was most pronounced with higher level of perfectionism (Davis 1997). Therefore, the empirical evidence of heuristic associating perfectionism to thinness body image in patients with eating disorders can be considered a strong support for a possible link between perfectionism and beliefs related to body dissatisfaction and drive for thinness.

There were also subtler differences between clinical group and healthy controls. When compared to non clinical control subjects, ED patients considered significantly more probable that thinness was associated with perfectionism at work ('Veronica'), while no significant differences were shown regarding the probability attributed to the body shape of being overweight.

Conversely, ED patients considered less probable that being overweight was associated with the profile of perfectionism at school ('Marta') in comparison to healthy volunteers, while there were no differences regarding thinness. Therefore, it seems that the heuristic of representativeness associates perfectionism at work with thinness and perfectionism in study to being less overweight.

Thus, thinness tended to be intuitively associated with perfectionism in cleaning in healthy and ED subjects while in the clinical sample this heuristic was seen also in the domain of work and study. This suggests that ED patients encompass heuristic processes associating perfectionism with thinness that are more pervasive in a wider range of daily life contexts. Conversely, in non clinical participants, the heuristic binding between thinness and perfectionism seems to be restricted in terms of life domains and therefore less maladaptive. This explanation of our results is consistent with studies showing that maladaptive perfectionism involving a wide range of life domains is a predisposing factor for EDs (Bieling et al. 2004).

The evidence that thinness is associated to perfectionistic personalities in ED patients leads to several socio-cultural considerations. It is plausible hypothesize that western cultural norms, values and standards play a role in promoting the occurrence of fast heuristic association between perfectionism and thinness. Cultural beliefs and attitudes have been identified as relevant contributing factors in the development of eating disorders (Miller & Pumariega, 2001) since values about physical aesthetic are involved. Specifically, the idealization of the thin body type in Western societies and acculturation to Western cultural models (Pumariega, 1986) has been acknowledged as a possible critical factor in ED with the appropriation of such thinness ideal models. In fact, some researchers have found a correlation between the appearance after World War II of the ideal of slenderness and the rise of eating disorders (Garner et al. 1980; Silverstein et al. 1986; Wiseman et al. 1992). Therefore, as cognitions are not isolated but deeply entangled with cultural models (Nisbett & Norenzayan, 2002) it is reasonable suppose that western cultural models may be a contributor in shaping and maintaining intuitive heuristics associating perfectionism with body thinness. Future cross-cultural studies might profitably test the cultural specificity of such heuristics.

As a final observation, both the clinical and non clinical group also showed examples of formal rational reasoning. In fact, they recognized and evaluated the sentence that conveyed controlling attitudes and forms of behaviour as being more probable than other sentences regarding body shape. The result indicated that both non clinical and clinical participants employed a form of rational reasoning, as they identified the cue which was rationally consistent with the specific profile as being more probable.

In conclusion, our study suggests that in young non clinical women, intuitive thinking may facilitate an association between thinness and perfectionism, at least in the obsessive domain of cleaning; while in ED patients the intuitive heuristics binding thinness and perfectionism is more pervasive in different domains of experience.

A limitation of the study could be the low generalizability of laboratory data related to the application of an experimental methodology to the clinical field. Moreover, this study

employed non-matched samples concerning the participants' gender: in both clinical and healthy group only female volunteers were included in the study. The descriptions of personalities provided in the experimental tasks were all of women. The reason of this choice relies on the epidemiological evidence that ED are a relevant cause of psychosocial morbidity in women and they are much less frequent in men (Fairburn & Harrison, 2003). It could be possible that gender impacts in terms of differential employment of heuristics in males and females; therefore in order to consolidate our results it would be beneficial in future studies considering the effect of gender on heuristics binding perfectionism and body shape of thinness.

The empirical results of this research represent an experimental confirmation of the association between perfectionism and thinness, that was previously only supported by correlational studies. In addition, the results suggest that the heuristics of Tversky and Kahneman may function as a reasoning mechanism underlying the association between perfectionism and thinness. From our viewpoint, this is a valuable contribution to the understanding of the ED psychopathological cognitive mechanism.

From a clinical perspective, our study may be relevant to confirm heuristic processes binding perfectionism and body thinness as risk pre-morbidity factor for ED; consequently heuristics associating perfectionism and body shape may become target of primary prevention in healthy population. In conclusion, the results may encourage the development of interventions aimed at assessing, increasing awareness of and modify heuristic cognitive styles in ED patients. These heuristic-based interventions should be tested and empirically verified within CBT randomized controlled trials for the treatment of ED.

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