Dancers have been found to be at risk of developing eating disorders (ED) (e.g., Benn and Walters, 2001; Ribeiro and Da Veiga, 2010; Ringham et al., 2006; Schluger, 2009). A recent systematic review and meta-analysis has shown dancers having three times higher risk of suffering from eating disorders, particularly anorexia nervosa and Eating Disorders Not Otherwise Specified (EDNOS), than non-dancers (Arcelus, Witcomb and Mitchell, 2014). The high levels of eating psychopathology found among dancers could point at the dance world (Schluger, 2009) or dancers personality (high levels of perfectionism and high levels of body dissatisfaction) as risk factors for the development of these conditions (Fairburn, Cooper, Doll and Welch, 1999; Pennniment and Egan, 2012; Sassoroli et al., 2011; Wade and Tiggemann, 2013).

Body dissatisfaction has also been associated to food restriction and dieting, depressed mood (Stice, Marti and Durant, 2011) and poor levels of self-esteem (Neumark-Sztainer et al., 2006; Stice, 1997) all known to be factors associated to the development of eating disorders. The idealisation of thinness within the dance world has been found to promote body dissatisfaction among dancers and eating disorders as a result (Heiland, Murray and Edley, 2008; Stice and Whitenton, 2002) possibly influenced by the high levels of depression (38%) (Marchant-Haycox and Wilson, 1992), anxiety (Carr and Wyon, 2003), including performance anxiety (Hanrahan, 1996; Kobori, Yoshie, Kudo and Ohtsuki, 2011) and body dissatisfaction identified among dancers (Cumming and Duda, 2012; Paredes, Nesser and Gonzalez, 2011).

Another personality characteristic known to be more prevalent in ED (Borda et al., 2011) and commonly found in dancers (e.g., Goodwin, Arcelus et al., 2014; Cumming and Duda, 2012; Nordin-Bates, Cumming, Aways and Sharp, 2011; Thomas, Keel and Heatherton, 2005) is perfectionism. Perfectionism has been described as a multi-dimensional construct by several authors (Frost, Marten, Lahart and Rosenblate, 1990; Hill et al, 2004). Some of the perfectionism elements associated to eating disorders include Concern over Mistakes (CM) and Personal Standards (PS) as described by Frost et al. (1990), and Conscientious Perfectionism (high standards) (CP) and Self-Evaluative Perfectionism (SP) (self-criticism) as described by Hill et al. (2004). Those dimensions are considered to be key constructs within perfectionism (e.g., Nordin-Bates et al., 2011). PS (which is similar to CP) is an internal motivation to set and strive for achieving high goals (Gaudreau and Thompson, 2010) and it has also been considered as a desire to succeed and reach challenging goals (Nordin-Bates et al., 2011). In contrast SP (similar to CM) consists of perceived parental pressure, rumination, need for approval and concern over mistakes (Gaudreau and Thompson, 2010). Some authors have described PS and CP as helpful aspect of perfectionism (e.g., Fiorese, Andrade, and López, 2013), while CM and SP as unhelpful or debilitating one (e.g., Stoeber and Otto, 2006).

According to a maintenance model for ED, debilitating perfectionism has a direct association with core ED psychopathology in individuals with a diagnosis of eating disorders (Tasca, Presniak, Demidenko et al., 2011). Additionally,
the literature has found a high association between CM and ED (e.g., Bulik, Tozzi, Anderson, Mazzeo et al., 2003; Wade and Tiggemann, 2013), as well as ED with other co-morbid symptoms such as depressive (Borda-Más, Torres-Pérez and del Río-Sánchez, 2008; Jain and Sudhir, 2010; Toro et al, 2009), and anxiety related psychopathology (Heimberg, Frost, Holt, Mattia and Faccenda, 1996; Solano and Cano, 2013). Goodwin et al., (2014) investigated the role of CP (high standards), in 254 female ballet dancers. They found that SP and CP predicted eating psychopathology. However, the relationship between CP and ED was fully mediated by SP.

Although within the dance world, perfectionism has been found to be associated with eating disorders (Goodwin et al., 2014), it does feel important to explore this association in more details and within different dance styles as well as to investigate the pathways involved in this relationship. With this in mind, this study has two aims. Firstly to replicate Goodwin et al. (2014) study in a different population of dancers by exploring the association between the two main elements of perfectionism (CM and PS) with variables known to be risk factors for the development of eating disorders (i.e., negative mood, performance anxiety, body dissatisfaction and diet restriction). Secondly to extent this study and to assess the role of some of the above variables in mediating the relationship between perfectionism and eating disorders risk factors.

Based on the above literature, we have developed a risk model for dancers shown in Figure 1.

We predict that there will be two different paths: a “positive” one based on healthy perfectionism and dance aesthetic standard (PS), and a “negative” path based on CM, mediated by body dissatisfaction. We predict that depressive symptoms will also relate to the two components, positively with concern over mistakes and negatively with personal standards (Douilliez and Lefèvre, 2011; Jain and Sudhir, 2010; Minarik and Ahrens, 1996). Finally, it is expected that both CM and body dissatisfaction will influence performance anxiety (Juster, Heimberg, Frost, Holt, Mattia and Faccenda, 1996) and performance anxiety will be associated to CM as it identified in previous study (Kobori, Yoshie, Kudo and Ohtsuki, 2011).

**Method**

**Participants and procedure**

Two hundred and eighty one participants were recruited via their school teachers from two professional dance conservatories in Spain. Inclusion criteria were: female and aged 12-20. Participation was voluntary. In under age participants, informed consent was also obtained from their parents. Each participant completed a set of questionnaires assessing perfectionism, performance anxiety, body dissatisfaction, eating attitudes, and symptoms of depression. Participants had their height and weight measured. The approximate time that students spent filling the questionnaire was 30 minutes. The study obtained ethical approval from the organization.

**Data analysis**

Before creating an estimated model, a correlation analysis was performed between variables to explore and eliminate, if necessary, independent variables whose correlation was greater than .7 in absolute value, thus eliminating possible problems of multicollinearity. The presence of variables with low correlations with the dependent variables ($r < .2$) were analysed also.

The SPPS 21.0 program was used for the descriptive statistics. Structural equation model testing was performed using EQS 6.1, which uses the maximum likelihood estimation (ML) to examine the fit of models of their respective observed variance-

![Figure 1. Theoretical model proposed about the influence of types of perfectionism over performance cognitive anxiety, body dissatisfaction, depression and food restriction.](image)
covariance matrices. We have to note that first we tried to estimate a model in which bulimia was another endogenous variable, but the indices do not fit. Thus, we decide to choose food restriction, because of the higher correlations with the rest of variables.

Since the requirement that data have a multivariate normal distribution was not satisfied (Mardia’s coefficient = 6.15; value higher than 5.00; Bentler, 2005), robust estimators were used. Consistent with Hoyle and Panter’s (1995) recommendations, the overall goodness of fit model overall was assessed using a set of global fit indices: the Satorra-Bentler robust \( \chi^2 \) test statistics (S-ratios < 3 indicate reasonable fitting models), the robust comparative fit index (CFI, with values .90 or over indicating better fitting models), and the root-mean-square error of approximation (RMSEA, with values of .05 or less indicating close fit).

To perform the Path analysis, the “Model Development Strategy” (Jöreskog and Sörbom, 1993) was used based on theoretical predictions from the literature (see Figure 1). This model was then successively modified based on the significance of estimated coefficients. Any direct effects that were not significant were eliminated.

**Instruments**

Perfectionism. Two subscales from the validated Multidimensional Perfectionism Scale by Frost were employed (Frost et al., 1990; Spanish adaptation done by Carrasco, Belloch and Perpiñá (2010). PS was measured by the scale of personal standards and the scale of concern over mistakes (reference?). Responses to each item were recorded on a Likert-type scale ranging from: 1 (strongly disagree) to 5 (strongly agree). In this sample, the reliability was satisfactory for both subscales (\( \alpha \) for CM = .90; \( \alpha \) for PS = .83).

Performance anxiety. This subscale consists of 5 items from the Revised Competitive State Anxiety Inventory-2 (CSAI-2R; Cox, Martens and Russell, 2003; translated into Spanish by Andrade, Rio and Arce, 2007). Some items were adapted to a more dance specific vocabulary (instead of play, dance or sport). The reliability of the subscale in this study was satisfactory (\( \alpha \) = .82).

Depression symptomatology. Beck Depression Inventory-II (BDI-II; Beck, Steer and Brown, 1996; Spanish adaptation by Sanz, Vázquez and Navarro, 2003) was administered. It has 21 items (range from 0 to 63 scores). In this sample, the index of reliability was acceptable (\( \alpha = .88 \)).

Body Dissatisfaction. Body Shape Questionnaire (BSQ) by Cooper, Taylor, Cooper and Fairburn (1987) and adapted to Spanish population by Raich, Mora, Soler, Avila, Clos and Zapater (1996). It is a 34-item questionnaire on a likert scale from 1 to 6. The index of reliability was satisfactory in our sample (\( \alpha = .98 \)).

Diet. The Diet subscale (13 items) belongs to the Eating Attitude Test (EAT-26; Garner, Olmsted, Bohr and Garfinkel, 1982; Spanish adaptation by Gandarillas, Zorrilla, Muñoz et al., 2002). In this sample, the index of reliability was acceptable (\( \alpha = .82 \)).

**Results**

Preliminary descriptive analysis

Four hundred twenty students were invited to take part in the present study and 369 accepted to participate. Finally, 281 participants were included in the present study as the inclusion criteria was female dancers ranged from 12 to 20 years old (\( M = 15.28; SD = 2.32 \)). The approximate mean age of dance experience was 7 years. Out of the 281 dancers 93 (33.1%) were Ballet, 22 (7.83%) Contemporary, 86 (30.6%) Flamenco and 80 (28.47%) Spanish folk dancers (regional dance similar to flamenco but with similar features to ballet for example the half pointe ballet shoes). The mean body mass index was above 20 (\( M = 20.27; SD = 3.10 \)) and varied according to the dance type; Ballet (\( M = 19.54; SD = 1.81 \)), Contemporary (\( M = 18.73; SD = 1.99 \)), Flamenco (\( M = 21.41; SD = 2.87 \)), Spanish folk dancers (\( M = 20.80; SD = 2.66 \)).

Table 1 displays the means, standards deviations and correlations between the contributing variables to the model. As shown, all correlations were positive and statistically significant. Concern over mistakes was significantly related to personal standards, body dissatisfaction, and depression. Correlations between body dissatisfaction, depression, and food restriction were also high.

<table>
<thead>
<tr>
<th></th>
<th>( M )</th>
<th>( SD )</th>
<th>Diet</th>
<th>CM</th>
<th>PS</th>
<th>BD</th>
<th>DE</th>
<th>CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet</td>
<td>5.82</td>
<td>6.31</td>
<td>1</td>
<td>.58**</td>
<td>.46**</td>
<td>.81**</td>
<td>.56**</td>
<td>.35**</td>
</tr>
<tr>
<td>Bulimia</td>
<td>.90</td>
<td>1.97</td>
<td>.55**</td>
<td>.44**</td>
<td>.33**</td>
<td>.47**</td>
<td>.41**</td>
<td>.20**</td>
</tr>
<tr>
<td>Control oral</td>
<td>3.16</td>
<td>2.98</td>
<td>.22**</td>
<td>.22**</td>
<td>.56**</td>
<td>.09</td>
<td>.23**</td>
<td>.13*</td>
</tr>
<tr>
<td>CM</td>
<td>2.14</td>
<td>.83</td>
<td>.58**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>2.93</td>
<td>.88</td>
<td>.46**</td>
<td>.67**</td>
<td>1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>BD</td>
<td>2.39</td>
<td>1.23</td>
<td>.81**</td>
<td>.64**</td>
<td>.43**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE</td>
<td>7.52</td>
<td>7.09</td>
<td>.56**</td>
<td>.61**</td>
<td>.45**</td>
<td>.62**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CA</td>
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<td>.82</td>
<td>.35**</td>
<td>.46**</td>
<td>.31**</td>
<td>.49**</td>
<td>.48**</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. CM: Concern over mistakes; PS: Personal standards; BD: Body dissatisfaction; DE: Depression; CA: Performance cognitive anxiety

\* *p < .01 * p < .05

Table 1. Descriptive statistics and correlations between variables (\( N = 281 \)).
Additionally, large amounts of variance were accounted for by the model for food restriction (.67), body dissatisfaction (.41), depression (.48) and performance cognitive anxiety (.28). The majority of the proposed relationships in the theoretical model are confirmed in the estimated model (see Figure 2). Two direct relationships that were not found to be significant ($p \geq .05; -2 \leq t \leq 2$) were eliminated from the proposed model.

As expected, CM was found to be directly, and positively correlated to: performance cognitive anxiety ($t = 3.56$), body dissatisfaction ($t = 4.86$); but there was no direct correlation with food restriction ($p > .05; 2 \leq t \leq 2$). Indirectly, CM was found to affect depression through three pathways: through performance cognitive anxiety ($r = .04$), through body dissatisfaction ($r = .22$) and through the combination of those two variables ($r = .04$). CM had other indirect effects both on diet, ($r = .48$) and on performance cognitive anxiety ($r = .21$), through body dissatisfaction. In contrast, PS only had a direct effect on food restriction ($t = 3.45$).

Performance cognitive anxiety was found to be directly correlated to levels of depression ($t = 3.44$). In respect to body dissatisfaction, it directly affects performance cognitive anxiety ($t = 4.81$), diet ($t = 17.17$) and depression ($t = 5.13$); indirectly, it influences to depression, though performance cognitive anxiety ($r = .06$).

With respect to the statistical significance of the direct effects, note that they all exhibited a high level of significance ($p < .05; 2 \geq t \geq 2$). Similarly, the results highlight the significant role of CM versus PS, limiting the effect of the latter type of perfectionism to dietary behaviors. We can verify that for almost all the endogenous variables, the most influential exogenous variable would be concern over mistakes.

### Discussion

The aim of the current study was to examine the association between the two main elements of perfectionism (CM and PS) with variables known to be risk factors for the development of an eating disorder in the population of dance students and to investigate the pathways for this association using structural equation modelling.

We developed a risk model for dancers based on the literature, (shown in Figure 1) and tested it with data from a large sample of Spanish dance students using structural equation modelling.
Evaluaciones gráficas en el modelo. Doscientas ocho bailarinas (M = 15.28, DEedad = 2.32) de dos conservatorios de danza españoles participaron en este estudio. Con apoyo en la literatura, evaluamos el

INFLUENCIA DEL PERFECCIONISMO EN VARIABLES RELACIONADAS CON TRASTORNOS ALIMENTARIOS EN ESTUDIANTES DE DANZA
PALABRAS CLAVE: Preocupación ante los Errores, Exigencias Personales, Insatisfacción Corporal, Ansiedad de Rendimiento, Depresión, Dieta, Perfeccionismo Debilitador.
RESUMEN: El objetivo del presente estudio fue examinar la influencia de los dos elementos principales del perfeccionismo (CM, preocupación ante los errores y PS, exigencias personales) ante los factores de riesgo de los trastornos alimentarios en bailarinas. Con apoyo en la literatura, evaluamos el rol de CM y de PS sobre la dieta y el estado de ánimo, y la función de la ansiedad de rendimiento y la insatisfacción corporal como los principales mediadores en el modelo. Doscientas ochenta bailarinas (M = 15.28, DEedad = 2.32) de dos conservatorios de danza españoles participaron en este estudio. Gracias a modelos estructurales, los resultados confirman la influencia de PS y de CM en la dieta, sin embargo la vinculación entre dieta, insatisfacción corporal, estado de ánimo y la ansiedad de rendimiento sólo se produce a partir del CM que es la vía del perfeccionismo debilitador. En conclusión, la presencia de CM puede ser la clave para diferenciar entre bailarines con mayor riesgo para desarrollar trastornos alimentarios debido a su asociación con variables tradicionalmente relacionadas con estos.
INFLUÊNCIA DO PERFECTIONISMO NAS VARIÁVEIS ASSOCIADAS AOS TRANSTORNOS ALIMENTARES EM ESTUDANTES DE DANÇA

PALAVRAS-CHAVE: Preocupação face aos erros, Exigências pessoais, Insatisfação corporal, Ansiedade face ao rendimento, Depressão, Dieta, Perfeccionismo debilitador.

RESUMO: O objectivo do presente estudo foi analisar a influência dos dois princípios elementos do perfeccionismo (CM, preocupação face aos erros e PS, exigências pessoais) face aos factores de risco dos transtornos alimentares em bailarinas. Com suporte na literatura, avaliamos o papel de CM e PS sobre a dieta e o estado de humor, e a função da ansiedade relativa ao rendimento e a insatisfação corporal como os principais mediadores do modelo. Participaram no estudo duzentas e oito bailarinas (M = 15,28, DP = 2,32) de dois conservatórios de dança espanhóis. Através de modelos estruturais, os resultados confirmam a influência de PS e de CM na dieta, contudo a relação entre dieta, insatisfação corporal, estado de humor e ansiedade relativa ao rendimento apenas é predita através de CM que é a via do perfeccionismo debilitador. Em conclusão, a presença de CM pode ser a chave para diferenciar os bailarinos com maior risco de desenvolverem transtornos alimentares devido à sua associação com variáveis tradicionalmente relacionadas com estes.

References


Influence of perfectionism on variables associated to eating disorders in dance students


