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**Preventing disordered eating in teenage ballet students:  
Evaluation of *DancExcellent*, a combined CBT and nutrition education intervention**

Sanna M. Nordin-Bates, PhD\*<sup>a</sup>, orcid ID 0000-0003-3428-6900

Petra Lundström<sup>b</sup>, MSc, orcid ID 0000-0003-4667-3457

Anna Katarina Melin<sup>c</sup>, PhD. orcid ID 0000-0002-8249-1311

Jorunn Sundgot-Borgen<sup>d</sup>, PhD, orcid ID 0000-0002-5291-5486

Klara Edlund<sup>e,f</sup>, PhD., orcid ID 0000-0002-2614-5174

<sup>a</sup> Swedish School of Sport and Health Sciences, Stockholm, Sweden

<sup>b</sup> Lund University, Lund, Sweden

<sup>c</sup> Department of Sports Science, Linnaeus University, Växjö/Kalmar, Sweden

<sup>d</sup> Norwegian School of Sport Sciences, Oslo, Norway

<sup>e</sup> Sophiahemmet University, Stockholm, Sweden

<sup>f</sup> Institute of Environmental Medicine, Karolinska Institutet, Solna, Sweden.

\* Communicating Author:

Sanna M. Nordin-Bates

Swedish School of Sport and Health Sciences

Box 5626, 114 86, Stockholm, Sweden

[sanna.nordin-bates@gih.se](mailto:sanna.nordin-bates@gih.se)

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**Preventing disordered eating in teenage ballet students:**

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**Abstract**

**Background:** Disordered eating (DE) behaviours are relatively common among high-level dancers, especially in classical ballet. At the same time, interventions aimed at reducing DE behaviours in this population are scarce.

**Methods:** An eight-week exploratory preventive intervention for DE behaviours was carried out in a high-level ballet school for 40 teenagers aged 12-15 years (77.5% female). Both risk factors (perfectionism) and potentially protective factors (self-esteem, self-compassion) for the development of DE behaviours were considered. The intervention was created specifically for this study and consisted of five cognitive behaviour therapy (CBT) workshops and four nutrition workshops. Additional components included newsletters for pupils and educational sessions and social media interactions with staff and parents. The intervention comprised two phases (control and intervention periods), with students acting as their own controls. Standardized questionnaires were completed before and after both phases.

**Results:** Questionnaire results did not indicate any changes in reported perfectionism, self-esteem or self-compassion; nor were symptoms of DE affected during either the control or intervention periods.

**Conclusions:** The intervention did not yield any discernible impact. However, it was affected by the onset of the Covid-19 pandemic, which limits our ability to draw conclusions about intervention effectiveness. Evaluations with pupils offer several considerations for future improvements.

### **Introduction**

Ballet sub-culture idealises bodies that are lean, lightweight and strong without bulk<sup>1</sup>, a body ideal associated with elevated risk for problems around body image, mental health, low energy availability, disordered eating (DE) behaviours and eating disorders (EDs).<sup>2-3</sup>

Research confirms that the prevalence of DE behaviours and EDs are higher among dancers than in non-dancer control groups<sup>4-5</sup>, with one meta-analysis indicating a 16.4% prevalence of EDs among female ballet dancers.<sup>4</sup> For comparison, a recent meta-analysis in sport found that overall EDs psychopathology did not differ between athletes and non-athletes, but that athletes in aesthetic or leanness-demanding sports reported more overall ED psychopathology than athletes in non-aesthetic or non-leanness sports.<sup>6</sup>

DE behaviours sit on a spectrum between healthy and sufficient dietary intake on the one hand, and clinical EDs on the other.<sup>7</sup> In other words, DE behaviours comprise a set of sub-clinical problems that are less severe than, but important predictors of EDs<sup>8</sup>, and is associated with a host of cognitive (e.g., anxiety), social (e.g., unsociability) and physical problems (e.g., recurrent injuries).<sup>3,9</sup> Similarly, dieting and compromised energy availability can have severe consequences on physiological functions including protein synthesis, menstrual-, immunological-, and gastrointestinal functions, as well as bone and cardiovascular health, reflected in decreased health and performance.<sup>3</sup> If DE behaviours evolve into a clinical ED, the long-term nutritional deficiencies are associated with health problems including co-morbid mental disorders (e.g., anxiety, depression).<sup>3</sup> In particular, anorexia nervosa is the deadliest of mental disorders.<sup>10</sup>

In ballet, a marked increase in dedication to training is typically required in adolescence. Concurrently, pubertal development reaches its peak, for girls precipitating increases in body weight and body fat that are often seen as undesirable.<sup>11</sup> These changes typically result in reduced performance for a time.<sup>12</sup> Among adolescent girls BMI also

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predicts teasing and body dissatisfaction, which in turn predict restrictive eating.<sup>13</sup> Hence, pubertal changes may lead to restrictive eating and DE behaviours.<sup>14</sup> Indeed, such behaviours often debut during adolescence.<sup>15-16</sup> Risk factors for and prevention of DE behaviours, especially among young dancers in high-risk contexts, warrant attention so that the number of dancers developing EDs may be reduced.

Despite the high incidence of DE behaviours and EDs in ballet, prevention programs are rare. In the largest intervention to date, Piran implemented a programme focused on reducing body weight and shape preoccupation in a ballet school with pupils aged 10-18.<sup>17</sup> Taking a so-called whole-school approach, the 10-year-long intervention comprised education for pupils (2-6 times/year) and staff (2-10 times/year) alongside systemic changes (e.g., prohibiting teacher comments on pupils' body shapes). Progressively lower scores for restrictive eating and DE behaviours were found four and nine years after the intervention commenced.<sup>17</sup> At 15-year follow up, those graduating post-intervention reported fewer bulimia symptoms than those graduating pre-intervention.<sup>18</sup> While impressive, the cohort-comparative study design leaves it unknown whether the intervention caused these changes or whether cohorts differed for other reasons (e.g., different students participating at different times).

Two interventions focused on improving nutritional knowledge for post-pubertal dancers (approx. 19 years old) have also been conducted, both leading to improved nutritional knowledge and decreased DE behaviours after just four<sup>19</sup> and 12 weeks.<sup>20</sup> However, one of these studies included no controls<sup>20</sup> and the other did not randomly assign participants to groups.<sup>19</sup> Further evidence for successful interventions, including some with more robust designs, exists in sport. For instance, Martinsen et al. conducted a year-long intervention at all Norwegian elite sport high schools (*M* age = 16.5).<sup>21</sup> Interactive sessions focused on energy and nutrient intake, recovery, self-esteem, psychological and physical

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growth, and development. For females, no new cases of EDs were identified in the intervention group while 13% of the control group developed an ED during that time.

Overall, it appears possible to reduce performers' DE behaviours and EDs via school-based interventions. However, previous interventions have comprised vastly different time frames (4 weeks – 10 years), and most have been undertaken with athletes in their late teens<sup>21</sup> or young adult dancers.<sup>19-20</sup> In the present study, we focused on participants in the age band often considered critical for developing DE behaviours (i.e., early to mid-teens). We also considered key points of prevention identified by previous studies, including advocating self-esteem, health and well-being; de-emphasizing weight; and making DE behaviours an issue of health and safety rather than a coaching issue.<sup>7</sup>

One of the most well-evidenced intervention types for EDs prevention outside sport and dance is cognitive behaviour therapy (CBT). For example, a recent systematic review and meta-analysis concluded that CBT interventions can significantly reduce ED behaviours and associated risk factors in high-risk populations.<sup>22</sup> To our knowledge, no published interventions have used CBT to prevent DE behaviours or EDs among performers, making ours the first of its kind. Specifically, an interdisciplinary protocol with key techniques from CBT in combination with nutrition education was developed. In line with recommendations<sup>17</sup> we included educational sessions and interactions with staff and parents. Overall, we aimed to (a) reduce the levels of risk factors for DE behaviours (perfectionism), (b) strengthen protective factors (self-esteem, self-compassion), and ultimately (c) reduce DE behaviours.

Elevated perfectionism places dancers at increased risk of DE behaviours.<sup>23-24</sup> Given that dancers are often perfectionistic<sup>25</sup> it is a pertinent risk factor in dance, especially in selective, high-level ballet schools.<sup>1</sup> It has also recently been suggested that interventions for EDs may benefit from targeting perfectionism<sup>23,26</sup>, and that CBT can reduce both perfectionism and associated psychological disorders.<sup>26</sup> Low self-esteem is another risk factor

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for EDs development<sup>23,27</sup>, although research in the area is disparate. For instance, low self-esteem among girls aged 11-12 has been considered as a risk factor for developing DE behaviours by age 15-16.<sup>28</sup> In a later study, self-esteem had limited predictive value for eating attitude development over a 3-year period.<sup>16</sup>

It is possible that self-compassion is a more suitable target than self-esteem for interventions of the type investigated here. Self-compassion is about being kind and caring toward oneself in times of difficulty by seeing one's experiences as part of being human and holding painful thoughts and emotions in balanced, mindful attention.<sup>29</sup> As such, self-compassion appears to protect against DE behaviours.<sup>30-31</sup> In one study, more self-compassionate women experienced lower levels of thinness-related pressure and DE behaviours.<sup>31</sup> To date, no published interventions have focused on self-compassion among performers; we therefore chose to extend existing research by considering both self-esteem and self-compassion.

Beyond psychological considerations, adequate energy and nutrient intake is of central concern for dancers because they underpin optimal training adaption and performance while preventing injury and illness.<sup>32</sup> While numerous aspects influence dietary intake and food choices (e.g., appetite, preferences, access), nutrition knowledge is one of the few that is readily modifiable.<sup>33</sup> Hence, nutrition interventions are recommended.<sup>3</sup>

In sum, the aim of this study was to evaluate effects of an exploratory eight-week intervention on symptoms, risk factors (perfectionism), and potential protective factors (self-esteem, self-compassion) for DE behaviours with 12-15-year-old dancers in a high-level ballet school. The intervention comprised CBT and nutrition education under the name of *DancExcellent*. The name was chosen to highlight that our focus was on promoting excellent health and performance. Accordingly, workshop content was focused on proactive skill building rather than on problems.



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### **Methods**

The project was designed with school leaders and the health team at a nationally recruiting ballet school. At this school, pupils receive tuition in both dance and academic subjects, but they do not board. Hence, they eat both at home (breakfast, dinner) and at school (lunch, snacks). Two 90-minute talks about the project (scientific background, CBT, nutrition) were held for staff and parents. They were also invited to join a Facebook group where project information and links on related topics were shared. Verbal and written information was provided to pupils, parents and staff, and informed consent obtained from pupils and both parents/guardians. The study was approved by the <BLINDED> (<BLINDED>) and funded by the <BLINDED>. The authors report there are no competing interests to declare.

### ***Participants***

All upper-secondary level pupils (years 7-9;  $N = 48$ ) were invited to participate, and 40 gave informed consent to do so (83%). Year 9 became a pilot group ( $n = 15$ ) and years 7–8 the intervention group ( $n = 25$ ). Participants were 12-15 years old ( $M = 13.90$ ,  $SD = .84$ ) and mostly female (77.5%). They had participated in dance since they were 5.70 years old ( $SD = 2.34$ ), had been at their current school for 3.66 years ( $SD = 1.42$ ), and participated in dance and supplementary training for 17.71 h/week ( $SD = 3.85$ ). Self-reported body height ( $M = 1.62\text{m}$ ,  $SD = .08$ ) and body mass (46.56 kg,  $SD = 7.04$ ) were used to compute BMI. The average BMI (adjusted for age) was 17.90 ( $SD = 1.63$ ; range 14.69-20.57); for comparison, Swedish BMI median reference values for the 12-15 age groups are 17.69 – 19.76.<sup>34</sup>

### ***Design***

The selection of specific year groups was based on discussions with staff. They were interested and supportive of the project overall and ensured that the intervention could be delivered during school hours. Participants thus had regular classes (dance and academic) somewhat altered during the intervention to fit everything into their schedules. The

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intervention (CBT and nutrition) was provided for all pupils whereas research project participation was voluntary.

Due to the small sample and lack of suitably matched control groups, a two-phase within-group design was conducted (see Figure 1). In Phase 1 (pilot phase), all participants (years 7-9) completed questionnaires before (pre-pilot test) and after (post-pilot test) an eight-week period. These measures bracketed the intervention period for year 9 pupils (pilot group) and a normal eight-week period for year 7-8 pupils (no-intervention control period). Year 9 pupils completed two project evaluations to aid intervention development for Phase 2: one brief, anonymous written evaluation and semi-structured telephone interviews. In Phase 2 (intervention phase), years 7 and 8 pupils again completed questionnaires before and after an eight-week period (pre- and post-intervention tests). These measurements bracketed their intervention period. They also completed a written evaluation.

### ***Measures***

#### *Demographic and background information*

Participants self-reported their age, gender, height and weight (if known) and dance training data (years in dance, ballet, and in current school; hours of training/week).

#### *Self-esteem*

We captured self-esteem via the Swedish version<sup>35</sup> of the Rosenberg Self-Esteem Scale (RSE).<sup>36</sup> Ten items capture positive and negative attitudes toward oneself, scored on a Likert scale from 1 (*Agree completely*) to 4 (*Reject completely*). Scores were reversed, summed and averaged so that higher scores indicate higher self-esteem. The RSE has good psychometric indices<sup>35</sup>, and in the present study internal reliability was sound at all time points ( $\alpha = .86 - .91$ ).

#### *Self-compassion*

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We captured self-compassion via the Swedish version<sup>37</sup> of the short form of the Self-Compassion Scale (SCS-SF).<sup>38</sup> It comprises 12 items about self-compassion (self-kindness, common humanity, mindfulness) and its opposites (self-judgment, isolation, over-identification). Items are scored on a Likert scale from 1 (*Almost never*) to 5 (*Almost always*). Scores are summed and averaged, with higher scores indicating higher self-compassion. The SCS-SF has good psychometric indices<sup>38</sup> and in the present study internal reliability was sound at all time points ( $\alpha = .81 - .85$ ).

### *Perfectionism*

In line with recommendations<sup>39</sup>, perfectionism was captured via indicator items from the Swedish versions of two established scales. For perfectionistic strivings we used the 7-item subscale *Personal Standards* from the Multidimensional Perfectionism Scale (MPS)<sup>40</sup> and the 5-item subscale *Perfectionistic Strivings* from the Multidimensional Inventory of Perfectionism in Sport (MIPS).<sup>41</sup> To capture perfectionistic concerns, we used the 9-item MPS subscale *Concern over Mistakes* and the 5-item MIPS subscale *Negative Reactions to Imperfection*. MPS items are scored on a Likert scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*) and MIPS items on a Likert scale from 1 (*Never*) to 6 (*Always*). All subscales have established psychometric indices.<sup>39-40</sup> In the present study, internal reliabilities were sound for all subscales at all time points: *Personal Standards* ( $\alpha = .76 - .86$ ), *Concern over Mistakes* ( $\alpha = .83 - .88$ ), *Perfectionistic Strivings* ( $\alpha = .71 - .94$ ) and *Negative Reactions to Imperfection* ( $\alpha = .83 - .95$ ).

### *Disordered eating behaviours*

We captured DE behaviours via the Swedish version<sup>42</sup> of the Eating Disorder Examination Questionnaire (EDE-Q 6.0).<sup>43</sup> The EDE-Q is a 36-item self-report measure capturing restraint, eating-, shape- and weight concerns. Questions pertain to the past 4 weeks (28 days), with most items scored on a Likert scale from 0 (*None*) to 6 (*Every day*). The EDE-Q

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also includes a section of yes/no-answers, with follow-up questions scored in absolute numbers. The EDE-Q has established validity and reliability<sup>44</sup>, and internal reliabilities in the current study ranged from .79 - .96 at the different time points.

### *Evaluations*

At the end of Phase 1 (year 9) and Phase 2 (years 7-8), participants were asked to complete an anonymous one-page evaluation. Questions were scored on Likert scales from 1 (*Disagree completely/Not true at all*) to 5 (*Agree completely/Completely true*) and tapped into their interest, engagement and understanding of intervention content; the value of homework tasks; and the extent to which they felt safe to disclose personal information in the workshops and perceived others (staff, parents) to have been interested and involved.

Telephone interviews were conducted with three pilot cohort pupils, enabling more in-depth feedback. Four pupils (two of the most and two of the least engaged) were invited to participate; three agreed to do so. Interviewees and their guardians were informed about the purpose and procedures of the interviews (e.g., that participation was voluntary and results would be presented in anonymised form); they also gave additional informed consent. Using a guide, interviews took a semi-structured form with questions focused on pupils' impressions of the intervention in general as well as of its different components, including any positive and negative impact they perceived. Interviews were conducted by a graduate level clinical psychology student and took 31.70 minutes ( $SD = 5.47$ ). They were recorded digitally, transcribed verbatim and analysed thematically using a primarily inductive approach.

### ***Procedure***

The intervention was created specifically for this study, comprising five 90-minute CBT-workshop and four 45-minute nutrition workshops (see Table 1). Information sharing and psychoeducation was intertwined with discussions and interactive exercises (e.g., via

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worksheets). Following phase 1 evaluations, more interactivity was added (e.g., Mentimeter, a digital tool using live polls, word clouds etc.; <https://www.mentimeter.com>). Pupils were also given fictitious vignettes (short stories) as a foundation for discussions and for functional analyses. These vignettes targeted issues for self-care such as aspects of perfectionism (e.g., worry, procrastination), body dissatisfaction, social media use, sleeping problems and fear of failure.

Nutrition workshops were delivered by an IOC diploma sport nutritionist and the CBT-workshops by a clinical psychologist specialized in CBT and EDs (all Phase 1 workshops and 2/5 in Phase 2). Due to the onset of the Covid-19 pandemic, a graduate level clinical psychology student delivered 3/5 Phase 2 CBT workshops and the final Phase 2 nutrition workshop was cancelled; an online recording was later provided. A second research team member attended all workshops, providing continuity, peer observation, and support.

Pupils received weekly one-page newsletters which included workshop summaries. To make these as engaging as possible, recipes, "fun facts", photographs and quotes from professional dancers on topics related to the workshops were added (e.g., their views on healthy striving in dance; how they look after themselves to both perform and feel well). To obtain the latter, interviews with five professional dancers were conducted.

### *CBT workshops*

The CBT-protocol was based on risk- (e.g., body image, weight focus) and protective (self-esteem, self-compassion) factors as they apply to dancers. The aim was to enhance awareness of how thoughts, emotions and behaviours interrelate (e.g., via functional analysis and goal setting; see Table 1). The intervention was delivered in a standard group-CBT manner (agenda; status check; homework follow-up; psychoeducation including exercises and discussions; new homework). While customised, it was partly based on a protocol for treating anxiety in youngsters ("Cool Kids").<sup>45</sup> Aspects of acceptance and commitment therapy

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focused on body image and values (ACT)<sup>46</sup> and compassion-focused therapy (CFT)<sup>47</sup> were integrated, with encouragement to work in a valued direction and with self-compassion.

Participants signed a mutually agreed upon code of silence, committing to treating information shared within the workshops as confidential, as part of ensuring integrity for participants.

### *Nutrition workshops*

Nutrition workshops aimed to increase knowledge and understanding of associations between food, health, and performance. Pupils were given a pamphlet outlining basic nutritional information and principles for optimal performance and health in dance, with topics such as the importance of sufficient energy and carbohydrate intake. Practical recommendations regarding fluid-, macro- and micronutrient intake were included, also for vegans and vegetarians. The pamphlet contained recipes with custom-made images and was additionally shared with parents and teachers. Workshops comprised 30 minutes of teaching followed by 15 minutes of questions, discussions, and introduction of an assignment for the subsequent session (see Table 1).

### *Quantitative Analyses*

Data were screened for inputting errors, normality and outliers, with no anomalies noted. Internal reliabilities, (sub-)scale scores and Pearson bivariate correlations were calculated next. Because the data was ordinal and the sample small, main analyses comprised Friedman tests to examine changes between pre- and post-pilot test mean rank values, which might have given (a) preliminary indications of an intervention effect for year 9 pupils, or (b) indications of an unstable baseline for year 7 and 8 pupils. If baseline (pre- to post-pilot tests) was stable, changes between pre-and post-intervention-tests would have indicated intervention effects for year 7-8 pupils. The sample size precluded multivariate analyses and led us to (a) combine the indicator variables for perfectionistic strivings and concerns into

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composites via item standardization (z-scores)<sup>39</sup> and (b) perform the Friedman test for the EDE-Q using the global score only. Hence, the reduced number of five univariate tests could be performed. To limit the potential for Type 1 error, a Bonferroni correction was made (new  $p$   $0.05/5 = 0.01$ ).

### **Results**

#### *Descriptive statistics*

At the pre-pilot data collection, participants reported high perfectionistic strivings alongside moderate self-esteem, self-compassion, perfectionistic concerns, and DE behaviours (in relation to the scale anchors; see Tables 2 and 3). Between 1-3 participants scored above clinical cut-off ( $\geq 4$ ) on the global EDE-Q at each time point.

#### *Correlations*

Pearson bivariate correlations between study variables were conducted for the entire sample with pre-pilot data to maximize  $n$ . As illustrated in Table 3, dancers reported elevated DE behaviours if they also reported greater perfectionistic concerns and lower self-esteem. Self-compassion was unrelated to DE behaviours but correlated positively with self-esteem and negatively with perfectionistic concerns. Perfectionistic strivings correlated only, and negatively, with perfectionistic concerns.

#### *Main analyses*

There were no significant differences between any of the dependent variables measured pre-pilot, post-pilot, pre-intervention and post-intervention,  $\chi^2_{\text{F}}(3) = .74 - 6.55$ , all  $p = > .01$  (range of  $p = .09 - .86$ ; see Table 2 for complete descriptive statistics). Effect sizes (Kendall's  $W$ ) were mostly near zero (.02 - .08), except for self-esteem where  $W = .20$ ; a small effect.

#### *Evaluations*

Results of the post-intervention evaluations suggested that intervention group pupils were only moderately interested and engaged ( $M = 2.61 - 3.13$ ); they also rated workshop delivery

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clarity in modest terms ( $M = 2.72 - 3.42$ ). Although ratings of whether they had learnt something were more positive ( $M = 3.03 - 4.19$ ), they did not particularly like the homework tasks ( $M = 2.61 - 3.13$ ) and did not do them to any great extent ( $M = 1.97 - 2.00$ ). Pupils reported feeling only modestly safe to disclose and discuss in class ( $M = 2.78 - 3.08$ ), and that their parents ( $M = 2.35$ ) and teachers ( $M = 3.12$ ) were only moderately interested and engaged in the project.

### **Interviews**

Thematic analysis of the interviews with three pilot cohort students resulted in two main themes: *new knowledge and learning*, and *perceived difficulties*. Regarding the first main theme, one pupil said that *"it feels like I've learnt quite a bit though; I think it was good that we got a bit of information on paper so that we can keep it"*. Another spoke of how *"we talked quite a bit about setting up goals and that. I thought that was interesting"*. The *perceived difficulties* theme comprised three sub-themes: *difficulties applying new knowledge*, *time conflicts*, and *difficulties opening up*. With regards to the first, one pupil mentioned how *"I feel that I have learnt but that it is still hard to use"*; another explained how s/he had learnt a lot, but *"it isn't so easy to change behaviours... so quickly"*. They also felt that the *time* taken for workshops sometimes conflicted with their need for free time, or that the time could have been better spent. For instance, one pupil stated that *"Sometimes we kind of finish near six in the evening, and to read a newsletter then might not really feel like a priority"*. Finally, there were examples of *difficulties opening up* within the group setting; for example, one interviewee stated that *"I don't think there were many who dared or wanted to engage in that discussion"*.

### **Discussion**

The aim of this study was to examine whether an eight-week intervention comprising CBT and nutrition education would impact on DE behaviours, risk factors (perfectionism), and



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protective factors (self-esteem, self-compassion) for DE behaviours in a sample of adolescent high-level ballet pupils. There were no changes in the target variables after the eight-week intervention: neither positive nor negative. In this discussion, we will compare and contrast our intervention with previously published work and offer potential reasons for the lack of effects.

Previous interventions reporting significant reductions in DE behaviours with dancers have been somewhat shorter (4 weeks)<sup>19</sup>, somewhat longer (12 weeks)<sup>20</sup> and considerably longer (10 years)<sup>17-18</sup> than ours. They have also differed considerably in content, methods, evidence base and rigour, suggesting that many intervention types have the potential to be impactful. A limitation to all these studies, including ours, is the lack of a randomised design with adequate control groups. In our case, no similar school could act as a control cohort and timetabling restrictions did not allow randomisation. We therefore employed a within-person design, with participants acting as their own controls. Using this design, we are reasonably confident that participants did not change (either decrease or increase) their DE behaviours, perfectionism, self-esteem or self-compassion over either a normal eight-week period (control) or the intervention period. Before discussing other intervention-specific reasons behind the lack of impact, it is notable that the Covid-19 pandemic broke out half-way through Phase 2. Alongside other upheaval in the pupils' lives around this time, this necessitated cancellation of one nutrition workshop and a change to a far less experienced instructor for 60% of the CBT workshops. This may be a key reason underpinning the lack of results. Notably, the school stayed open throughout the pandemic for this age group.

Although we did not find any changes in perfectionism and self-esteem over the eight-week period, results are in line with previous studies indicating that dancers with lower self-esteem and greater perfectionistic concerns report more severe DE behaviours.<sup>1,4,23-24</sup>

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Interestingly, no significant relationship between levels of self-compassion and DE behaviours was found although dancers reporting higher levels of self-compassion also reported higher self-esteem and fewer perfectionistic concerns. This contradicts suggestions that self-compassion might be an especially important target in prevention of EDs<sup>30</sup>, though these were made on the basis of research with older participants. Our small sample size also limits the conclusions that may be drawn about relationships between variables, especially over time, and further research into the potential effects of interventions aiming at preventing EDs are warranted.<sup>26</sup> Importantly, interviewees reported that they had learnt new things during the intervention but sometimes found it hard to apply their learning, or that doing so would take more time.

While different content may have yielded different results, our content was evidence-based, mostly delivered by experts, and several steps were taken toward the recommended *whole-school approach*<sup>17</sup>, such as on-going interactions with staff and parents. We also tried to engage students via newsletters comprising inspiration from professionals, recipes and more; still, this was probably insufficient, with evaluations (including interviews) suggesting only moderate engagement. This somewhat limited interest and engagement of pupils, as well as their caregivers, may help explain why we did not find any improvement in DE behaviours, risk- or protective factors. Additionally, some pupils said they had no time to try the suggestions offered – or even to eat properly. We encourage future researchers, and practitioners, to consider the *how* of an intervention (e.g., delivery style, intensity, practical orientation) as carefully as they design its content (the *what*).

The school's decision to integrate workshops into the normal timetable signalled that they took the topics seriously; it also meant that workshop participation (unlike data collections) was not voluntary. This may have limited openness and interest, and the presence of those who had opted out of research participation may have affected other pupils'

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engagement. In the future, researchers should consider the (dis-)advantages of providing interventions to intact classes in school hours vs. those who participate voluntarily in their spare time. This is perhaps especially pertinent in groups like ours, where some appeared to struggle with trust and openness; this speaks to the difficulties of balancing valuable group discussions with privacy around sensitive topics.

Finally, the targets of EDs interventions should be considered. Like other dance interventions<sup>19-20</sup>, we directed most attention toward dancers. Piran, however, emphasised the importance of systemic changes such as encouraging staff to shift focus from body weight and shape to more controllable factors such as fitness, and changes to the school cafeteria.<sup>17-18</sup> In sport, Martinsen et al. provided talks for coaches somewhat similar to ours; however, they also used tests and individual feedback, concluding these were likely to have been impactful.<sup>21</sup> Simply ensuring there is enough time to eat and recover is also likely to be important. Such systemic changes are called for alongside participant-focused interventions, but require different resources.

### ***Study Strengths and Weaknesses***

Key limitations of the current study are the small sample size and lack of randomization and control group. However, a design where participants acted as their own controls partially overcame these methodological limitations. Strengths of the study include evidence-based intervention content designed and delivered by experts, the steps taken toward a whole-school approach, and the use of both written and verbal (interview) evaluations. Unique features of the study include the focus on dance students in their early teens, and the use of CBT and self-compassion.

### ***Conclusion***

We delivered an intervention comprising CBT and nutrition workshops to ballet pupils in their early teens over an eight-week period. Dancers with lower self-esteem and greater

perfectionistic concerns scored more highly for DE behaviours, but no significant changes in these variables were identified after the intervention. In addition to possible impacts of the Covid-19 pandemic, several study design considerations may underpin these results. The evident problems with DE behaviours, perfectionism and low self-esteem in this population suggest that further development of sound interventions is highly warranted.

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Table 1. Overview of workshop content.

<b>Workshop</b>	<b>Topics</b>	<b>Theoretical Underpinnings</b>
CBT 1	<ul style="list-style-type: none"><li>• Introduction</li><li>• Basic Functional Analysis</li></ul>	Applied Behaviour Analysis
Nutrition 1	<ul style="list-style-type: none"><li>• Macro- &amp; micronutrients</li><li>• Energy metabolism and storage</li></ul>	
CBT 2	<ul style="list-style-type: none"><li>• Goal Setting</li></ul>	CBT
Nutrition 2	<ul style="list-style-type: none"><li>• Carbohydrates and fluid</li></ul>	
CBT 3	<ul style="list-style-type: none"><li>• Body Image</li></ul>	CBT/ACT
Nutrition 3	<ul style="list-style-type: none"><li>• Protein and fat</li></ul>	
CBT 4	<ul style="list-style-type: none"><li>• Emotion Regulation</li></ul>	CBT/CFT
Nutrition 4	<ul style="list-style-type: none"><li>• Summary and follow-up</li></ul>	
CBT 5	<ul style="list-style-type: none"><li>• Sustainability - acting in one's valued direction</li></ul>	CBT/ACT

*Note.* CBT = Cognitive Behavioural Therapy; ACT = Acceptance and Commitment Therapy; CFT = Compassion-Focused Therapy.

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1 Table 2. Descriptive statistics and Friedman test results for all study variables at each time point, for the intervention group.

	Phase 1		Phase 2		Friedman test results	
	Pre-pilot <i>M</i> (SD)	Post-pilot <i>M</i> (SD)	Pre-intervention <i>M</i> (SD)	Post-intervention <i>M</i> (SD)	Test result ( $\chi^2_F$ (3)) and significance ( <i>p</i> )	Sample ( <i>n</i> ) and effect sizes ( <i>W</i> )
<i>Disordered eating</i>	1.49 (1.33)	1.44 (1.53)	1.52 (1.52)	1.80 (1.66)	2.47, <i>p</i> = .48	<i>n</i> = 16, <i>W</i> = .05
Restraint	1.04 (1.10)	1.07 (1.50)	1.15 (1.47)	1.50 (1.71)		
Eating concern	.97 (1.13)	1.00 (1.24)	1.03 (1.21)	1.10 (1.37)		
Shape concern	2.13 (1.73)	2.12 (1.98)	2.17 (1.94)	2.42 (2.10)		
Weight concern	1.77 (1.66)	1.57 (1.67)	1.53 (1.59)	1.75 (1.78)		
<i>Perfectionistic strivings</i>						
Personal standards	3.44 (.56)	3.38 (.55)	3.43 (.69)	3.44 (.75)	3.85, <i>p</i> = .28	<i>n</i> = 17, <i>W</i> = .08
Perfectionistic strivings	4.93 (.65)	4.85 (.70)	5.04 (.82)	5.28 (.79)		
<i>Perfectionistic concerns</i>						
Concern over	3.03 (.74)	2.89 (.79)	3.12 (.81)	3.01 (.78)	.74, <i>p</i> = .86	<i>n</i> = 17, <i>W</i> = .02

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mistakes

Negative reactions to  
imperfection

3.59 (1.07)      3.67 (1.13)      3.49 (1.14)      3.86 (1.12)

---

Self-esteem                      2.62 (.79)      2.63 (.61)      2.58 (.61)      2.41 (.60)      6.55,  $p = .09$        $n = 11, W = .20$

Self-compassion                3.06 (.68)      3.15 (.73)      3.06 (.67)      2.86 (.65)      1.02,  $p = .80$        $n = 15, W = .02$

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2 *Note.* Standard descriptive statistics for the perfectionism subscales are provided here (i.e., items averaged within their original subscales) in  
 3 order to allow readers to interpret the data more easily. Disordered eating behaviours were scored on a scale from 0-6; perfectionistic strivings  
 4 and negative reactions to imperfection were scored on a scale from 1-6; personal standards, concern over mistakes and self-compassion were  
 5 scored on a scale from 1-5; and self-esteem was scored on a scale from 1-4. Friedman tests were computed for composite scores for  
 6 perfectionistic strivings and perfectionistic concerns.

7

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8 Table 3. Descriptive statistics and bivariate correlations between study variables for the full sample of participants at the first time point (pre-  
9 pilot).

	<i>M</i>	<i>SD</i>	1	2	3	4
1. Disordered eating	1.59	1.41	-			
2. Perfectionistic strivings	.00	.59	.28	-		
3. Perfectionistic concerns	.00	.65	.51**	.61**	-	
4. Self-esteem	2.52	.74	-.52**	-.05	-.59**	-
5. Self-compassion	2.99	.76	-.33	-.31	-.54**	.51**

10 *Note.* \* =  $p < .05$ , \*\* =  $p < .01$ . Calculations of perfectionistic strivings and concerns were performed using z-scores (i.e., composites of Personal  
11 Standards from the MPS and Perfectionistic Strivings from the MIPS for the former; Concern over Mistakes from the MPS and Negative  
12 Reactions to Imperfection from the MIPS for the latter).

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13 **Figure 1.** Overview of Study Design.

