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Impact of adolescent dance participation on the development of disordered eating habits

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Abstract

Dancers and adolescents are high-risk groups for developing disordered eating behaviors, making it critical to understand these eating behaviors for developing effective prevention and treatment strategies. However, there is limited literature on the impact of adolescent dance participation on the development of disordered eating, with even fewer studies addressing the potential long-term effects. This paper reviews current literature on eating disorders in the context of dance, while integrating insights from a neurocognitive perspective. It identifies the risk factors contributing to disordered eating in adolescent dancers and examines how these behaviors can develop into habits over time. The review suggests that these persistent disordered eating habits pose significant treatment challenges, emphasizing the need to break them early. Effective strategies involve reducing stimuli that reinforce unhealthy behaviors and shifting the dance community's focus from appearance to health and skill. Long-term effects of disordered eating in adolescent dancers may extend beyond their dance years, potentially impacting brain health. This highlights the need for holistic treatment strategies that address both emotional disorders and disordered eating. Additionally, the review recommends integrating recreational dance into school curricula and community settings to promote collaborative, health-focused activities that enhance adolescent dancers' well-being and cultural understanding. Future research should prioritize longitudinal studies to track the progression of disordered eating in adolescent dancers and their potential development into clinical eating disorders.

Keywords

Cognitive psychology, Dancers, Adolescence, Disordered eating habits, Eating Disorder, Dance, Recreational dance, Clinical eating disorders, Peer pressure, Perfectionism

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1. Introduction

Eating disorders (EDs) are behavioral conditions that can be characterized by persistent disordered eating behaviors that coincide with distressing thoughts and emotions (1). These disorders possess high mortality rates due to medical complications or suicide and affect physical and psychological function (1-4). Obsessions with food, body shape, or weight are common in EDs, along with behaviors such as restrictive eating, food avoidance, binge eating, purging through vomiting or laxatives, or compulsive exercise (1). EDs are normally classified as follows: anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), pica, rumination, avoidant restrictive food intake disorder (ARFID), other specified feeding and eating disorder (OSFED), and unspecified feeding and eating disorder (UFED) (1, 5). Together, around 5% of the population suffers from an ED, with AN and BN in women being the most common types (1, 6). However, five decades of research have suggested that less than half of those suffering from AN and BN will recover (7).

Therefore, identifying high-risk groups for ED development is crucial to developing prevention strategies (8, 9). One such group is dancers—specifically, ballet dancers (9). Arcelus and colleagues' systematic review showed that dancers were three times more likely to experience an ED compared to the general population (10). The overall prevalence of EDs among dancers was 12%, with 2% for AN, 4.4% for BN, and 9.5% for eating disorders not otherwise specified (EDNOS) (10). In comparison, the prevalence among ballet dancers was higher, at 16.4% overall, with 4% for AN, 2% for BN, and 14.9% for EDNOS (10). Another high-risk group was adolescents aging from 10 to 19, due to sudden changes in physical appearance, desire for peer approval, and the start of dating (11). Those who engaged in dieting and disordered eating behaviors during their adolescent years were more likely to experience these behaviors in later adulthood (11). Therefore, understanding the EDs associated with adolescent dancers is of particular importance to developing prevention and treatment strategies.

However, the literature on the relationship between adolescent dance participation and the development of EDs is limited. Earlier research has primarily focused on identifying risk factors that shape dancers' disordered eating behaviors, particularly ballet dancers (12-15). For instance, low self-esteem and high levels of perfectionism were two important variables that were crucial in the development of disordered eating patterns among ballet dancers (12). One study found that dancers who exhibited high degrees of perfectionism had a significantly greater chance of disordered eating than those who did not (13). However, previous findings have not been entirely consistent. One clinical study, for example, suggested that participation in ballet could not be considered a risk factor for EDs; rather, it was found that risk factors were largely dependent on the academic and psychosocial characteristics of the school (12). Among the limited literature on EDs among adolescent dancers, even fewer papers directly address the potential long-term impact of dance participation on adolescent dancers, especially in the format of a longitudinal study.

The following paper aims to broaden our understanding of the impact of adolescent dance participation on the development of disordered eating habits, especially the long-term effects. The paper reviews current literature on EDs in the context of dance, while integrating insights from a neurocognitive perspective. The next section summarizes the major factors influencing adolescent dietary behaviors, with a focus on specific risk factors contributing to disordered eating in adolescent dancers. The third section examines how these disordered eating behaviors can develop into ingrained habits over time. Finally, it presents recommendations for addressing disordered eating in adolescent dancers and outlines directions for future research.

2. Factors contributing to dietary behaviors in adolescent dancers

2.1 Major factors that influence adolescent eating behaviors

Story and colleagues proposed a conceptual model to explain the factors that shape adolescent eating behaviors, integrating insights into social cognitive theory and an ecological perspective (14). Adolescent eating behavior was conceptualized in this model as a function of four levels of influences, including individual or intrapersonal, social environmental or interpersonal, physical environmental or community settings, and macrosystem or societal (Table 1) (14).

At the intrapersonal level, psychosocial factors like food preferences, taste, and sensory perceptions played significant roles (16). Though health and nutrition did not play as big of a role as food preferences (17), adolescents could attach symbolic and functional meanings to certain foods, such as the classification of "health" and "junk" foods, where their self-efficacy and knowledge about these foods then could impact their food choices (18). Biological factors like hunger and sex differences (male vs. female) also affected eating behaviors (19, 20). Additionally, lifestyle considerations, including time and convenience, cost, meal patterns, and dieting practices, further shaped how adolescents chose their food (21, 22).

Socio-environmental factors involve interactions with family and peers. Especially in adolescence, one's family significantly influences eating patterns as the family not only provides food but also mediates attitudes, preferences, and values toward food (23). Peers also strongly impact adolescent behaviors due to the wish to conform to group norms, especially in middle adolescence aged 14 to 16, where a substantial amount of time is spent with friends (24). However, there have been inconsistent results on the effects of peer influence on eating behaviors. Because adolescents often seek autonomy, they may self-report that their behavior has not been influenced by those around them, making it difficult to assess social influence on behaviors (14).

The physical environment encompasses community settings such as schools and extracurricular activities. Because adolescents spend significant time at school, they obtain a substantial portion of their daily energy intake —about 35% to 40%—from the food environment there (25). Therefore, the foods offered at school, such as school lunches and vending machines, can have a major influence

on adolescent eating behaviors (14). Additionally, the location of extracurricular activities relative to other locations, such as convenience stores and fast-food restaurants, can also impact the type of food eaten daily (14).

Table 1. Risk factors contributing to adolescent dancers' disordered eating compared to major factors influencing adolescent eating behaviors (14)

Levels of Influence	**General**	**Dancers**
Individual (Intrapersonal)	Psychosocial: Food preferences, Taste or sensory perceptions, Health and Nutrition, Self-Efficacy, Knowledge Biological Lifestyle: Time and convenience, Cost, Dieting	Psychosocial: Perfectionism, Drive for thinness, Physical and aesthetic Standards Biological: Predominantly female Lifestyle: Dieting
Social Environmental (Interpersonal)	Family: Demographic characteristics, Family meals, Food availability Peers	Dance Teachers: Pressure to be thin, Comments Family Teammates (Peers): Body Talk
Physical Environmental (Community)	Schools Fast-food chains Vending machines Convenience stores	Dance Studios/Schools: Mirrors, Dance attire, Decorations (Pictures of Thin Dancers, Studio/school culture
Macrosystem (Societal)	Adolescents as consumers: media and advertising Cultural/social norms Supply chain Availability and accessibility	Cultural/Social Norms: Drive for thinness (standards for dancer's bodies), Competitiveness

Finally, macrosystems, or societal influences like media, cultural and social norms, food supply systems, and food accessibility can all substantially affect adolescents' eating behaviors (14). Specifically, in recent years, mainstream media has focused marketing to adolescents because they influence both their and their parents' spending habits (26). Furthermore, mass media influences can have detrimental effects on how adolescent girls view their bodies. Studies have found a positive relationship between the prevalence of dieting to lose weight and the frequency of reading fashion magazines, which often feature thin, attractive models (27). Social media sites like Instagram and TikTok have further promoted these trends, by exposing teenagers to dieting contents and misleading marketing tactics (28).

2.2 Risk factors contributing to disordered eating behaviors in adolescent dancers

The review of ED literature identified that among the major factors influencing adolescent eating behaviors, certain risk factors associated with dancers may contribute to the perpetuation of their disordered eating behaviors (Table 1).

At an individual level, studies have found that adolescents with higher levels of perfectionism were more likely to develop EDs (29-31).

Dancers typically are more likely to be perfectionists compared to non-dancers, and the link between perfectionism and the drive for thinness was notable stronger among dancers than in those outside the dance community (32, 33). This perfectionistic drive, coupled with the intense physical and aesthetic demands of dance, placed dancers at a higher risk of developing disordered eating behaviors as they struggled to meet the often-unattainable standards they set for themselves (31).

Risk factors at the interpersonal level included dance teachers, teammates, and parents. Studies have shown that dance teachers could negatively influence dancers' body satisfaction (13, 34). Francisco and colleagues found that dance teachers were the most influential figures in the lives of young dancers (34). Pressures from dance teachers to be thin placed significant stress on dancers aged 15 to 17 (34). Peers also played an important role in encouraging adolescent girls to develop unhealthy eating behaviors by promoting unrealistic beauty standards (35, 36). Peer pressure about the importance of weight was also found to be a risk factor for dancers (37). As adolescent dancers spend much of their spare time dancing, the teammates and peers surrounding them significantly shape how young dancers perceive themselves. However, since body talk—a dominant practice in the world of dance—was primarily negative, it lead dancers to think and speak negatively about their bodies (38). Compared to teachers or peers, the influence of parents' views on dancers' body dissatisfaction was less significant. Though parents could still negatively influence dancers' body image through body-related jokes, comments on others' bodies, and comments about food, many parents were generally supportive and tried to create a home environment where adolescent girls felt comfortable with their bodies (38).

At the third level, the influence of the physical environment, key risk factors when considering dancers included continuous exposure to mirrors, tight-fitting dance attire, and the culture/settings of different dance schools. Studies have shown that mirrors in the dance classroom could negatively influence body image and, consequently, induce disordered eating habits. Many dancers spent hours each day training in front of mirrors to assess and refine their technique and skills, but they also used them to constantly assess their figures, leading to increased self-objectification (38-41). Another risk factor was the type of attire (e.g., leotards and tights, sports bras and shorts), as well as costumes. Dance attire is generally tight and revealing, emphasizing dancers' figures and making them more aware of their weight and appearance (40). Dance costumes could also create a sense of vulnerability and stress, as dancers constantly stressed over how their bodies would look in costumes that were not typically customized to fit them (38). The characteristics of each dance institution could also play different roles in decreasing or increasing disordered eating behaviors among adolescent dancers, including decoration, norms, and food dispensers. For example, one survey study found that many adolescent dancers commented on the harmful effects of photos hung in their dance studio that depicted thin or extremely thin dancers (38). One clinical study also suggested that ballet training could not be considered a risk factor for EDs on its own. The risk appeared to

depend in part on the specific school's academic and psychosocial characteristics (13).

At the broader societal level, the culture of driving for thinness in the dance community has deeply shaped the experiences and expectations of dancers at all levels (42, 43). There is an idealized norm of the "perfect" dancer's body in almost all dance disciplines, especially ballet, which is typically characterized by a thin, slender physique (44). Adolescent dancers are especially vulnerable to this thin ideal as they are in a critical period of identity formation (45). Another pervasive aspect of the dance community is competitiveness, particularly in competitive rather than recreational dance, which creates numerous insecurities and pressures for dancers (38). Research has shown that among elite, competitive, and non-competitive ballet dancers, elite dancers suffered significantly higher rates of EDs than those in the other two groups (46). One study sampled 35 adolescent female dancers who spent an average of 16.7 hours per week dancing and found a strong link between ego involvement (emphasizing outperforming others), competitiveness, and disordered eating behaviors (47). However, the risk associated with competitiveness may be closely tied to individual tendencies toward perfectionism, as dancers who exhibited higher levels of perfectionism were more likely to place themselves in highly competitive environments and to show a significantly increased risk for disordered eating behaviors compared to their less-perfectionistic peers (46).

3. Development of disordered eating habits among adolescent dancers

3.1 Formation mechanism of disordered eating habits

A variety of factors influence adolescent dancers' eating behaviors. Such eating behaviors, including dieting and food restriction, are initially shaped by the factors discussed. Over time, eating behaviors may develop into habits that are less impacted by the outcome of an action and continue regardless of external reinforcement (48, 49). Thus, understanding how adolescent dancers develop disordered eating habits can offer valuable insight into the impact of dance participation among adolescents on disordered eating and/or EDs.

In cognitive neuroscience, human behavior is categorized into goal-directed and habitual actions (50). Goal-directed behavior is developed through stimulus-response-outcome learning and is highly responsive to outcomes or rewards. Therefore, if a behavior stops being rewarded, engagement in that behavior will decrease. In contrast, habits are learned and automatic behaviors. Once initiated by external or internal cues, habitual actions will continue to completion with minimal conscious control. These behaviors often start as goal-oriented actions but, with repeated practice, become less responsive to outcomes, more automatic, and more closely tied to specific triggers (48). This process leads to the formation of habits and functions similar to muscle memory.

In individuals with AN, food restriction, one of the most observed disordered eating behaviors, was thought to be maintained through habitual rather than goal-directed behavior (51). In this model, food restriction and other AN-associated behaviors began as goal-directed

actions. These actions, driven by outcomes such as successful weight loss or a sense of control, could be described as action-outcome learning. Over time, as these behaviors persistently engaged, they eventually become habitual. Once habits were established, these eating behaviors occurred nearly automatically after exposure to stimuli, as well as in the absence of a "reward" or outcome. As they become highly resistant to change, habit maintenance become a critical element in the maintenance of the disorder; in other words, once disordered eating habits were established, "it is not that the individual won't stop restricting, but rather, the individual can't stop (52)."

3.2 Development of disordered eating habits among adolescent dancers

The obsession with being thin has long been known to have cultural origins (53). Of any other demographic, adolescent girls are most inclined to adopt this thin ideal, engaging in dieting behaviors to achieve a slender body (45). Adolescent dancers feel the intense pressure to conform to societal ideals of being thin, especially with the sociocultural expectations in the dance field (45). As a result, they may engage in disordered eating behaviors to achieve the immediate rewards associated with a lean physique. For example, dancers have expressed connections between being thin and improved performance and aesthetics; 'the dancer always has to be thin' (54).

The perceived connection between body weight and dance performance, along with other motivations, led many adolescent dancers to adopt restrictive eating patterns and other disordered eating behaviors (38). A survey of adolescent girls who participated in modern dance in Indonesia found that about two-thirds of respondents were on a diet, one-quarter of them regularly skipped meals, more than half used a food substitute, and nearly one-fifth engaged in extreme dieting practices such as using diet pills, vomiting on purpose, and using laxatives and diuretics (55).

Studies have found that dancers do not significantly differ in their eating opinions or behaviors compared to the general adolescent population (56). However, adolescent dancers who aimed to pursue a professional dance career, particularly those in ballet, exhibited more restrictive dieting behaviors. These behaviors started as early as ages 10 to 12 and increased with age and professional advancement (57). A questionnaire survey of ballet dancers aged 10 to 12 found that, compared to a peer control group, young ballerinas significantly more often restricted their intake of fats and carbohydrates, felt self-angry after eating a large meal, and avoided eating under stress. These unhealthy eating behaviors were linked to self-dissatisfaction, the belief that success depended on looks, and a strong desire to improve one's appearance (57). Furthermore, a study by Gacek et al. found that nearly a quarter of ballet dancers aged 14 to 18 only had one to two meals a day (58). These eating habits take time to form. They don't happen all at once. As adolescent dancers spend years in dance studios, their eating behaviors are influenced by a variety of social and environmental factors. Certain behaviors, such as losing weight or increasing self-esteem, can be beneficial and encourage dancers to repeat them. With repetition, these behaviors

can become deeply ingrained and turn into habits.

Initially, dieting behavior is goal-oriented, mediated by action-outcome learning, and highly responsive to reward. It activates key reward-related circuits, including the ventral striatum (VS) and ventromedial prefrontal cortex (VMPFC) (Figure 1). As behavior becomes more automated and less dependent on reward, though the VS and VMPFC remain involved, the dorsal striatum (DS) and dorsolateral prefrontal cortex (DLPFC)—key structures associated with habits—become more engaged in stimulus-response actions (48). Disordered eating behaviors, once established as habits, become almost automatic when triggered and are less influenced by outcomes such as weight loss. These triggers can be external—such as comments from dance teachers and peers, standing in front of mirrors, or fitting into dance attire—or internal—such as stress and anxiety (51). Additionally, research indicates that stress and anxiety are positively correlated with increased volume and activity in the DS, which reinforces habit learning at the expense of goal-directed actions (49).

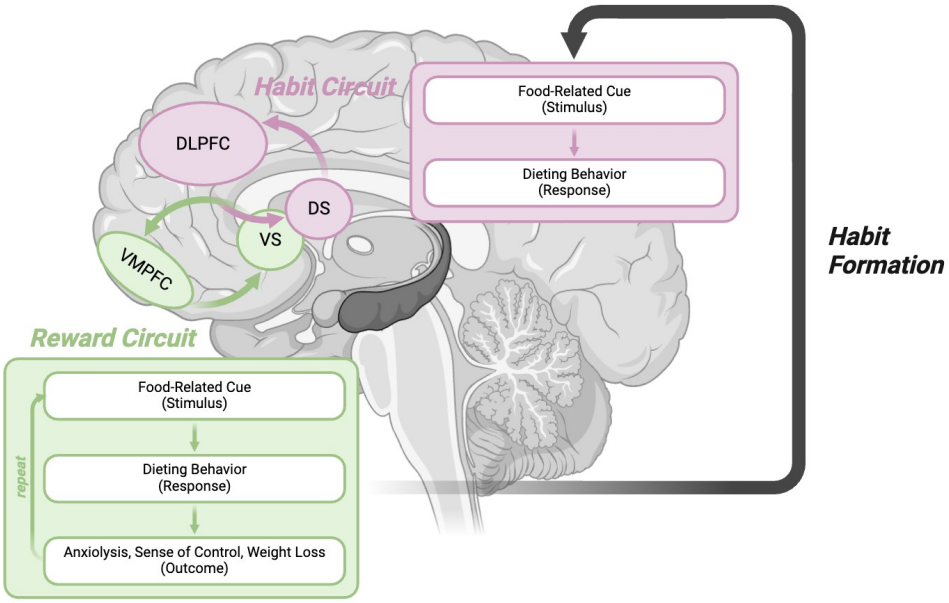

Figure 1. Development mechanism of disordered eating habits among adolescent dancers (48, 49) (*Created with BioRender.com*)

The persistence of habits implies that for adolescent dancers, these unhealthy eating patterns, once established, may continue even outside of a dancing environment. When ballet dancers were asked whether they would alter their usual diets upon quitting dancing, most responded that they would not make significant changes but would instead adapt to a new

routine, with one noting, 'Maybe a less restricted and worrying diet' (54). This finding is consistent with Ackard et al.'s study, which suggested that participating in dance during childhood may influence eating behaviors in adulthood (30).

4. Recommendations for addressing disordered eating among adolescent dancers

4.1 Breaking ingrained disordered eating habits early

Disordered eating behaviors include a variety of irregular eating behaviors such as fasting, restrictive dieting, using food substitutes, and an unhealthy focus on food and body image. While all EDs are forms of disordered eating, not all disordered eating qualifies as an ED. Although the term 'disordered eating' lacks a precise definition, it is generally understood that these behaviors are less severe and less consistent than EDs, encompassing a wide range of eating-related issues from simple dieting to clinical EDs (59). Disordered eating is notably prevalent among adolescent dancers, affecting up to two-thirds of this group, in contrast to the roughly 12% diagnosed with clinical eating disorders (10, 55). However, the absence of a formal diagnosis does not mean there is not a problem; as many adolescent dancers with disordered eating behaviors remain undiagnosed, their struggles often go unrecognized and untreated. This is especially concerning because disordered eating is a well-established risk factor for developing EDs later in life (60).

Breaking disordered eating habits at an early stage is essential to preventing their progression into clinical EDs. Once unhealthy eating habits are established, they are almost automatically triggered by a wide range of internal or external stimuli and persist regardless of the once-salient goals or rewards. Additionally, the longer the engagement in these unhealthy eating patterns, the higher the chance of acquiring EDs (51). This implies that the start of disordered eating behaviors as early as in adolescence could greatly raise the risk of having EDs in adulthood. Furthermore, stress and anxiety are both common during adolescence, which can further strengthen these disordered habits (51). Adolescent dancers face extra pressures, such as performance demands, competition, and the rigorous time commitments associated with their training (54). These stressors can worsen the formation of disordered eating habits, therefore highlighting the need for early intervention.

A critical component of early prevention is to reduce or even eliminate external influences that consistently reinforce unhealthy eating behaviors. For instance, dance teachers play a key role in shaping how adolescent dancers perceive their bodies (13, 38). But often, without realizing it, they may inadvertently reinforce negative body images by emphasizing the importance of maintaining thin bodies (38). Instead, dance teachers should encourage the acceptance of diverse body types within the dance community to cultivate a more supportive and inclusive environment. Additionally, teachers should give adolescents more freedom in choosing their attire and costumes. The choices may help young dancers feel more comfortable and confident, likely empowering them to develop a positive relationship with their bodies (38). Furthermore, organizations and institutions

dedicated to preventing EDs may consider holding educational seminars and even ongoing mentorship programs targeted to dance teachers, educating them in the psychological and physical impacts of promoting the thin ideal and more importantly, practical strategies for creating more body-positive classrooms.

Another significant component of early prevention is to initiate collective effort from everyone involved in the dance world, shifting the broader dance culture norm from focusing on appearance to health, skill, and artistic expression, reducing the pressure young dancers feel to conform to unhealthy body standards, thus helping them to prevent the development of disordered eating habits. Dance schools and programs, for example, should take a closer look at how their curricula and training practices influence dancers' perceptions of their bodies, making sure to highlight the importance of physical well-being, strength, and flexibility rather than appearance. Social media is another important player in changing the dance community's focus from thinness to overall health. Dance influencers can use their platforms to post content that highlights the importance of physical and mental well-being, while also sharing insights on proper nutrition, rest, injury prevention, and mental health practices.

4.2 Addressing long-term effects of disordered eating alongside emotional disorders

The neurological impact of disordered eating habits, particularly those developed during adolescence, can extend far beyond a dancer's active years and have lasting effects on brain health. Current brain research suggests that EDs have distinct neurobiological underpinnings and may directly alter brain structure and function (61, 62). Studies have found that food restriction, as well as binge eating and purging behaviors, was linked to reduced regional brain volumes or cortical thickness (63). Lower regional brain volumes may be a sign of brain atrophy, a loss of brain cells and connections between them (64), while cortical thinning may lead to cognitive deterioration, which in turn may lead to reactive depressive symptoms (65). However, those changes may mostly resolve as weight and eating behaviors return to normal (63).

While some of these neurological changes may improve with the normalization of weight and eating behaviors, specific effects can persist. For instance, reduction in gray matter was observed to persist in individuals who had recovered from AN (66), which may have led to several lingering symptoms, including lower self-control, difficulty processing emotions, and an even increased risk of developing major depressive disorder (67). For example, studies found that in AN, altered functional connectivity between the amygdala and frontal cortex could explain difficulties with emotion regulation (68). A brain-based computational model for AN suggested that, based on the evaluation of dopamine-related brain reward functions, the conscious drive to restrict food intake conflicted with bodily signals that promoted eating. This clash led to anxiety and reinforced a continuous cycle of food restriction (63).

Depression, anxiety, and other emotional disorders are strongly associated with disordered eating. Studies have found that depression, either alone or in combination with

other negative emotions like anxiety, played a significant role in both the development and persistence of disordered eating (69-71). Additionally, eating attitudes and behaviors significantly contributed to the variance in self-reported depressive symptoms (72). Although current studies cannot definitively establish the direction of causality, this suggested a reciprocal relationship where emotional distress fueled disordered eating, which, in turn, exacerbated psychological symptoms (73). These implications suggested that future interventions aimed at reducing disordered eating among adolescents may be more effective if they incorporated strategies for managing both depression and anxiety. When disordered eating symptoms are observed, subsequent mental health screenings for depression and anxiety should be conducted, and *vice versa*.

Dance schools and other organizations dedicated to EDs could develop and offer programs that help adolescent dancers manage stress, develop healthy coping methods, and maintain a balanced diet. Peer support groups may also be incorporated into those programs, offering young dancers a safe and supportive space so that they can openly discuss their emotional struggles and eating concerns. A key goal of these programs should be to help reduce the chances of adolescent dancers turning to disordered eating as a way of coping with stress or anxiety.

Future research could explore the intricate relationship between emotional distress and disordered eating, which may provide fresh perspectives on individualized treatment plans that target both emotional and eating disorders. For example, one topic could focus on how stress hormones affect appetite or how diets can influence emotions. Another direction of future research could be to conduct longitudinal studies on how early emotional stress contributes to the onset of disordered eating and, conversely, how disordered eating behaviors may exacerbate or trigger the development of emotional disorders.

4.3 Promoting diversified recreational dance opportunities in public schools

Unlike competitive dance, which centers on mastery, performance, and scoring and can inadvertently perpetuate body image pressures and unhealthy behavior, recreational dance prioritizes participation over performance and emphasizes inclusivity, enjoyment, and cultural diversity (74-77). Consequently, it may be effective in fostering physical and emotional well-being of adolescent dancers and reducing risk factors for EDs.

Examples of recreational dance include social dances like ballroom, salsa, or bachata; cultural and folk dances such as Irish Step Dance, Hula, Kabuki, and Bharatanatyam; fitness-oriented dances like Rumba; and recreational classes in ballet, jazz, hip-hop, or contemporary dance (74). Notably, those forms of dance that avoid rapid, high-intensity movement or tight-fitting attire can provide participants with a relaxed and supportive environment, fostering personal growth, creativity, and meaningful social interactions. For instance, folk dances—representing the rich diversity of global cultures—offer accessible and inclusive platforms for self-expression. Dances with stylized facial expressions, such as Japan's Kabuki, India's Bharatanatyam, New Zealand's

Haka, Indonesia's Legong, Korea's Talchum, and Thailand's Khon, emphasize storytelling and cultural heritage over physical performance. These styles promote a holistic approach to movement, emphasizing cultural appreciation and emotional connection over competition and thereby helping to reduce risk factors for EDs among adolescent dancers (78).

However, although dance programs are widely recognized for their role in improving mental health, reducing stress, and enhancing social cohesion among students, their implementation remains inconsistent (79). According to the National Dance Education Organization, only around 11% of schools in the U.S. offer dedicated dance programs as part of their curriculum, often integrating them into physical education rather than offering them as standalone courses (79). Among these programs, a significant portion may include elements of competitive dance.

To address these gaps, more comprehensive support is required to establish recreational dance as a standard component of school curricula. Programs like Dancing Classrooms, for instance, introduce social dance to schools, fostering students' confidence and collaboration skills (80). Recreational dance could also adopt structures similar to those of recreational soccer leagues, focusing on participation driven by interest rather than competition. Furthermore, recreational dance presents opportunities for cross-curricular integration. For example, dance assignments could be incorporated into world history classes, allowing students to research and perform traditional dances from various cultures. This approach promotes physical activity while enhancing cultural understanding and appreciation. Research suggests that culturally informed activities can foster a holistic understanding of body image and self-expression, while also reducing the emphasis on appearance (74, 78).

Moreover, recreational dance could extend beyond the school campus by including performances in community settings, such as local libraries or senior living facilities. Through participation, high school students can earn volunteer hours while benefiting from valuable community involvement. This involvement offers opportunities for adolescents to develop life skills such as leadership, empathy, and social responsibility. At the same time, dance participation has been shown to improve cognitive function in older adults, fostering social bonds and reducing isolation (81). This community-based model not only reinforces the value of dance as a lifelong activity but also shifts its narrative from a competitive to a collaborative, health-oriented pursuit.

In summary, integrating recreational dance into schools can address disordered eating by redefining dance as an inclusive, educational, and community-driven activity. This shift can create a supportive environment that prioritizes mental and physical well-being, thereby fostering healthier relationships with body image among adolescents.

5. Conclusion

Adolescents and dancers are two high-risk groups for developing EDs. Therefore, understanding disordered eating behaviors associated with adolescent dancers is of

particular importance to developing prevention and treatment strategies. This paper summarizes the multifaceted factors contributing to disordered eating behaviors among adolescent dancers, including individual traits, such as perfectionism and the drive for thinness, physical environment of dance studios and school, characterized by mirrors, tight-fitting attire, and a culture within the dance community that often emphasizes thinness and encourages competitiveness.

Influenced by all the factors mentioned above and motivated by the incentives such as weight loss and a desire for self-control, adolescent dancers often engage in various irregular eating behaviors, including fasting, restrictive dieting, the use of food substitutes, and an unhealthy obsession with food and body image. Studies on cognitive neuroscience suggest that these unhealthy eating behaviors are initially goal-directed and motivated by incentives but may become habitual over time and less influenced by outcomes. This implies that once these unhealthy eating patterns are established, adolescent dancers will continue those unhealthy eating behaviors even if the original goal, such as weight loss, is no longer desired, or if they are no longer in a dance environment. Once these habits evolve into full-blown EDs, they may pose significant challenges for treatments.

Therefore, it is crucial to break disordered eating habits as early as possible to prevent them from escalating. The break would require reducing or even eliminating both internal and external stimuli that continuously reinforce unhealthy eating behaviors. For instance, dance teachers could greatly affect how adolescent dancers feel about their bodies. Hence, they should regularly encourage students to accept diverse body types rather than perpetuate the "ideal" thin body stereotype. Another significant component of early prevention is to initiate collective efforts from everyone involved in the dance world, including dance teachers and choreographers, dance schools/studies/companies, dance competitions, dancewear and costume designers, parents and families, and dance media and social platforms, shifting the broader dance culture norm from focusing on appearance, to emphasizing health, skill, and artistic expression.

Adolescent dance participation may have long-term impact on disordered eating habits beyond the active dance years. Research suggests that EDs can alter brain structure and function, resulting in conditions such as reduced brain volume, cognitive deterioration, and persistent emotional disorders such as depression and anxiety. These findings emphasize not only the necessity of early intervention but also the need for a holistic approach to treatment: any strategy for addressing EDs should also include treatment for emotional disorders such as depression and anxiety. When disordered eating symptoms are observed, subsequent mental health screenings for depression and anxiety should be performed, and *vice versa*.

Future research could explore the intricate relationship between emotional distress and disordered eating, which may provide fresh perspectives on individualized treatment plans that address both issues. For example, researchers might examine how stress hormones affect appetite or how diets can influence emotions. Another valuable direction

of future study would be to conduct longitudinal studies on how early emotional stress contributes to the onset of disordered eating and, in turn, how disordered eating behaviors may trigger or exacerbate the development of emotional disorders over time.

Additionally, recreational dance, unlike competitive dance, emphasizes inclusivity, cultural diversity, and enjoyment over performance and scoring, making it particularly effective in promoting physical and emotional well-being while reducing the risks for disordered eating among adolescent dancers. This review recommends expanding recreational dance into school curricula and community settings. For example, schools could establish recreational dance programs modeled after recreational soccer leagues, incorporate cultural and folk dance assignments into world history classes, and organize performances in community settings such as local libraries or senior living facilities.

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