

Too strict or too loose? Perfectionism and impulsivity: The relation with eating disorder symptoms using a person-centered approach



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ABSTRACT

Although both perfectionism (i.e. personal standards perfectionism and evaluative concerns perfectionism) and impulsivity have been shown to be implicated in eating disorders, no previous studies have examined the interplay between both personality dimensions in their association with eating disorder symptoms. This is the first study to investigate the relationship between empirically derived personality subtypes based on perfectionism and impulsivity and eating disorder symptoms (i.e., dietary restraint, and concerns over eating, weight and shape). Cluster analysis was used to establish naturally occurring combinations of perfectionism and impulsivity in adolescent boys and girls ($N = 460$; M age = 14.2 years, $SD = .90$). Evidence was obtained for four personality profiles: (1) a resilient subtype (low on perfectionism and impulsivity), (2) pure impulsivity subtype (high on impulsivity only), (3) pure perfectionism subtype (high on perfectionism only), and (4) combined perfectionism/impulsivity subtype (high on both perfectionism and impulsivity). Participants in these four clusters showed differences in terms of eating disorder symptoms in that participants with a combination of high perfectionism and high impulsivity (rather than the presence of one of these two characteristics alone) had the highest levels of ED symptoms. These findings shed new light on extant theories concerning ED.

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1. Introduction

Research suggests, paradoxically, that both overcontrolled personality features, such as perfectionism, and undercontrolled personality characteristics, such as impulsivity, are implicated in eating disorder symptomatology (e.g., Bardone-Cone et al., 2007; Dawe & Loxton, 2004). To gain more insight into this rather counterintuitive finding, this study aimed to examine the interplay between perfectionism and impulsivity in relation to eating disorder symptoms (i.e., dietary restraint, and concerns over eating, weight and shape) from a person-centered approach. Specifically, we aimed to investigate the relationship between naturally occurring combinations of perfectionism and impulsivity within persons.

Perfectionism has been conceptualized as a multidimensional personality feature. Many studies have found that perfectionism consists of two components, that is personal standards (PS) perfectionism (i.e., the setting of and striving for high personal standards and goals), and evaluative concerns (EC) perfectionism (i.e., negative reactions to failures,

concerns over others' criticism and expectations, and doubts about performance abilities) (Bieling, Israeli, & Antony, 2004; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993). Several case control studies found that both PS and EC perfectionism are elevated in patients with anorexia nervosa and bulimia nervosa compared to healthy controls or other psychiatric groups (e.g., Bastiani, Rao, Weltzin, & Kaye, 1995; Soenens et al., 2008). Furthermore, research on perfectionism has consistently found that levels of EC perfectionism, and to a lesser extent PS perfectionism, are strongly related to body image concerns in a clinical sample (Boone, Braet, Vandereycken, & Claes, 2013) and to the severity (Sherry, Hewitt, Besser, McGee, & Flett, 2004) and the presence (DiBartolo, Li, & Frost, 2008) of a wide range of eating disorder symptoms (e.g., dieting, bulimic symptoms, and preoccupation with food, weight and shape) in non-clinical samples (see Bardone-Cone et al. (2007) for an overview). More recently, longitudinal (Boone, Soenens, & Braet, 2011; Mackinnon et al., 2011) and experimental research (Boone, Soenens, Vansteenkiste, & Braet, 2012; Shafran, Lee, Payne, & Fairburn, 2006) found evidence for the role of PS and EC perfectionism in the onset and course of ED symptoms, such as restraint eating, binge eating, and weight and shape concerns. Importantly, in a recent study – using a person-centered approach – it was found that a combination of high PS perfectionism and high EC perfectionism is associated with the highest level of ED symptoms, such as dietary restraint, and concerns over eating, weight and shape in a sample of

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healthy adolescents (e.g., Boone, Soenens, Braet, & Goossens, 2010). In sum, these studies show that not only EC perfectionism, but also PS perfectionism is implicated in the development of a diverse range of ED symptoms. Therefore, in this study both PS and EC perfectionism will be used as indicators of perfectionism.

Yet, as noted, eating disorders have also been related to impulsivity. Impulsivity has been conceptualized in many different ways (Whiteside & Lynam, 2001). Eysenck, for instance, has proposed a three dimensional model defining impulsiveness as an inability to think and reflect on the consequences of actions before engaging in these actions (Eysenck, Pearson, Easting, & Allsopp, 1985). Others have conceptualized impulsivity based on Gray's Reinforcement Sensitivity Theory (RST; Gray, 1970), which focuses on motivational factors underlying impulsive behavior. Gray's impulsivity dimension reflects individual variation in sensitivity to rewarding (conditioned or unconditioned) environmental stimuli, which is regulated by the Behavioral Approach System (BAS).

Impulsiveness, which might thus also be conceptualized as high BAS reactivity, has been positively related to various psychological symptoms, including eating disorder symptoms such as dysfunctional eating patterns (e.g., bingeing and purging), and preoccupation with weight and dieting (see Bijttebier, Beck, Claes, & Vandereycken, 2009 for an overview; Dawe & Loxton, 2004). In an experimental study (Guerrieri, Nederkoorn, Schrooten, Martijn, & Jansen, 2009), for instance, it was found that participants who were primed with the concept of "impulsivity" (i.e., participant were asked to read and imagine a story in which impulsivity traits were central) showed a higher caloric intake compared to participants who were primed with the concept of "inhibition" (i.e., a story in which more restrictive and controlling aspects were mentioned). In clinical samples, it has been found that impulsivity is elevated in patients with bulimia nervosa (BN) and binge/purging AN (AN-P), whereas patients with restrictive AN (AN-R) have been shown to exhibit less severe impulsivity levels (Beck, Smits, Claes, Vandereycken, & Bijttebier, 2009; Claes, Vandereycken, & Vertommen, 2002). However, a study by Claes and colleagues (Claes, Robinson, Muehlenkamp, Vandereycken, & Bijttebier, 2010) found that BAS reactivity did not discriminate between BN, AN-P, and AN-R, suggesting that all patients with an ED presented some impulsivity traits. Further, these authors found that effortful control, i.e. the ability to inhibit an automatic response, played an important role in the differentiation between restrictive and binge/purging ED subtypes. Hence, it seems that high levels of impulsivity in ED may interact with other features in predicting ED symptoms. A focus on impulsivity alone is therefore insufficient to fully understand the dynamics involved in ED symptoms. Therefore, in this study, we investigated the interplay between impulsivity and perfectionism in relation to ED symptoms.

1.1. Interplay between perfectionism and impulsivity

Perfectionism and impulsivity can be expected to interact with each other for at least two reasons. First, clinical observations and empirical studies have reported that a substantial proportion of patients with an ED are characterized by a combination of strong perfectionistic attitudes as well as high impulsivity (e.g., Claes et al., 2002). This suggests that perfectionism and impulsivity are different constructs that should not be considered as opposites on a single continuum. Second, research has shown that crossover from the AN-R subtype to the AN-P subtype or from AN to BN is substantial, with percentages ranging from 64% to 17%, and 54% to 20% respectively (see Peat, Mitchell, Hoek, & Wonderlich, 2009 for an overview), suggesting that both personality features might be simultaneously elevated in patients with eating disorders, but that at any given point in time, perfectionistic or impulsive traits might dominate the clinical presentation of ED patients.

In this study, we therefore aim to investigate the interplay between perfectionism and impulsivity in explaining eating disorder symptoms using a person-centered approach (i.e., cluster-analysis). Such an

approach allows examining naturally existing combinations of perfectionism and impulsivity within persons. Unlike variable-centered approaches that focus on the relationships among variables (e.g., using correlations or regression analyses), person-centered approaches aim to identify clusters of individuals with the same features or trajectories (von Eye & Bogat, 2006). Moreover, it has often been argued that a person-centered approach, because of its focus on individual profiles, is clinically more relevant as clinicians are primarily concerned with individuals rather than variables, and thus can more easily translate these findings to their own clinical practice (Bergman & Trost, 2006).

Although no study to date has investigated the interplay between perfectionism and impulsivity specifically in predicting eating disorder symptoms, many studies have addressed naturally occurring personality types more generally using cluster analysis or Q-analysis (e.g., Claes et al., 2006, 2012; Thompson-Brenner, Eddy, Satir, Boisseau, & Westen, 2008; Thompson-Brenner, Eddy, Franko, et al., 2008; Westen & Harnden-Fischer, 2001). The majority of these studies have identified three personality subtypes in patients with EDs, whereas others have identified three to five subtypes, each of which may include individuals with any of the ED diagnoses. Most studies in this area have identified the three subtypes of individuals (1) a *resilient/high functioning cluster* (low scores on all clinical big five traits), (2) an *undercontrolled/emotionally dysregulated cluster* (high scores on neuroticism and low on conscientiousness and agreeableness), and (3) an *overcontrolled/constricted cluster* (high scores on neuroticism and conscientiousness, and low scores on openness). In addition, some studies found evidence for two additional clusters: (4) an *avoidant-insecure type* (with anxious, depressed, and socially avoidant tendencies), and (5) a *behaviorally dysregulated type* (with stimulus-seeking, antisocial, and impulsive dysregulated behaviors) (e.g., Thompson-Brenner, Eddy, Franko, et al., 2008; Thompson-Brenner, Weingeroff, & Westen, 2009; Wonderlich et al., 2005).

Studies in this area have consistently found that individuals in the resilient cluster typically reported less severe ED symptoms compared to individuals in the other clusters. Furthermore, individuals classified in the emotionally and behaviorally dysregulated cluster generally report more bulimic symptoms and impulsive behaviors, whereas those classified in the overcontrolled and avoidant-insecure cluster tend to exhibit more restrictive symptoms (Thompson-Brenner, Eddy, Satir, et al., 2008). In addition, although findings have not always been consistent in patients with bulimia nervosa (Claes et al., 2006), patients in the overcontrolled cluster tend to report the highest level of weight and shape concerns (e.g., Wonderlich et al., 2005).

1.2. The present study

Although research has shown that both perfectionism and impulsivity are implicated in eating disorder pathology, no study to date has simultaneously investigated their interplay in relation to eating disorder symptoms. This is the first study to examine naturally occurring combinations of PS and EC perfectionism and impulsiveness in a community sample of 460 adolescent boys and girls using cluster analysis.

In line with previous studies on personality subtypes that found evidence for three personality clusters, we expected to replicate these clusters based on scores on impulsivity and perfectionism. Specifically, we expected to find a resilient cluster (low on perfectionism and impulsivity), a pure impulsive cluster (high on impulsivity and low on perfectionism), a pure perfectionistic cluster (high on perfectionism, and low on impulsivity), and a combined cluster (high perfectionism and high impulsivity). Second, we aimed to examine differences in ED symptoms (i.e., dietary restraint, and concerns over eating, weight and shape) between clusters. It was expected that adolescents in the resilient cluster would show the least ED symptoms, whereas the overcontrolled cluster would report similar (Claes et al., 2006) or more ED symptoms (Wonderlich et al., 2005) compared to the undercontrolled cluster.

Given the lack of previous studies exploring the interplay between perfectionism and impulsivity, no further predictions were made. Given that previous research showed that PS and EC perfectionism are highly correlated and are both implicated in ED pathology (Boone et al., 2012; Sherry et al., 2004) we did not expect that both perfectionism components would differentially relate to ED symptoms.

2. Materials and method

2.1. Participants and procedure

In total, 460 adolescent boys (30%) and girls (70%) with a mean age of 14.2 ($SD = .90$, ranging from 12 to 16 years) were recruited from two secondary schools in Belgium. All participants were Caucasian, and came from middle-class backgrounds. Of the participants, 82.2% came from intact, two parent families, 16.5% had divorced parents, and 1.3% came from a family in which one of the parents had passed away. Passive informed consent from parents and active informed assent from the adolescents were obtained. Adolescents had the opportunity to withdraw from the study at any moment. The adolescent questionnaires were administered during a class period. Students had approximately 45 min to complete the survey. This procedure was approved by the local research ethics committee.

2.2. Measures

2.2.1. Perfectionism

The Frost Multidimensional Perfectionism Scale (F-MPS; Frost, Marten, Lahart, & Rosenblate, 1990) is a 35-item self-report questionnaire using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). For the purpose of this study, we only used three scales from the F-MPS: personal standards (PS; 7 items; “I have extremely high goals”), concern over mistakes (CM; 9 items; “If I fail partly, it is as bad as being a complete failure”), and doubts about actions (DA; 4 items; “I usually have doubts about the simple everyday things I do”). As done in many previous studies (e.g., Boone et al., 2011), the latter two subscales of the F-MPS were combined (i.e., averaged) into a measure of evaluative concerns (EC) perfectionism. Consistent with previous research (Boone et al., 2010), after factor analysis on the three F-MPS subscales, 1 item from the PS perfectionism factor (i.e., “If I do not set high standards for myself, I am likely to end up a second rate person”) that had a cross-loading on the EC perfectionism factor was removed, resulting in a pure PS perfectionism factor (DiBartolo, Frost, Chang, SaSota, & Grills, 2004). The F-MPS has been shown to have good psychometric properties in both adult (Frost et al., 1990) and adolescent samples (Hawkins, Watt, & Sinclair, 2006), with Cronbach's alphas ranging from .74 to .93. In this study, Cronbach's alphas for PS perfectionism and EC perfectionism were .83 and .91, respectively.

2.2.2. Impulsivity

Impulsivity was measured using the I-7 Impulsiveness questionnaire (Eysenck & Eysenck, 1978; Eysenck et al., 1985). The impulsiveness subscale of the I-7 measures the extent to which one tends to act rashly without considering the consequences of one's action (e.g., “Do you generally do or say things without stopping to think?”). The scale consists of 19 items that are answered using a yes or no format. Higher scores indicate higher levels of impulsivity. The Dutch translation of the scale has been found to have good psychometric properties (Lijffijt, Caci, & Kenemans, 2005), including in adolescent samples (e.g., Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005). The internal consistency of the impulsivity scale for this study was .79.

2.2.3. Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994)

The EDE-Q focuses on the past 28 days and assesses four core attitudinal and behavioral features of eating disorders: Dietary Restraint

(5 items, e.g., “Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight?”), Weight Concern (5 items, e.g., “Have you had a strong desire to lose weight?”), Shape Concern (8 items, e.g., “Have you had a definite desire to have a totally flat stomach?”), and Eating Concern (5 items, e.g., “Have you had a definite fear of losing control over eating?”). Items are rated on a 7-point rating scale, ranging from 1 (no days) to 7 (every day). The EDE-Q has been shown to have adequate internal consistency, with Cronbach's alphas ranging from .78 to .93 (Luce & Crowther, 1999). Cronbach's alphas in the present study for concerns over weight, shape, eating, and dietary restraint were .85, .93, .82, and .87, respectively.

2.2.4. Plan of analysis

Analyses were carried out with SPSS 19.0. First, differences in gender, age, and adjusted Body Mass Index (BMI) [adjusted BMI = (actual BMI / percentile 50 of BMI for age and gender) \times 100] in the studied variables were explored, along with correlations between the variables. Before cluster analysis was conducted, participants with missing data on one of the clustering variables were removed ($n = 32$). Furthermore, uni- and multivariate outliers were inspected, but no participants were detected as outliers.

Cluster analysis was performed to determine the personality prototypes. Based on recommendations by Gore (2000), cluster analysis was performed in two steps. In the first step, the standardized PS and EC perfectionism and impulsivity scores were entered in a hierarchical cluster analysis. This first step is used to identify the number of clusters and to establish the cluster centers. The determination of the number of clusters is based on the percentage of variance explained in the clustering variables and interpretability. In the second step, a subsequent nonhierarchical, k -means cluster analysis was performed to optimize the hierarchical solution, using the initial seed points of the best cluster solution as derived from the hierarchical cluster solution in Step 1 (Gore, 2000). z -Scores for clustering variables represent the distances between the cluster means and the total sample standardized mean, in standard deviation units, can be interpreted as effect sizes. Analogous to Cohen's d (Cohen, 1988), .2 SD is a small effect, .5 SD is a medium or moderate effect, and .8 SD is a large effect. Between-cluster differences in ED symptoms were examined using a MANCOVA and Tukey HSD tests.

3. Results

3.1. Descriptive statistics and correlations

Univariate ANOVAs indicated that gender was significantly related to PS perfectionism [$F(1,458) = 10.54, p < .01, \eta^2 = .02$], restraint [$F(1,447) = 15.07, p < .001, \eta^2 = .03$], eating concerns [$F(1,446) = 11.14, p < .01, \eta^2 = .02$], weight concerns [$F(1,448) = 44.29, p < .001, \eta^2 = .09$], and shape concerns [$F(1,444) = 48.76, p < .001, \eta^2 = 1.00$]. Men reported higher levels of PS perfectionism compared to women, whereas females indicated higher levels of ED symptoms compared to men. Correlational analyses showed that adjusted BMI was significantly related to higher scores and all EDE-Q measures (r 's ranging between .16 and .30). Age was slightly but significantly related to higher scores on PS perfectionism ($r = .13, p < .01$), EC perfectionism ($r = .10, p < .05$), and impulsivity ($r = .11, p < .05$). In all main analyses we therefore controlled for the effects of gender, adjusted BMI, and age.

Means and standard deviations of the variables, along with correlations between all variables are displayed in Table 1. PS perfectionism and EC perfectionism were positively correlated. EC perfectionism, but not PS perfectionism, was positively correlated with impulsivity. Both perfectionism dimensions and impulsivity were positively related to the eating disorder symptoms.

Table 1
Means, standard deviations, and correlations of the study variables.

	1	2	3	4	5	6	7
1. PS perfectionism							
2. EC perfectionism	.71***						
3. Impulsivity	.06	.23***					
4. Restraint	.17***	.28***	.24***				
5. Eating concerns	.19***	.34***	.25***	.78***			
6. Weight concerns	.15**	.28***	.28***	.75***	.69***		
7. Shape concerns	.14**	.29***	.28***	.74***	.72***	.94***	
Mean	2.52	2.04	7.06	.65	.50	1.13	1.16
SD	.76	.70	3.56	1.06	.86	1.33	1.34
Range	[1.00; 4.76]	[1.00; 4.15]	[1.00; 17.00]	[0; 5.60]	[0; 5.00]	[0; 6.00]	[0; 6.00]

Note. $N = 460$. PS = personal standards; EC = evaluative concerns.

** $p < .01$.

*** $p < .001$ (2-tailed).

3.2. Identifying personality profiles by means of cluster analysis

In Step 1, we estimated cluster solutions with three to five clusters and we inspected the percentage of variance explained in each solution. One commonly used criterion is that the cluster solution should explain at least 50% of the variance in each of the defining variables (Milligan & Cooper, 1985). This was not the case for a three-cluster solution, which was not further considered.

In the second step, the cluster centers derived from Ward's method were used as the initial cluster centers for a non-hierarchical k -means clustering procedure. This procedure was applied to the four- and the five-cluster solutions. In each analysis, all participants were assigned to the most similar cluster on the basis of their Euclidian distance from the initial cluster centers. Subsequently, new cluster centers were computed and used as new initial cluster centers for the next step in an iterative procedure until the largest change in any cluster center was less than 2% of the minimum distance between the initial centers.

We examined the interpretability of the four- and five-cluster solutions by inspecting the z -scores of the clustering variables (i.e., perfectionism dimensions and impulsivity) within each of the clusters. The four-cluster solution consisted of adolescents scoring high on PS and EC perfectionism and high on impulsivity ($n = 93$; $z = .67$ and $z = .94$, $z = 1.17$, respectively), a cluster of adolescents scoring high on both PS and EC perfectionism and low on impulsivity ($n = 76$; $z = 1.13$ and $z = 1.01$, $z = -.53$, respectively), a cluster of adolescents scoring low on both PS and EC perfectionism and high on impulsivity ($n = 101$; $z = -.96$ and $z = -.77$, $z = .67$, respectively), and a cluster of adolescents scoring low on both PS and EC perfectionism and low on impulsivity ($n = 190$; $z = -.29$ and $z = -.46$, $z = -.75$, respectively). The five-cluster solution contained four similar clusters as found in the four-cluster solution. The additional fifth cluster consisted of a cluster of adolescents with low scores on EC perfectionism ($z = -.18$) and low on impulsivity ($z = -.54$) and almost zero on PS perfectionism ($z = .00$). This cluster was, although with more moderate scores, comparable to the cluster scoring low on all three variables and therefore the added value was rather small. Next, the explained variance of the four- and five-cluster solution was compared. The four-cluster solution explained .59% of the variance in PS perfectionism, .62% in EC perfectionism, and .67% in impulsivity. The respective explained variance for the five-cluster solution was .65%, .71%, and .69%.

We preferred the four-cluster solution over the five-cluster solution for two reasons. First, although the five-cluster solution explained more

variance in the clustering variables, the added value was rather small, such that the four-cluster solution was more parsimonious. Second, the four-cluster solution was superior in terms of interpretability of the cluster solutions. Indeed, the fifth cluster was not clearly interpretable and it was found that almost all participants who were allocated to the fifth cluster in the five-cluster solution were allocated in one and the same cluster in the four-cluster solution, again suggesting that the four-cluster solution is the most appropriate and parsimonious solution.

In the final four-cluster solution (see Fig. 1), 93 participants (20.2%) were classified in the combined perfectionism/impulsivity cluster, 76 participants (16.5%) were classified in the pure perfectionism cluster, 101 participants (22%) were classified in the pure impulsivity cluster, and 190 participants (41.3%) were classified in the resilient cluster. Differences in age were found [$F(3,455) = 5.04$, $p < .01$] between the clusters. Older participants were more likely to be classified in the combined perfectionism/impulsivity cluster and in the pure perfectionism cluster. No significant gender differences [$\chi^2(3) = 4.27$, $p > .05$] and differences in terms of adjusted BMI [$F(3,431) = .88$, $p > .05$] were found between the clusters.

3.3. Between-clusters differences in eating disorder symptoms

The MANCOVA with the EDE-Q scales as dependent variables revealed an overall significant effect of cluster membership [Wilks' $\lambda = .86$, $F(12,1161) = 5.61$, $p < .001$, $\eta^2 = .05$] (see Table 2). Each of the univariate ANOVAs was statistically significant and the effect sizes (η^2) of cluster membership ranged from .10 to .12.

As can be seen in Table 2, participants in the combined perfectionism/impulsivity cluster showed the highest scores on the eating disorder scales compared to the three other clusters. For restraint and eating concerns, the participants in the pure perfectionism cluster had higher scores compared to the pure impulsivity and resilient cluster. Weight and shape concerns were not significantly different for the participants in the combined perfectionism/impulsivity cluster and the pure perfectionism cluster. The participants in the pure perfectionism cluster had higher scores on all ED symptoms compared to those in the pure impulsivity cluster, but the clusters did not differ significantly from each other. Similarly, for all ED outcomes, the participants in the pure impulsivity cluster had higher scores on all ED symptoms compared to those in the resilient cluster, but the clusters did not differ significantly from each other³.

4. Discussion

The overarching goal of this study was to enhance our understanding of the personality dynamics involved in ED symptomatology. With this goal in mind, the aims of the present cluster analytic study were twofold. First, we aimed to examine naturally occurring combinations of perfectionism and impulsivity in adolescents using a cluster analytic

² This study also contained the assessment of the frequency of core ED behaviors, such as the occurrence of binge and purging behaviors over the previous 28 days. Results showed that there were cluster differences for vomiting behavior [$F(3,433) = 3.43$, $p < .05$, $\eta^2 = .02$], but not for objective binge eating [$F(3,433) = 2.00$, $p > .05$, $\eta^2 = .01$]. Although participants in the combined cluster reported the highest levels of vomiting behavior, their levels did only significantly differ from participants in the resilient cluster. In the latter cluster, no participants reported that they engaged in self-induced vomiting in the past 28 days. The lack of differential relations could be due to the low reliability scores for the behavioral measures of EDs as measured with the EDE-Q (e.g., Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004), and the low frequencies of these behaviors (mean score binge eating = 0.18; $SD = 1.02$; mean score vomiting behaviors = .07; $SD = 0.60$). The low reliability of these scales in combination with their truncated distribution may have limited the possibility to detect differences between the clusters.

³ Cluster analyses in which only EC perfectionism and impulsivity were used as clustering variables also revealed the same four cluster solution. Furthermore, the established clusters showed a similar pattern of relations with the ED symptoms.

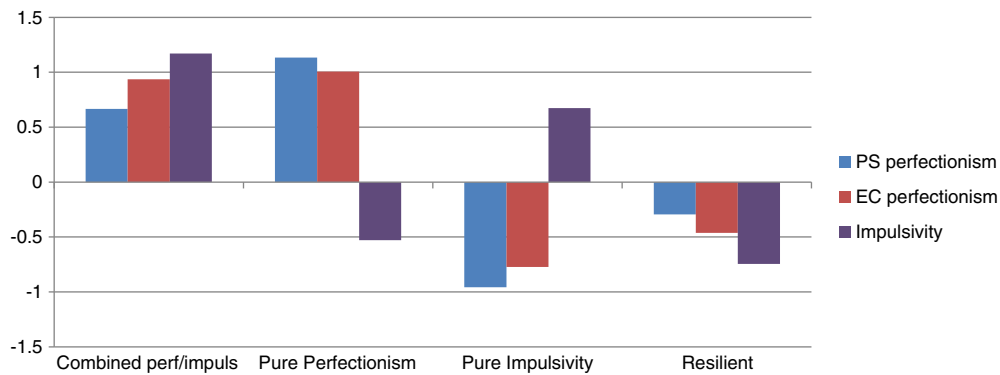


Fig. 1. z-Scores for personal standards (PS) perfectionism, evaluative concerns (EC) perfectionism, and impulsivity in the four-cluster solution.

approach. Second, we aimed to determine the relationship between these clusters and ED symptoms.

4.1. Personality subtypes

Four naturally occurring clusters were identified, reflecting different combinations of perfectionism and impulsivity: a resilient cluster, a pure perfectionism cluster, a pure impulsive cluster, and a combined perfectionism/impulsive cluster. These findings thus replicate three personality subtypes that have been identified in previous research (e.g., Claes et al., 2006, 2012; Thompson-Brenner, Eddy, Franko, et al., 2008; Thompson-Brenner, Eddy, Satir, et al., 2008). Yet, we also found evidence for a fourth cluster of adolescents which were characterized by both overcontrolling (i.e. perfectionistic) and undercontrolling (impulsive) features.

Although previous studies failed to detect this latter cluster, it is congruent with earlier clinical and empirical reports showing that patients with an ED are often characterized by both overcontrolling and undercontrolling traits (Claes et al., 2002). Indeed, empirical studies have shown that many patients with restrictive AN start to progressively develop episodes of loss of control and objective binges as the ED evolves (Peat et al., 2009). In line with this, studies show that individuals who engage in highly restrained eating often develop binge eating in the long run (e.g., Stice, Presnell, & Spangler, 2002). Although some authors have argued that binge eating may inevitably result from restrained eating because of physiological reasons (Herman & Polivy, 1980), at the same time, studies show that not all individuals who engage in restrained eating develop binge eating problems. Indeed, research findings suggest that some individuals

maintain healthy eating behaviors and weight after dieting (e.g., Stice, Presnell, Groesz, & Shaw, 2005).

Hence, psychological mechanisms, and personality dynamics in particular, may perhaps provide more insight in why some individuals struggle with restrained as well as binge eating and are at the same time concerned with weight and shape (Westen & Harnden-Fischer, 2001). In line with results from our study, the combination of two conflicting motivations (overcontrol vs. undercontrol) within an individual may put individuals at increased risk for psychopathology and eating disorder symptoms in particular. Specifically, many patients with restrictive AN or adolescents with a restrained eating pattern may develop binge eating and/or engage in purging behaviors because they may use a restrictive eating pattern in an attempt to control high levels of impulsivity. However, with time, this overcontrolling strategy might increasingly fail as their eating problems evolve. Although more research is needed to investigate this assumption, our findings that older participants were more likely to be classified in the combined cluster is congruent with the view that overcontrolling strategies might increasingly fail over time. Further, this view suggests that some adolescents with a restrained eating pattern or patients with restrictive AN are characterized by high impulsivity. In an attempt to compensate for what they consider “unwanted” (i.e., high levels of impulsivity), they may develop overcontrolled regulation strategies expressed in high levels of perfectionism. This assumption is congruent with findings that adolescents struggling with an ED typically have strong wishes to be thinner (e.g., Westerberg-Jacobson, Ghaderi, & Edlund, 2012), and value determination, impulse control, and rigid standards. Hence, perfectionism might thus be a coping strategy that is developed in an attempt to control high levels of impulsivity, which is considered to be unacceptable (Baumeister, Dale, & Sommer, 1998). When this defensive reaction or coping mechanism fails, the inhibition of impulsivity fails which may result in binge eating symptoms, or other impulsivity related symptoms and behavior such as self-harm, drug abuse and/or sexual promiscuity (Bresin, Carter, & Gordon, 2013; Dawe & Loxton, 2004). A reason why this coping mechanism fails might be due to reasons of ego-depletion. The notion of ego-depletion refers to the fact that one’s capacities for self-control are limited and can get depleted over time. Just as a muscle gets tired from exertion, acts of self-control cause impairments (i.e., ego depletion) in subsequent self-control (e.g., engaging in binge eating) (Baumeister, Vohs, & Tice, 2007). It might be possible for an individual to maintain restrictive eating patterns and an overcontrolled regulation for a certain period of time, but when these resources get depleted over time, one is more susceptible to binge eating (Baumeister, Muraven, & Tice, 2000).

Table 2

Eating disorder (EDE-Q) symptom scores by cluster.

Eating disorder symptoms	Cluster 1 (N = 93; 20.2%)	Cluster 3 (N = 76; 16.5%)	Cluster 2 (N = 101; 22.0%)	Cluster 4 (N = 190; 41.3%)	F-value	Eta ² (r ²)
	Combined perf/impuls	Pure perfectionism	Pure impulsivity	Resilient		
EDE-Q					F(3,442)	
Restraint	1.19 (1.54) _a	.79 (1.17) _b	.58 (.81) _{bc}	.33 (.64) _c	15.42***	.10
Eating concerns	1.03 (1.35) _a	.65 (.84) _b	.40 (.63) _{bc}	.24 (.46) _c	20.66***	.12
Weight concerns	1.77 (1.71) _a	1.36 (1.43) _{ab}	1.04 (1.20) _{bc}	.73 (.90) _c	15.14***	.09
Shape concerns	1.86 (1.70) _a	1.42 (1.46) _{ab}	1.11 (1.25) _{bc}	.73 (.91) _c	17.16***	.10

Note. Adolescents’ age, gender and adjusted Body Mass Index were controlled for. Means not sharing subscripts differ significantly, as indicated by post hoc contrasts (Tukey, $p < .05$).

*** $p < .001$.

4.2. Relation between personality subtypes and eating disorder symptoms

With regard to the association between the four clusters and ED symptoms, differential relations were found. The general pattern of

findings showed that highly perfectionistic and impulsive adolescents reported the highest level of ED symptoms, followed by the pure perfectionism cluster and the pure impulsivity cluster. In line with previous studies that did not obtain differences between participants in the undercontrolled and overcontrolled cluster (Claes et al., 2006), we found that the pure perfectionism cluster and the pure impulsivity cluster did not differ significantly from each other. Furthermore, although the pure perfectionism cluster reported significantly higher ED symptoms compared to the resilient cluster, the latter cluster did not significantly differ from the pure impulsivity cluster. Taken together, these findings suggest that the combination of both impulsivity and perfectionism within an individual is associated with the highest levels of eating disorder symptoms. As noted, this combined configuration suggests that these individuals are involved in an approach-avoidance conflict (Luyten & Blatt, 2011), and may have developed rigid and overcontrolled regulation strategies in an attempt to cope with high levels of impulsivity and as such fall prey to a vicious cycle in which overcontrolled and undercontrolled regulation strategies constantly conflict (Mansell, 2005). This dynamic might increase their vulnerability to develop ED symptoms, even more compared to individuals who are only characterized by either perfectionistic behaviors or either impulsive behaviors. This reasoning is in line with the findings of Wonderlich et al. (2005), who found that those patients with bulimia nervosa that were classified in the overcontrolled cluster reported most ED symptoms.

Furthermore, the pattern of findings of the relation between clusters and ED symptoms was fairly similar for all ED symptoms. It appears that adolescents in the pure perfectionistic subtype did not report higher levels of restraint symptoms or concerns about eating, weight and shape compared to those in the pure impulsive subtype. This is in line with the transdiagnostic model of eating disorders that argues that all eating disordered individuals have a strong desire to be thin, and are overly concerned about weight and appearance (Fairburn, Cooper, & Shafran, 2003). It is also in line with the finding of Claes et al. (2010) that undercontrolled individuals scored equally high on restraint compared to overcontrolled individuals.

Finally, it was found that PS and EC perfectionism co-varied with each other as they were clustered together in each of the four clusters, and thus did not differentially relate to ED symptoms. This finding is in line with studies showing that both perfectionism components are highly correlated at the between-person (e.g., Sherry et al., 2004) and the within-person level (Boone, Soenens, Thanasis, et al., 2012), and are both implicated in the development of ED pathology (Bardone-Cone et al., 2007; Boone et al., 2011). Although previous cluster-analytic studies (e.g., Boone et al., 2010; Sironic & Reeve, 2012) of perfectionism found that PS and EC perfectionism could be distinguished, this was not the case when the cluster procedure also included impulsivity. Possibly, because in this study impulsivity was added, the relation between both perfectionism components became more apparent, which could explain why both components systematically clustered together.

4.3. Study limitations, suggestions for future research, and clinical implications

Although it is important to investigate eating disorders symptoms in non-clinical populations, it would be interesting to replicate our findings in a clinical sample of patients with an ED or a sample of highly restrained eaters. Second, our study was cross-sectional in nature, thus we should be cautious with interpretations of the direction of effects. A longitudinal study in which the intra-individual stability of the clusters over time is examined could shed further light on the dynamics involved in the interplay between impulsivity and perfectionism. Such a design would allow investigating whether individuals shift from one cluster to another over time. For example, individuals from the pure perfectionism cluster are expected to shift to a combined perfectionism/impulsive cluster or a pure impulsive cluster if perfectionism is indeed a coping mechanism

against impulsive traits that progressively tends to fail over time. Third, given that both perfectionism (Bardone-Cone et al., 2007) and impulsivity (Bijttebier et al., 2009) are related to a diverse range of psychopathologies, such as depression and anxiety, it would be interesting for future research to investigate the dynamic interplay between perfectionism and impulsivity in relation to these psychopathologies.

Findings from this study call into question the utility of the DSM 5 classification which suggests a relatively neat distinction between eating disorder diagnoses and associated symptoms. Although our findings need to be replicated in a clinical sample, a classification based on personality prototypes would increase our understanding of the dynamics involved in ED symptomatology and the notably comorbidity and crossover among the various eating disorder categories (Luyten & Blatt, 2011; Thompson-Brenner, Eddy, Franko, et al., 2008). Indeed, previous studies have shown that personality styles explain additional variance above and beyond descriptive ED diagnoses (Thompson-Brenner, Eddy, Satir, et al., 2008). Furthermore, our findings show that prevention and intervention programs should focus on both impulsivity and perfectionism, and clinicians should pay attention to the dynamic interplay between them.

4.4. Summary

This study showed the added value of examining the interplay between perfectionism and impulsivity. It was found that adolescents with high levels of both perfectionism and impulsivity experience more severe eating disorder symptoms. This finding suggests that these adolescents might have developed overcontrolled regulation strategies, expressed in high levels of perfectionism, to control underlying feelings of impulsivity. Yet, over time these strategies might increasingly fail over time and are associated with high psychosocial costs in terms of higher levels of eating disorder symptoms.

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The first author LB is a research assistant at the Special Research Funds Belgium (BOF).

Contributors

Author contributions: LB designed and coordinated the study, coordinated the data collection, conducted literature searches, analyzed the data and drafted and finalized the manuscript.

LC conducted literature searches and helped in drafting and finalizing the manuscript.

PL helped in the interpretation of the data and in drafting and finalizing the manuscript.

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Conflict of interest

All other authors declare that they have no conflicts of interest.

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