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Self-reported symptoms of eating disorders amongst university dance students

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Abstract

Eating disturbances are common amongst female athletes, especially those participating in dance. We investigated the prevalence and correlates of eating disorder risk symptoms amongst female student dancers. Fifty-eight female university dancers (N=58) completed a self-report measure of eating disorders and correlates, along with factors hypothesised to be associated with the concept, including perfectionism and anxiety. Height and body mass were measured to calculate body mass index (BMI). Results indicated that psychological variables correlated positively with eating disorder risk, and that BMI and ineffectiveness were the subset of factors best associated with eating disorder risk for these dancers. Results indicate that the screening of dancers using a self-report measure can help to identify dancers suffering from poor psychological health of which one characteristic is disordered eating. Given the implications of well-being and performance, we suggest that future research should investigate factors associated with eating disorders and that course administrators and health practitioners consider these factors when facilitating and optimising the mental health and performance of dancers.

Keywords: Eating disorder risk, university dancers, psychological well-being.

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Introduction

Eating disorders are a significant threat to the health of individuals and research efforts to identify at-risk groups are worthwhile. Eating disorders can be defined as a pattern of disordered eating behaviours that negatively affects the physical and mental health of individuals (American Psychiatric Association [APA], 2013). Individuals with a disordered eating behaviour can develop a full-blown eating disorder and are more likely to be at risk for eating disorder psychopathology, such as anxiety and low self-esteem (APA, 2013; Rikani et al., 2013). A growing number of studies have identified risk factors associated with the development of eating disorders. These include psychological, biological and also socio-cultural

factors that provide the context in which these disorders can unfold (Eagles, Johnston, Hunter, Lobban & Millar, 1995). It is generally agreed that these factors are complex and no single factor is prevalent (Rikani et al., 2013).

Leanness is believed to provide an advantage in a number of different activities, such as boxing (Hall & Lane, 2001), running (Martinsen & Sundgot-Borgen, 2013) and rowing (Terry, Lane & Warren, 1999). Sports such as these include mass-classification categories and in boxing and rowing participants also attempt to improve their power-to-weight ratio. A second area of activities is aesthetic sports such as figure skating (Monsma & Malina, 2004) and gymnastics (De Bruin, Bakker & Oudejans, 2009), in which body shape is an integral aspect of assessment in competition. The prevalence of eating disorders in dancers is well recognised and documented in literature (Ringham et al., 2006; Arcelus, Witcomb & Mitchell, 2014; Arcelus, Gracia-Dantas, Sanchez-Martin & Del Rio, 2015) and research studies have typically reported higher rates of diagnosable eating disorders and related symptoms among dancers (Hamilton, Brooks-Gunn & Warren, 1985).

A recent systematic review and meta-analysis (Arcelus et al., 2014) revealed that female dancers (Age: M = 19.5 years, SD = 5.76 years) have a three times higher risk of suffering from eating disorders than reported on the general population. They reported that dancers particularly suffer more from anorexia nervosa and Eating Disorders Not Otherwise Specified (EDNOS) than non-dancers (Arcelus et al., 2014). Le Grange, Tibbs and Noakes (1994) reported a prevalence of 4.1% of anorexia nervosa and 8.2% partial syndrome cases of anorexia nervosa in a group of South African female university ballet dancers (Age: M = 18.96, SD = 1.9). The majority of studies reported high incidences of eating disorders in adolescent female dancers who participate in ballet (Reel, SooHoo, Jamieson & Gill, 2005; Thomas, Keel & Heatherton, 2005; Ravaldi, Vannacci, Bolognesi, Mancini, Faravelli & Ricca, 2006; Nordin-Bates, Walker & Redding, 2011), because eating disorders commonly emerge during adolescence, especially in females, and ballet is known to have an inflexible nature and a strong focus on appearance compared to other dance genres (Morris, 2003; Jackson, 2005).

A review of the literature indicates that few studies have looked at the risk of eating disorders and associated psychological factors with regard to university dancers participating in different genres (Dotti, Fioravanti, Ballotta, Tozzi, Cannella & Lazzari, 2002; Estanol, Shepherd & MacDonald, 2013; Goodwin, Arcelus, Marshall, Wicks & Meyer, 2014). Recent research indicated that South African female student dancers are at risk for disordered eating behaviour, which can result in serious health implications (Robbeson, Kruger & Wright, 2015). Robbeson et al. (2015) found that dancers have a negative energy balance and experience chronic dieting. Whilst such behaviour links to feelings of fatigue, the culture, norms and complexity of the art (Wyon, Abt, Redding & Head, 2004; Wyon, 2010;

Twitchett, Angioi, Koutedakis & Wyon, 2010; Molnar & Karin, 2017) induce the development of maladaptive psychological dispositions (Carr & Wyon, 2003) and is inexorably linked to the development of eating disorder symptomatology (Penniment & Egan, 2012; Nordin-Bates, Cumming, Aways & Sharp, 2011). Therefore, suggestions made by Robbeson et al. (2015) to alter diet or activity, are not likely to be implemented. This prompted the need to not only investigate disordered eating behaviour, pathogenic weight control methods and energy status (Le Grange et al., 1994; Robbeson et al., 2015) but also to understand the specific association of psychological variables with eating disorder risk in university dancers and those in South Africa.

The prevalence of eating disorders amongst dancers results from a combination of factors. Socio cultural factors such as cultural demands (Hamilton & Robson, 2006; Molnar & Karin, 2017) high technical standards, pursuit for excellence, intense training schedules, subjective judgments, criticism, and authority control (Carr & Wyon, 2003; Wyon, 2010; Twitchett et al., 2010; Grove, Main & Sharp, 2013) create disempowering environments and increase negative affect of dancers (Hancox, Quested, Ntoumanis & Duda, 2017). In addition, psychological and personality factors associated with eating disorders, such as perfectionism, low self-esteem and anxiety, appear to be prevalent in dancers (Thomas et al., 2005; Estanol et al., 2013). As dancers' exhibit psychopathology and characteristics similar to those of individuals diagnosed with eating disorders, further research is needed to understand these factors in greater detail (Le Grange et al., 1994; Anshel, 2004; Ringham et al., 2006).

Perfectionism is perhaps the most common and recognised phenomenon in the dance world and has been found to constitute a risk factor in the development of eating disorders (Bardone-Cone et al., 2007). Frost, Marten, Lahart and Rosenblate (1990) describe perfectionism as a multidimensional construct involving the setting of high personal standards, which can be adaptive or maladaptive (overly critical evaluative tendencies) (Frost et al., 1990; Frost & Henderson, 1991). The maladaptive side of perfectionism has been linked to disturbed eating in sport (Haase, Prapavessis & Owens, 1999) and in adolescent and professional dancers (Nordin-Bates et al., 2011; Penniment & Egan, 2012; Padham & Imogen, 2014; Arcelus et al., 2015). Penniment and Egan (2012) found that the maladaptive perfectionism tendencies of non-elite and elite female dancers between the ages of eighteen and thirty partially derive from learning about the benefits of food restriction in the dance environment. Furthermore, Nordin-Bates et al. (2011) reported that adolescent female dancers with perfectionistic tendencies who ruminate, are concerned over mistakes, more in need of approval and more at risk for eating disorder symptomatology.

Trait anxiety are an important personality variable in the prevalence of eating disorders. Studies in sport (Vardar, Vardar & Kurt, 2007) suggested that greater

levels of trait anxiety are associated with a risk for developing eating disorders. Trait anxiety can be described as a relatively enduring disposition to experience stress and worry (Spielberger & Sydeman, 1994) and is prevalent amongst dancers and may be related to the pursuit of important goals (Barrell & Terry, 2003; Lench, Levine & Roe, 2010). However, few studies have investigated relationships between anxiety and eating disorders amongst university dancers (Estanol et al., 2013) and South African dancers. Recently, Estanol and colleagues (2013) reported that negative affect (depression and trait anxiety) and pressure to have a lean physique were positively associated with eating disorder symptoms amongst university dancers.

Subscales from the Eating Disorder Inventory, such as interoceptive deficits and interpersonal alienation, are linked to eating disorders in the general population (Garner, Olmsted & Polivy, 1984). However, these subscales have not been well researched in dance. Anshel (2004) found that an impairment of attachment in relationships and an inability to accurately recognise and respond to emotional states were correlated with eating disorder risk in adolescent dancers. In addition, self-esteem was reported to have a negative association with eating disorder risk in athletes and dancers (Berry & Howe, 2000; Bettle, Bettle, Neumarker & Neumarker, 2001; Nordin-Bates, Walker & Redding, 2011; Goodwin et al., 2014), and associated with ineffectiveness in adolescent dancers (Anshel, 2004). Garner and colleagues (1984; 2004) describe ineffectiveness as a composite of low self-esteem and personal alienation, which incorporates self-assessments of low self-understanding and deficits in personal identity. It is known that dancers often define themselves solely in terms of their dance participation (Mainwaring, Krasnow & Kerr, 2001; Rip, Fortin & Vallerant, 2006) to the extent where a sense of self-understanding and self-worth becomes contingent to their achievements and a lean physique and had been linked with risk in developing eating disorders (Stirling, Cruz & Kerr, 2011; Padham & Imogen, 2014). It is, however, unclear whether these specific psychological variables are associated with eating disorder risks in university dancers and dancers in South Africa.

In addition to psychological variables, significant relationships were found between physical factors, such as BMI and restrained eating, in university-level athletes (Berry & Howe, 2000; Hoerr, Bokram, Lago, Bivins & Keast, 2002). For instance, Rouxveix and colleagues (2007) indicated that body mass satisfaction and BMI contributed to 54.6% and 17% of the variance respectively in the prediction of disordered eating amongst female judo athletes. Recent research findings reported that professional dancers have a higher BMI than adolescent student dancers partially due to increases in nutritional knowledge with age (Wyon, Hutchings, Wells & Nevill, 2014). However, associations between BMI and eating disorder risk have not been well researched in university student dancers. Data are scarce regarding the association of eating disorder risk and psychological variables specifically in South African athletes and to the best of

our knowledge have not been studied in South African university dancers. The health implications of eating disorders prioritise the importance of using research to inform practice and therefore, focusing on South African dancers represents an important delimitation. The purpose of the present study was to investigate associations between eating disorder risk, psychological risk factors and BMI in order to assist and promote the mental health and performance of South African student dancers. To accomplish the aims, a sample of female university dancers participating in an intensive and competitive university dance programme was studied. Given the positive relationships that exist between eating disorder risk and individual risk factors found in previous studies (Nordin-Bates et al., 2011), it was hypothesised that significant relationships would be found between eating disorder risk, psychological self-assessments (perfectionism, trait anxiety, interoceptive deficits, interpersonal alienation and ineffectiveness) and BMI.

Methods

Participants and procedures

The study formed part of a larger cross-sectional study investigating components of the female athlete triad in female university student athletes and were approved by the ethics committee of the first author's institution, the North-West University. The present study followed a correlational design (Creswell, 2013). Dancers were recruited through non-probability purposive sampling (Creswell, 2013) meaning that the characteristics from a specific group were sought and sampled. Inclusion criteria for selection were university dancers with a specific level of dance achievement, fulltime enrolment in a competitive dance course, at least four to six hours of dance per day, being female and proficiency in English language. The available sample was limited due to the level of dance achievement and the voluntary nature of inclusion. Fifty eight (N=58) dancers from a total of approximately one hundred and thirty university dancers participated in the study aged between 18 and 22 (Age: $M = 20$ years, $SD = 2.03$ years). Five male dancers were excluded from the study because of the focus on female dancers. Dancers were recruited from two universities in South Africa, Tshwane University of Technology, Department of Performing Arts and the University of Cape Town, School of Dance and were mainly studying classical ballet or contemporary dance. They also participated in genres such as African, tap, jazz and modern dance, as part of their training course. At the time of data collection, the dancers participated in classes and rehearsals and danced between five and six hours per day, six days per week. All of the participants were either African or Caucasian and speak English, Afrikaans or Tswana. English language proficiency was an inclusion criterion and therefore questionnaires were present in English.

The first author liaised with the directors of the dance departments to obtain permission to conduct the research. Prior to data collection, prospective

participants were invited to participate and received an information letter explaining the voluntary nature, confidentiality and purpose of the study (Jefford & Moore, 2008). Those who agreed to participate, were requested to provide informed consent before completing demographic, psychological and eating disorder questionnaires. All of the contact numbers of the researchers and a helpline were included in order to accommodate any questions, inquiries or problems regarding eating disturbances experienced by the participants. Contact numbers and a helpline were included due to the sensitive nature of the study and the possibility of participants experiencing distress.

Measurements

BMI: The mass of each participant was measured with an electronic scale (PS Upright Weigh-less Scale, SCALES 2000) and their height was measured with a stadiometer to the nearest decimal point. BMI was calculated with the following equation: Mass (kg)/height (m^2).

Multi-dimensional Perfectionism Scale (MPS): The Frost et al. (1990) Multidimensional Perfectionism Scale provides six subscales for a multidimensional assessment of perfectionism: *Concern over mistakes, Personal standards, Parental expectations, Parental criticism, Doubts about actions*, and *Organisation*. The scale consists of 35 items rated on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Maladaptive perfectionism tends to be characterised by high scores on the *Doubt about actions* and the *Concern about mistakes* subscales (Frost et al., 1990). Adaptive perfectionism is characterised by high scores on the *Parental expectations* and *Personal standards* subscales (Frost et al., 1990). Favourable reliability and validity have been demonstrated for the MPS (Frost et al., 1990). An alpha coefficient above .70 is generally considered an acceptable level (Tabachnick & Fidell, 1996). Alpha coefficients in the present study were acceptable for: *Concern over mistakes* = 0.87; *Personal standards* = 0.82; *Parental expectations* = 0.86; *Parental criticism* = 0.82; and *Organisation* = 0.86. The subscale *Doubts about actions* was marginally lower (alpha = 0.68).

State-Trait Anxiety Inventory (STAI): The trait anxiety scale from the State-Trait Anxiety Inventory (Spielberger & Snydeman, 1994) was used to measure anxiety. The participants rated how often they generally experienced each of the ten items (e.g., "I feel secure") on a scale ranging from 1 (almost never) to 4 (almost always). The STAI demonstrated acceptable reliability and validity in student populations (Spielberger & Snydeman, 1994). The Cronbach alpha coefficient of the STAI for the current study population was 0.91.

Eating Disorder Inventory-3 (EDI-3): The EDI-3 (Garner, 2004) is a revision of the original EDI (Garner et al., 1984). Three subscales, specifically *Drive for thinness*, *Bulimia* and *Body dissatisfaction*, assess and predict the development of

eating disorders and were used in previous research as selection criteria when exploring eating disorder risk in individuals. The EDI-3 is an appropriate instrument for the screening of eating disorder risks in non-clinical settings. The other psychological EDI-3 subscales included in this study were *Ineffectiveness* (low self-esteem and personal alienation); *Interpersonal alienation*; and *Interoceptive deficits*. The psychometric properties of the EDI-3 show good reliability and validity (Clausen, Rosenvinge & Friborg, 2011) and in South African samples as well (Wassenaar, Le Grange, Winship & Lachenicht, 2000). The cut-off scores of the EDI-3 subscales *Bulimia*, *Body dissatisfaction* and *Drive for thinness* are set at ≥9, ≥5, ≥14, and ≥15, respectively. Participants scoring above the previously mentioned EDI-3 scores are at an increased risk for eating disorder behaviours. Cronbach alpha coefficients for the current study were: *Drive for thinness* = 0.90; *Bulimia* = 0.76; *Body dissatisfaction* = 0.91; *Low self-esteem* = 0.83; *Personal alienation* = 0.77; *Interpersonal alienation* = 0.66; *Interoceptive deficits* = 0.83; and *Ineffectiveness* = 0.87. An acknowledged limitation of measures in the present study was that two subscales demonstrated alpha coefficients marginally below the 0.70 criterion. There are different reports about the acceptable values of alpha (DeVellis, 2012). A commonly accepted rule is that a Cronbach's alpha lower than 0.70 is questionable (DeVellis, 2012). However, if the number of test items is too small, such as in the case of the above-mentioned scales, it will violate the assumption of tau-equivalence and will underestimate reliability (DeVellis, 2012). More items increase the reliability of a test regardless whether the test is homogenous or not (Nunnally & Bernstein, 1994; Tabachnick & Fidell, 2007).

Data analysis

The data were firstly analysed for normality checks with the option to use Spearman's correlation if the data were not normally distributed. A normal distribution indicated that Pearson correlation analysis was an appropriate method to assess relationships between eating disorder risk, psychological variables and BMI (Tabachnick & Fidell, 2007). Multiple regressions were used to test the extent to which eating disorder scores can be explained by psychological and mass-related variables when analysed collectively. We followed a correlational design and therefore investigated associations between variables rather than attempting to manipulate one variable and predict changes in the second. It should be noted that there is not a non-parametric multivariate regression option available (Tabachnick & Fidell, 2007). The alpha level for all tests was set at $p \leq 0.05$.

Results

Descriptive statistics

The means and standard deviations of demographic variables, age, height, mass, BMI and all psychological variables, were calculated (Table 1).

Table 1: Descriptive statistics for age, height, weight, BMI and all psychological variables (N=58)

Variable	Mean	SD
Age	19.9	2.0
Height	1.62	6.9
Mass	56.1	0.1
BMI	21.4	2.3
Risk for eating disorders	33.3	22.5
Total perfectionism	3.14	0.56
Concern over mistakes	2.7	0.84
Doubts about actions	2.9	0.83
Personal standards	3.7	0.71
Parental expectations	3.1	1.03
Ineffectiveness	13.2	9.3
Interpersonal alienation	9.1	4.5
Interoceptive deficits	8.8	5.3
Trait anxiety	2.3	0.51

Note. SD = Standard deviation

Thereafter, the descriptive statistics of ethnicity and genre (ballet and contemporary) were calculated. When reviewing Table 2, it shows that the majority (76%) of participants were white. Table 2 also indicates that more dancers participated in contemporary dance as their main genre (53%) than in ballet (47%).

Table 2: Descriptive statistics for ethnicity and genre (N=58)

Variable	Category	N	Valid percentage
Ethnicity	Black	12	21
	White	44	76
	Not indicated	02	03
Genre	Ballet	27	47
	Contemporary	31	53

When reviewing Table 3, it can be observed that a significantly strong positive relationship was found between ineffectiveness (a sense of low self-esteem and personal alienation) and eating disorder risk in university dancers. It shows that the more ineffective dancers feel in terms of self-esteem and personal alienation, the higher the risk for eating disorders becomes. Significant positive and moderate relationships were found between trait anxiety, interoceptive deficits, interpersonal alienation, mass and BMI. A weak correlation was found between total perfectionism and eating disorder risk. No significant links were found between the subscales *Personal standards* and *Parental expectations*.

In order to examine relationships in more detail and to determine the best subset of factors associated with eating disorder risk, a stepwise regression was performed. The results of the regression are reported in Table 4. A stepwise regression was used in order to examine whether psychological variables added a significant increase in the variance explained by the demographic variables. As

such, the demographic variable BMI was controlled for, given that it was the only variable that correlated with eating disorder risk.

Table 3: Correlation analysis between age, body mass and all psychological variables (N=58)

Variable	***R***	**P**
Age	-0.20	0.13
Mass	0.46	<0.000
BMI	0.46	<0.000
Total perfectionism	0.36	0.006
Concerns over mistakes	0.36	0.006
Doubts about actions	0.38	0.003
Personal standards	0.20	1.3
Parental expectations	0.12	0.37
Ineffectiveness	0.72	<0.000
Interpersonal alienation	0.43	<0.000
Interoceptive deficits	0.55	<0.000
Trait anxiety	0.52	<0.000

Note. Significance level $p \leq .05$

The entry of BMI in the first step produced a significant model ($F_{(1.55)}$= 14.61; p = 0.000), accounting for approximately 21% of the variance in eating disorder risk. The result showed that BMI (β = 0.46; t = 3.82; p < 0.05) was a significant predictor of eating disorder risk in university dancers. In the second step, *Ineffectiveness*, *Interpersonal alienation* and *Perfectionism* were entered. Two cases (trait anxiety and interoceptive deficits) were deleted because of producing multicollinearity. The second step produced a statistically significant model ($F_{(4.52)}$ = 22.1; p = 0.000), which explains 63% of the variance in eating disorder risks. Results showed that BMI (β = 0.233; t = 2.57; p < 0.05) and *Ineffectiveness* (β = 0.574; t = 0.610; p < 0.05) are significant factors from stepwise multiple regression (see Table 4).

Table 4: Summary of regression analysis with BMI, Ineffectiveness, IA and Perfectionism (N=58)

Model		**Understandardised coefficients**		**Standardised coefficients**	**T**	**P**	***F***	**R^2**	**$\triangle R^2$**
		B	**SE**	**Beta**					
1.	-(Constant)	-60.54	24.6	0.458	-2.46		14.61	0.21	0.20
BMI			1.14		3.82	0.17			
						0.000			
2.	(Constant)	-44.7	18.3		-2.5	0.018	22.1	0.63	0.60
BMI		2.22	0.864	0.233	2.57	0.013			
Ineffectiveness		1.40	0.229	0.574	6.10	0.000			
IA		0.960	0.494	0.191	1.94	0.057			
Perfectionism		0.297	0.374	0.076	0.794	0.431			

Note. Significance of model $p \leq .0001$; $p \leq .05$
IA: Interpersonal Alienation

Interpersonal alienation (β = 0.191; t = 6.08; p > 0.05) and *Perfectionism* (β = 0.076; t = 0.794; p > 0.05) did not significantly associate with risk, but contributed to the shared variance in eating disorder risk.

Discussion

The present study examined relationships between eating disorder risk, psychological risk factors and mass-related variables in a sample of South African female university dancers. The results support existing literature and show that the psychological self-assessments and mass-related variables of female university dancers are related to eating disorder risk (Petrie, Greenleaf, Reel & Carter, 2009; Toro, Guerrero, Sentis & Castro, 2009; Estanol et al., 2013). We argue that these associations have mostly been found in adolescent dancers (Neumarker, Bettle, Neumarker & Bettle, 2000; Anshel, 2004) and further the findings from previous studies investigating eating disorder risk in university dancers and specifically those in South Africa participating in different genres.

The results of the present study showed that the BMI of dancers is comparable with that of university dancers (Dotti et al., 2002; Hirsch, Eisenmann & Moore, 2003; Friesen, Rozenek & Clippinger, 2011; Robbeson et al., 2015). BMI was found to be positively associated with eating disorder risk, which is consistent with previous research findings in sport (Berry & Howe, 2000; Monsma & Melina, 2004; Hoerr et al., 2002) and support suppositions made by Haase et al. (1999) in athletes, such as rowers. Wyon et al. (2014) found positive correlations between BMI and disordered eating and lower levels of nutritional knowledge in adolescent student dancers compared to professional dancers. The current results extend findings and indicate that dance students − regardless of age − are a population who pursue important personal and professional goals and it may influence perceptions about body mass. Arcelus et al. (2015) reported that dancers' perceptions about physical appearance, body appearance and dieting cause anxiety and may be an indicator and precede the development of eating disorders among university dancers. One possible explanation may involve socio-cultural pressures to conform to a thin figure (Penniment & Eagan, 2012), such as pressure from teachers concerning eating habits, appearance and artistic performance (Torro et al., 2005). Another possible explanation may involve low energy expenditure during dance classes and rehearsals (Wyon, et al., 2004). Wyon et al. (2004) reported that the heart rate of dancers is rarely within the aerobic training zone during classes and rehearsals and it is not possible for dancers to use their training as a means of regulating body weight. In order to maintain the ideal body shape, dancers may, therefore, engage in diet restriction methods (Nordin-Bates et al., 2011; Robbeson et al., 2015).

Results indicated that perceived ineffectiveness was significantly related to eating disorder risk amongst South African university dance students. Perceived ineffectiveness is characterised by a combination of core deficits in identity and low self-esteem, which can be detrimental when a physical attribute, such as body size (a higher BMI), is taken in consideration. The current results are an extension of previous findings; showing a specific association between ineffectiveness and

eating disorder risk in university dancers and those in South Africa. An explanation may be that dancers often define themselves in terms of their own dancing (Rip et al., 2006; Van Staden, Myburgh & Poggenpoel, 2009), and their passion for dance may become obsessive and an extension of their identity (Padham & Aujla, 2014). Dancers who rigidly base their self-definition on dance, who perceive events to be uncontrollable and who have a negative self-evaluation, may experience an increased sensitivity to body size. They may strive to lose body mass in order to feel more valued and accepted within the dance performing climate. A recent study by Eusanio and colleagues (2014) indicated that the shame dancers experience due to fear of failure fully mediate a relationship between socially prescribed perfectionism (concern about meeting environmental expectations) and their self-concept (self-worth).

Results of the present study further indicated that *Interpersonal alienation* and Perfectionism were not significantly related to eating disorder risk; however, the shared variance was large enough to make a further contribution to the risk. Dancers who experience disappointing relationships are at an increased risk for eating disorders (Garner, 2004). Unrewarding and distrusting relationships incorporate failure to experience acceptance, trust and understanding from significant others and often leads to impairments in relationships (Garner, 2004). Impaired relationships may arise from a combination of an insecure attachment with caregivers and/or may be triggered by the dance competitive context known for its unequal recognition, competition, troubled peer relations, pressure and an atmosphere of perfectionism (Grove et al., 2013; Quested & Duda, 2010; Hancox et al., 2017). Carr and Wyon (2003) specifically linked the maladaptive dispositions of dancers, such as anxiety and perfectionism, with a performance-orientated climate. The results of this study indicate, therefore, the importance of conducive and constructive relationships within the performing climate to enhance the well-being of dancers.

Dancers who reported that they perceived they responded to mistakes in a negative and adverse manner and who displayed doubts to meet achievement demands were positively related to risk of eating disorder, while adaptive perfectionism was not. Even though ineffectiveness showed an association with eating disorder risk in the current study, dancers who reported high scores of personal ineffectiveness also seem to suffer from maladaptive perfectionism tendencies. A possible explanation involves that a combination of concerns about mistakes, doubts about actions and ineffectiveness may have an impact on the psychological well-being of dancers, such as a desire to control their BMI, in order to obtain success. Findings by Goodwin et al. (2014) indicated that low self-esteem mediates the relationship between critical comments made about the appearance of dancers and eating pathology. In this regard, Arcelus et al. (2015) argued that less focus should be placed on the dieting behaviour of dancers and rather on reducing their concerns about mistakes.

The current results contradict the findings of most of the previous studies posing evidence of a strong relationship between perfectionism and eating disorder risk in athletes (Berry & Howe, 2000) and dancers (Thomas et al., 2005; Nordin-Bates et al., 2011). Differences in the strength of relationships between studies could be due to the small sample size of the study or the inclusion of different cultures and genres and therefore warrants further research. However, previous research posed evidence of a shared variance between perfectionism, low self-esteem and links with eating disorder risks in adolescent dancers (Nordin-Bates et al., 2011) and specifically linked socially prescribed perfectionism tendencies of dancers (expectations from others) with a compromised self-esteem (Eusanio et al., 2014; Goodwin et al., 2014).

Except for the predictor variables in the stepwise multiple regression, trait anxiety and interoceptive deficits also moderately correlated with eating disorder risk in university dancers. This result supports existing literature that suggests positive relationships between these variables and risk in the general population (Hudson, Hiripi, Pope & Kessler, 2007; Vardar et al., 2007; Nowakowski, McFarlane & Cassin, 2013) and also in dancers (Anshel, 2004; Estanol et al., 2013). Trait anxiety may be enhanced by dance environmental pressures, such as pursuing standards and important personal and group goals leading to physical and emotional demands (Schnitt, Schnitt & Del A'Une, 1986; Carr & Wyon, 2003; Estanol et al., 2013). Additionally, difficulty in recognising and expressing emotions may also be enhanced by pressures in the dance environment and a lack of autonomy support (Quested & Duda, 2011).

The present study has several limitations. The first is that all participants were drawn from a small sample from a few institutions and may provide caution for the generalisability of the study findings. A second limitation is that data were based on self-report measures that are inherently suspect and influence the reliability of the results. Dancers with eating disorders may be reluctant to participate in or accurately answer questionnaires as they could disclose inappropriate behaviours, even though anonymity was assured. Because participants were invited, potential response bias may also be present. A third limitation involves the fact that dancers were not screened for previous diagnosis of or treatment for an eating disorder, which may have an influence on results. Last, the range of factors studied cannot account for more than a portion of the variance in eating disorder risk scores.

Given the implications for well-being and performance of dancers, future studies should endeavour to include variables that have not been considered in the current study but have been shown to be important. These variables include ethnicity (Hamilton et al., 1985), genre (Anshel, 2004; Thomas et al., 2005) and gender (Nordin-Bates et al., 2013). Aside from individual variables, the importance of the dance environment cannot be underestimated and it is recommended that further interventional research should focus on the interaction of systemic and individual

factors. Identifying dysfunctional patterns, such as ineffective group performance and relationships, may be an effective approach that encompasses both cultural and individual physical and psychological factors leading to malfunctions, such as eating disorders.

In conclusion, self-reported symptoms of eating disorder risk that may be used as health warnings for university-level South African dancers include ineffectiveness and BMI. These variables can be used as a diagnostic tool to predict problems associated with eating disorder risk. It is suggested that personnel and dance course administrators should be made aware of possible risk factors and − with the assistance of health practitioners − consider using self-report measures to screen dancers as eating disorders may have implications for their well-being and performance. A further suggestion is awareness of the fostering of a healthy dance environment that enhances constructive relationships and self-esteem in order to assist dancers with building a positive sense of self.

References

American Psychiatric Association (2013). *Diagnostic and Statistical Manual of M ental Disorders* (5th ed., text revision). Washington DC: Author.

Anshel, M.H. (2004). Sources of disordered eating patterns between ballet dancers and non-dancers. *Journal of Sport Behavior*, *27*(2), 115-133.

Arcelus, J., Witcomb, G.L. & Mitchell, A. (2014). Prevalence of eating disorders amongst dancers: A systematic review and meta-analysis. *European Eating Disorder Review*, *22*(2), 92-101.

Arcelus, J., Gracia-Dantas, A., Sanchez-Martin, M. & Del Rio, C. (2015). Influence of perfectionism on variables associated to eating disorders in dance students. *Revista de Psicologia del Deporte*, *24*(2), 297-303.

Bardone-Cone, A.M., Wonderlich, S.A., Frost, R.O., Bulik, C.M., Mitchell, J.E., Uppala, S. & Simonich, H. (2007). Perfectionism and eating disorders. Current status and future directions. *Clinical Psychology Review*, *27*, 384-405.

Barrell, G.M. & Terry, P.C. (2003). Trait anxiety and coping strategies among ballet dancers. *Medical Problems of Performing Artists*, *18*(2), 59-64.

Berry, T.R. & Howe, B.L. (2000). Risk factors for disordered eating in female university athletes. *Journal of Sport Behavior*, *23*, 207-219.

Bettle, N., Bettle, O., Neumarker, U. & Neumarker, K. (2001). Body image and self-esteem in adolescent ballet dancers. *Perceptual and Motor Skills*, *93*, 297-309.

Carr, S. & Wyon, M. (2003). The impact of the motivational climate on dance students' achievement goals, trait anxiety and perfectionism. *Journal of Dance Medicine and Science*, *7*(4), 105-15.

Clausen, L., Rosenvinge, J.H. & Friborg, O. (2011). Validating the Eating Disorder Inventory-3 (EDI-3): A comparison between 561 female eating disorder patients and 878 females from the general population. *Journal Psychopathological Behavior*, *33*(1), 101-110.

Creswell, J.W. (2013). *Research Design*. Thousand Oaks: Sage.

De Bruin, K.A.P., Bakker, F.C. & Oudejans, R.R.D. (2009). Achievement goal theory and disordered eating: Relationships between female gymnasts' goal orientations, perceived motivational climate and disordered eating correlates. *Psychology of Sport and Exercise*, *10*(1), 72-79.

DeVellis, R.F. (2012). *Scale Development: Theory and Applications.* Los Angeles: Sage.

Dotti, A., Fioravanti, M., Balotta, M., Tozzi, F., Cannella, C. & Lazzari, R. (2002). Eating behaviour in ballet dancers. *Eating and Weight Disorders – Studies on Anorexia, Bulimia and Obesity*, *7*(1), 60-67.

Eagles, J.M., Johnston, M.I., Hunter, D., Lobban, M. & Millar, H.R. (1995). Increasing incidence of anorexia nervosa in the female population of northeast Scotland. *American Journal of Psychiatry*, *152*, 1266-1271.

Estanol, E., Shepherd, C. & MacDonald, T. (2013). Mental skills as protective attributes against eating disorder risk in dancers. *Journal of Applied Psychology*, *25*, 209-222.

Eusanio, J., Thompson, P. & Jaque, S.V. (2014). Perfectionism, shame and self-concept in dancers: A mediation analysis. *Journal of Dance Medicine and Science*, *18*(3), 106-114.

Friesen, K.J., Rozenek, R. & Clippinger, K. (2011). Bone mineral density and body composition of collegiate modern dancers. *Journal of Dance Medicine and Science*, *15*(1), 31-36.

Frost, R.O. & Henderson, K.J. (1991). Perfectionism and reactions to athlete competition. *Journal of Sport & Exercise Psychology*, *13*, 323-335.

Frost, R.O., Marten, P., Lahart, C. & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy Research*, *14*(5), 449-468.

Garner, D.M., Olmsted, M.P. & Polivy, J. (1984). *Manual of Eating Disorder Inventory*. Odessa, FL: Psychological Assessment Resources.

Garner, D.M. (2004). *EDI-3 Referral Form Manual*. Florida: Psychological Assessment Resource, Inc.

Goodwin, H., Arcelus, J., Marshall, S., Wicks, S. & Meyer, C. (2014). Critical comments concerning shape and weight: Associations with eating pathology among full-time dance students. *Eating and Weight Disorders*, *19*(1), 115-118.

Grove, J.R., Main, L.C. & Sharp, L. (2013). Stressors, recovery processes and manifestations of training distress in dance. *Journal of Dance Medicine and Science*, *17*(2), 70-78.

Haase, A.M., Prapavessis, H. & Owens, R.G. (1999). Perfectionism and eating attitudes in competitive rowers: Moderating effects of body mass, weight classification and gender. *Psychology and Health*, *14*, 643-657.

Hall, C.J. & Lane, A.M. (2001). Effects of rapid weight loss on mood and performance among amateur boxers. *British Journal of Sports Medicine, 35*(6), 390-395.

Hamilton, L.H., Brooks-Gunn, J. & Warren, M.P. (1985). Socio-cultural influences on eating disorders in female professional dancers. *International Journal of Eating Disorders, 4*, 465-477.

Hamilton, L.H. & Robson, B. (2006). Performing arts consultation: developing expertise in this domain. *Professional Psychology Research and Practice, 37*(3), 25-29.

Hancox, J.E., Quested, E., Ntoumanis, N. & Duda, J.L. (2017). Teacher-created social environment, basic psychological needs, and dancers' affective states during class: A diary study. *Personality and Individual Differences, 115*,137-143. doi: 10.1016/j.paid.2016.03.033

Hirsch, N.M., Eisenmann, J.C. & Moore, S.J. (2003). Energy balance and physical activity patterns in university ballet dancers. *Journal of Dance Medicine and Science, 7*(3), 73-79.

Hudson, J.I., Hiripi, E., Pope, H.G. & Kessler, P.C. (2007). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biology and Psychiatry, 61,* 348-358.

Hoerr, S.L., Bokram, R., Lago, B., Bivins, T. & Keast, D.R. (2002). Risk for disordered eating relates to both gender and ethnicity for college students. *Journal of American College Nutrition, 21*(4), 307-314.

Jefford, M. & Moore, R. (2008). Improvement of informed consent and the quality of consent documents. *The Lancet Oncology, 9*(5), 485-493.

Jackson, J. (2005). My dance and the ideal body: Looking at ballet practice from the inside out. *Research in Dance Education, 6*, 25-40.

Le Grange, D., Tibbs, J. & Noakes, T.D. (1994). Implications of a diagnosis of Anorexia Nervosa in a ballet school. *International Journal of Eating Disorders, 15*(4), 369-376.

Lench, H.C., Levine, L.J. & Roe, E. (2010). Trait anxiety and achievement goals as predictors of self-reported health in dancers. *Journal of Dance Medicine and Science, 14*(4), 163-170.

Mainwaring, L.M., Krasnow, D. & Kerr, G. (2001). And the dance goes on: Psychological impact of injury. *Journal of Dance Medicine & Science, 5*(4), 105-115.

Martinsen, M. & Sundgot-Borgen, J. (2013). Higher prevalence of eating disorders among adolescent elite athletes than controls. *Medicine and Science of Sports and Exercise, 45*(6), 1188-1197.

Molnar, M. & Karin, J. (2017). The complexities of dancers' pain. *Journal of Dance Medicine and Science, 21*(1), 3-4. doi: 10.12678/1089-313x.21.1.3

Monsma, E.V. & Malina, R.M. (2004). Correlates of eating disorder risk among female figure skates: A profile of adolescent competitors. *Psychology of Sport and Exercise, 5*, 447-460.

Morris, G. (2003). Problems with ballet: Steps, style and training. *Research in Dance Education, 4*, 17-30.

Neumarker, K., Bettle, N., Neumarker, U. & Bettle, O. (2000). Age and gender related psychological characteristics of adolescent ballet dancers. *Psychopathology, 33*, 137-142.

Nordin-Bates, S., Cumming, J., Aways, D. & Sharp, L. (2011). Imagining yourself dancing to perfection? Correlates of perfectionism among ballet and contemporary dancers. *Journal of Clinical Sport Psychology*, *5*, 58-76.

Nordin-Bates, S.M., Walker, I.J. & Redding E. (2011). Correlates of disordered eating attitudes among male and female young talented dancers: Findings from the UK Centres of Advanced Training. *Eating Disorders*, *19*, 211-233.

Nowakowski, M., McFarlane, T. & Cassin, S. (2013). Alexithymia and eating disorders: A critical review of the literature. *International Journal of Eating Disorders*, *1*(21), 1-14.

Nunnally, J. & Bernstein L. (1994). *Psychometric Theory*. New York: McGraw-Hill Higher.

Padham, M. & Aujla, I. (2014). The relationship between passion and the psychological well-being of professional dancers. *Journal of Dance Medicine and Science*, *18*(1), 37-43.

Penniment, K.J. & Egan, S.J. (2012). Perfectionism and learning experiences in dance class as risk factors for eating disorders in dancers. *European Eating Disorder Review*, *20*(1), 13-22.

Petrie, T.A., Greenleaf, C., Reel, J. & Carter, J. (2009). Personality and psychological factors as predictors of disordered eating among female collegiate athletes. *Eating Disorder Journal of Treatment and Prevention*, *17*, 302-321.

Quested, E. & Duda, J.L. (2010). Exploring the socio-environmental determinants of well-and ill-being in dancers: A test of basic needs theory. *Journal of Sport and Exercise Psychology*, *32*, 39-60.

Quested, E. & Duda, J.L. (2011). Perceived autonomy support, motivation regulations and the self-evaluative tendencies of student dancers. *Journal of Dance Medicine and Science*, *15*(1), 3-14.

Ravaldi, C., Vannacci, A., Bolognesi, E., Mancini, S., Faravelli, C. & Ricca, V. (2006). Eating disorders and body image disturbances among ballet dancers, gymnasium users and body builders. *Psychopathology*, *36*, 247-254.

Reel, J.J., SooHoo, S., Jamieson, K.M. & Gill, D.L. (2005). Femininity to the extreme: Body image concerns among college female dancers. *Women, Sport and Physical Activity Journal*, *14*(1), 39-51.

Rikani, A.A., Choudhry, Z., Choudhry, A.M., Ikram, H., Asghar, M.W., Kajal, D., Waheed, A. & Mobassarah, N.J. (2013). A critique of the literature on etiology of eating disorders. *Annals of Neurosciences*, *20*(4), 157-161.

Ringham, R., Klump, K., Kaye, W., Stone, D., Libman, S., Stowe, S. & Marcus, M. (2006). Eating disorder symptomatology among ballet dancers. *International Journal of Eating Disorders*, *39*, 503-508.

Rip, B., Fortin, S. & Vallerant, R.J. (2006). The relationship between passion and injury in dance students. *Journal of Dance Medicine and Science*, *10*(1), 14-20.

Robbeson, J.G., Kruger, H.S. & Wright, H.H. (2015). Disordered eating behaviour, body image, and energy status of female student dancers. *International Journal of Sport Nutrition and Exercise Metabolism*, *25*, 344-352. doi: 10.1123/ijsnem.2013-0161

Rouveix, M., Bouget, M., Pannafieux, C., Champeley, S. & Filaire, E. (2007). Eating attitudes, body esteem, perfectionism and anxiety of judo athletes and non-athletes. *International Journal of Sports Medicine*, 28, 340–345.

Spielberger, C.D. & Sydeman, S.J. (1994). State-Trait Anxiety Inventory and State-Trait Anger Expression Inventory. In M.E. Maruish (Ed.), *The Use of Psychological Testing for Treatment Planning and Outcome Assessment* (pp. 292-321). Hillsdale, NJ: Lawrence Erlbaum Associates.

Schnitt, J.M., Schnitt, D. & Del A'Une, W. (1986). Anorexia nervosa or thinness in modern dance students: Comparison with ballerinas. *Annual Sports Medicine*, *3*, 9-13.

Stirling, A.E., Cruz, L.C. & Kerr, G.A. (2011). Development of sport-related drive for thinness in female athletes. *Athletic Insight*, *2*(3), 221-238.

Tabachnick, B.G. & Fidell, L.S. (1996). *Using Multivariate Statistics*. New York: Harper & Row.

Tabachnick, B.G. & Fidell, L.S. (2007). *Using Multivariate Statistics* (5th ed.). Boston: Pearson Education, Inc.

Terry, P.C., Lane, A.M. & Warren, L. (1999). Eating attitudes, body shape perceptions, and mood among elite rowers: Effect of age, gender and weight category. *Journal of Science and Medicine and Sport*, *2*, 67-77.

Thomas, J.J., Keel, P.K. & Heatherton, T.F. (2005). Disordered eating attitudes and behaviors in ballet students: Examination of environmental and individual risk factors. *International Journal of Eating Disorders*, *38*(3), 263-268.

Toro, J., Guerrero, M., Sentis, J. & Castro, J. (2005). Eating disorders in ballet dancing students: Problems and risk factors. *European Eating Disorder Review*, *17*(1), 40-49.

Twitchett, E., Angioi, M., Koutedakis, Y. & Wyon, M. (2010). The demands of a working day among female professional ballet dancers. *Journal of Dance Medicine and Science*, *14*(4), 127-132.

Van Staden, A., Myburgh, C.P.H. & Poggenpoel, M. (2009). A psycho-educational model to enhance the self-development and mental health of classical dancers. *Journal of Dance Medicine and Science*, *13*(1), 20-28.

Vardar, E., Vardar, S.A. & Kurt, C. (2007). Anxiety of young female athletes with disordered eating behaviours. *Eating Behavior*, *8*(2), 143-147.

Wassenaar, D., Le Grange, D., Winship, J. & Lachenicht, L. (2000). The prevalence of eating disorder pathology in a cross ethnic population of female students in South Africa. *European Eating Disorders Review*, *8*(3), 225-236.

Wyon, M., Abt, G., Redding, E. & Head, A. (2004). Oxygen uptake during modern dance class, rehearsal and performance. *Journal of Strength and Conditioning Research*, *18*(3), 646-649.

Wyon, M. (2010). Preparing to perform: Periodization and dance. *Journal of Dance Medicine and Science*, *14*(2), 67-72.

Wyon, M., Hutchings, K.M., Wells, A. & Nevill, M. (2014). Body mass index, nutritional knowledge and eating behaviours in elite student and professional ballet dancers. *Clinical Journal of Sports Medicine*, *24*, 390-396.