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Stressors, Recovery Processes, and Manifestations of Training Distress in Dance

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Abstract
Dancers are expected to maintain consistently high levels of performance capability and to perform on demand. To meet these expectations, they subject their bodies to long hours of intensive physical training. Such training regimens are often combined with tight rehearsal and performance schedules, which over time can lead to persistent fatigue, psychological distress, performance decrements, and injury. A similar process has been observed as a consequence of high-intensity training in many different sports, and considerable sport-related research has been devoted to identifying the antecedents, the symptoms that are experienced, and the most cost-effective ways of monitoring symptom development. This paper presents a general heuristic framework for understanding this "training distress process" and discusses the framework with specific reference to dance.

Historically, the development of training distress symptoms has been discussed using a variety of terms such as overreaching, overtraining, staleness, overtraining syndrome, and burnout. Although these terms are sometimes used interchangeably, an important qualitative distinction exists between what athletes might do as part of their preparation (i.e., overreaching or overtraining) and the negative consequences that sometimes result from these actions (i.e., staleness, overtraining syndrome, or burnout). It is also possible to distinguish between burnout and the other types of negative outcomes on the basis of sequencing and some of the symptoms experienced. More specifically, when burnout occurs, it is likely to follow the development of symptoms related to staleness and the overtraining syndrome rather than precede the development of these symptoms. In addition, although fatigue, exhaustion, and performance decrements are common features of all these negative outcome states, burnout is uniquely characterized by feelings of reduced accomplishment as well as devaluation and resentment of a previously enjoyable activity.

Given these distinctions and the existence of recent reviews of the burnout phenomenon, we will not address burnout per se. Although comments will be offered on some of the symptoms that burnout shares with staleness and the overtraining syndrome, the primary focus will be on the latter two constructs. Collectively, negative outcomes will be referred to as "training distress states," and when discussing their development, the term "training distress process" will be used. This terminology is preferred because it 1. situates the phenomenon within the broader theoretical context of stress and coping, and 2. emphasizes the dynamic nature of the events involved.

Figure 1 presents the general heuristic framework that will guide this discussion. We believe that this framework can be applied to any performance domain characterized by heavy physical workloads, including dance. The central issue, of course, is the mental and physical state of the individual, which determines his or her readiness to perform. At any given point in time, strain on the body from the physical stress of training will combine with other psychosocial stressors to exert a negative influence on physical state, mental state, and as a consequence, the readiness to perform. Active and passive recovery processes serve as counter-balancing forces that reduce the negative impact of these stressors, improve mental and physical states, and enhance performance readiness. If an appropriate...
balance does not exist, manifestations of training distress will emerge (e.g., perceived stress will increase, mood states will become more negative, sleep quality will be reduced).

This general view of the process, which emphasizes the relative balance between stressors and counteracting forces as a determinant of positive or negative outcomes, is consistent with a variety of existing health and well-being models. This perspective has also been employed more specifically by sport scientists to analyze the training distress process. These analyses are noteworthy for their comprehensive consideration of potentially relevant factors. However, we note that none of them elaborates on how specific aspects of the dance environment might influence the stress-recovery balance and thereby contribute to training distress. This paper is intended to address that void, to review the literature on how training distress is typically manifested, and to offer suggestions for monitoring its indicators.

### Training Stressors

Wyon has commented on the heavy physical workloads carried by professional dancers, noting that they often dance from 6 to 10 hours per day when preparing for a performance, and that their dance training is sometimes supplemented with additional fitness work. During the performance period itself, it is not unusual for daily classes, rehearsals, and performances to be undertaken continuously for 4 to 8 weeks. Although dance schools have different priorities, their programs also place extreme physical demands on trainee dancers. In the final days or weeks before studio showings and dance exams, there is a tendency for these workloads to increase even further in an effort to ensure attainment of the required standard. Thus, it is common for rehearsals at this time to involve many more repetitions than is normally the case. The nature of the activities also contributes to the physical stress associated with dance. More specifically, dance movements are characterized by explosive forces, high-impact landings, eccentric work, and, in some cases, extreme musculoskeletal strain. These qualities are known to increase the demands placed on the body when performing physical work and may also influence the time needed for adequate recovery.

In addition, professional dancers normally work within a given genre of dance (e.g., classical ballet, contemporary dance, hip hop, jazz), either because that style best suits their physiognomy or because it is their preferred style of movement and artistic expression. When a new work is being created, the dancer's body may need to adapt to a different choreographic style of movement. As the new choreography moves further away from the dancer's usual or preferred style and becomes more novel, greater physical stress is created and more adaptation is required. Among dance students, physical adaptation to novel movement forms occurs quite often, as their training is designed to develop technical proficiency in a variety of genres. When a certain standard is reached within any given genre, the complexity of the movements increases, which in turn disrupts movement efficiency and increases physical strain as well as fatigue.

### Other Stressors in Dance

It is likely that training-specific stressors will combine with a variety of additional psychosocial stressors to influence a dancer's mental and physical readiness to perform. The list of potential psychosocial stressors is virtually endless, but they can be grouped into categories that include ambient stressors, daily hassles, role stressors, and major life events. Ambient stressors are environmental conditions that impose persistent demands on the individual and that often operate below the level of consciousness. They include poor facilities and equipment, crowded working conditions, extreme temperatures, and other relatively stable but taxing circumstances. Daily hassles are events that disrupt the flow of one's normal routine and therefore require that coping resources are allocated to them. They include things such as financial concerns, unexpected obligations, misunderstandings, and interruptions during work. Role stressors are ongoing difficulties encountered as a person performs his or her duties within a group or organization. They include a perceived lack of autonomy and control, inadequate or inconsistent direction, intra-group rivalry, poor social support, and role conflicts (e.g., mentor vs. partner). Major life events are potent stressors related to large-scale changes in one's life circumstances such as death of a loved one, relationship dissolution, relocation, serious injury, or career transition.

Analyses of job-related stress among musicians, examinations of stress factors among elite figure skaters, and discussions of dance-specific stress by Hanna and Hamilton provide insight into specific ways these
stressors are likely to manifest themselves for dancers. Indeed, a synthesis of these works reveals a network of common psychosocial stressors surrounding the lives of many performing artists. One such stressor is an atmosphere of perfectionism, which Hamilton describes as pervasive and particularly problematic in dance.\(^{30,33}\) Several studies support this view, revealing higher levels of perfectionism in dance cohorts relative to matched controls.\(^{36-39}\) At a personal level, this quest for perfection requires a substantial allocation of time, energy, and resources, which can result in financial uncertainties, relationship difficulties, restricted social support, and feelings of isolation and loneliness.\(^{20,34}\) It also generates a tendency for the artist to be concerned about making mistakes, to ruminate, experience self-doubt, be highly critical of oneself as well as others, and to experience persistent anxiety about one's own performances, the performances of colleagues, and the reactions of observers.\(^{40-41}\) At an organizational and interpersonal level, every “move” the dancer makes is subjected to immediate scrutiny and criticism by various supervisory personnel, who may: 1. also be highly perfectionistic, and therefore tend to micromanage; 2. come or go unpredictably; 3. have more authority and control than the performer; and 4. sometimes make conflicting demands because of inconsistencies in their own artistic visions.\(^{20,34}\) Psychosocial stress in the performing arts is also generated by the competitive environment surrounding evaluation and selection, combined with the subjective nature of these judgements, the tendency for them to be accompanied by minimal feedback, and their potential to impact the performer’s career.\(^{20,31,35,34}\)

The stress associated with performance expectations can be compounded by status concerns and career development issues. For example, having reached the top rank, a principal may feel added pressure to maintain that position. At the same time, dancers under the rank of principal may put pressure on themselves to attain a particular standard in order to be granted a promotion or to be cast in more prominent roles.\(^{40}\) Even in training environments, where less emphasis is placed on these formal rankings, there is still likely to be an informal perception of status based on seniority, ability, or casting decisions. In addition, dancers in vocational training often live away from their families at 13 or 14 years of age and may, therefore, experience increased stress because of relatively weak social support networks.\(^{33}\) Similarly, many professional dancers work in touring companies, where travelling can mean being away from their usual support networks.\(^{20}\) Moreover, maintaining healthy nutrition can be difficult while touring and for some dancers having to adapt to unfamiliar theaters, rehearsal studios, and living arrangements can reduce perceptions of control and compound the physical stress associated with rehearsing and performing.\(^{46}\)

### Recovery Processes

Passive and active recovery processes serve to counteract the influence of physical and psychosocial stressors. We view “passive recovery” as synonymous with rest and consider it to be the single most important element in effective recovery. Appropriate rest involves regular physical "down-time" on a week-to-week basis, planned scheduling of activities to avoid continual overload of specific muscle groups, and relatively long-term periodicization of training elements throughout the year to prevent residual fatigue.\(^{1,19}\) It also involves developing good sleep habits\(^{1,42,43}\) and cultivating interests that allow for temporary mental disengagement from performance-related thoughts and concerns.\(^{44}\) These “mental timeouts” may be especially important if the dancer is experiencing a performance plateau or slump.\(^{45}\)

We view active recovery as any recovery protocol other than physical and mental rest. A cautious approach needs to be taken with some of these protocols because despite their widespread use, the costs and benefits continue to be debated. For example, it does appear that post-exercise fluid and electrolyte replacement is important for preventing performance decrements due to dehydration.\(^{43}\) It also appears that the replenishment of glycogen stores and the stimulation of protein synthesis capacity via intake of foods high in carbohydrates and essential amino acids is beneficial for recovery between repeated bouts of intense exercise.\(^{1,26,43}\) Similarly, regular antioxidant supplementation with vitamins C and E may help to reduce the symptoms of exercise-induced muscle damage.\(^{1,26}\) and massage appears to be helpful in reducing post-exercise muscle soreness.\(^{50}\) On the other hand, there does not appear to be convincing evidence of any physiological recovery benefits from compression garments, cryotherapy, contrast immersion, or electrotherapeutic modalities.\(^{26,46}\) The use of nonsteroidal antiinflammatory drugs (NSAIDs) as an aid to recovery deserves explicit comment because of its popularity. While there is evidence that NSAIDs may reduce muscle soreness and assist in the short-term recovery of muscle function,\(^{47}\) there is also concern that they may inhibit certain aspects of the muscle damage-repair process.\(^{26,46}\) In addition, there is an emerging consensus that long-term use of NSAIDs can have negative effects on the gastrointestinal, renal, and cardiovascular systems.\(^{26,46,47}\)

Active recovery also involves the development and use of various cognitive-behavioral strategies to moderate stress responses and facilitate recovery. Prominent among these skills is the deliberate use of self-monitoring and self-reflection procedures to enhance awareness of training workload and psychosocial stressors, as well as ongoing thoughts and emotions.\(^{48,49}\) The subjective nature of performance assessment in dance and associated need to rely on others for feedback can sometimes limit self-awareness,\(^{50}\) in which case the use of logsbooks and expressive writing in journals may serve both to reduce stress and stimulate coping behaviors.\(^{48,51}\) It may also identify conflicting demands that could be resolved through more efficient time management strategies.\(^{31}\) Using
somatic and cognitive relaxation techniques on a regular basis is also a useful aid to recovery.48,49,52 These techniques include abdominal breathing, progressive muscular relaxation, meditation, and imagery, all of which are effective for reducing muscular tension, anxiety, and stress.53 Imagery can also be helpful for rehearsing coping behaviors to be used during potentially problematic (and therefore potentially stressful) interactions with directors, choreographers, or other dancers.48,49 At the same time, the conscious and deliberate cultivation of supportive social relationships both within and outside of the dance environment can benefit recovery by providing a mechanism for expressing concerns, obtaining feedback, gaining perspective, and maintaining balance.48,52,54

**Manifestations of Training Distress**

As illustrated in Figure 1, the balance between various stress and recovery processes will influence the dancer's physical and mental state and as a consequence, his or her readiness to perform. When recovery is inadequate, various systems will be negatively affected. Research suggests that regular monitoring of these systems may be beneficial for detecting training distress, adjusting training loads, and maintaining high-level performance capabilities. We turn now to some of these research findings.

**Perceived Stress**

Rushall was one of the first to emphasize the importance of monitoring perceived stress during periods of heavy training because of the potential for stress to increase fatigue and decrease performance capabilities.55 Consistent with this view, subsequent research found that perceived stress was one of the better indicators of training distress for competitive swimmers.56,57 Halson and colleagues also documented predictable workload-related increases in perceived stress among cyclists during a 2 week period of high intensity training.58 While Hynynen and coworkers showed that perceived stress ratings could distinguish between over-trained athletes and healthy controls.59 More recent studies by Main and associates have revealed significant relationships between perceived stress, immune system functioning, and fatigue and exhaustion among athletes.60-63

**Mood Disturbance and Fatigue**

Seminal studies by Morgan and colleagues demonstrated that increases in training load among swimmers were reliably associated with increases in mood disturbance scores.64,65 Subsequent studies have replicated these findings for swimmers and documented similar effects in many other sports.66-70 When specific elements of mood disturbance are examined, it appears that an increase in depressive affect is one of the more reliable indicators of training distress.60,70-72 Given that increases in depression are often accompanied by increases in fatigue and decreases in perceived energy,73 it is not surprising that measures of generalized fatigue and lack of psychological vigor also appear to be good indicators of training distress.63,64,74 Indeed, Raglin has suggested that the magnitude of training-induced changes in vigor and fatigue relative to those for depression might be especially informative in this regard.71 Findings obtained in studies of elite athletes during periods of heavy training are consistent with this view.75,76 Additionally, there is evidence that assessing generalized fatigue on its own can provide useful information about burnout risk.50

**Somatic Symptoms**

Numerous investigators have suggested that the monitoring of physical symptoms is an important component of training distress evaluations.56,64,77 In particular, it appears that self-reports of muscle soreness, stiff and sore joints, heavy feelings in the arms or legs, and the presence of minor illnesses can be instructive.78-80 These symptoms are possibly a reflection of acute inflammatory responses associated with exercise-induced muscle damage as well as temporary suppression of various immune system functions in response to intensive exercise.80,81 In the short term, these responses are likely to serve an adaptive function and assist with recovery,82 but their continuous activation over a long period of time may be associated with a variety of training distress problems.83

**Sleep Difficulties**

It has been shown that prolonged or high-intensity exercise can have detrimental effects on sleep,83,84 and the literature contains numerous observations of sleep disturbance during periods of high-intensity training. For example, swimmers have reported a reduction in sleep quality at such times.56,57 and rowers have been shown to sleep fewer hours during intense training than either before or after these periods.85 Sleep disturbances in response to excessive training have also been documented in studies of military personnel.78,86 Age-group athletes report sleep difficulties during episodes of "staleness," although these issues appear to be less pronounced than physical complaints and fatigue-related symptoms.57 Positive associations between sleep onset latency, restlessness after falling asleep, and burnout risk have also been observed in athletes.50

**Motivational Changes**

Recent studies of burnout risk among athletes suggest that motivational changes might serve as an additional indicator of training distress. Although training distress and burnout are distinct phenomena, the development of training distress symptoms can be a precursor to burnout.67 At the same time, there is also evidence that burnout is preceded by changes in motivation. At a global level, these findings indicate that burnout risk is associated with a loss of motivation, a shift toward higher levels of extrinsic motivation, and a shift toward lower levels of self-determined motivation.87,90 Lonsdale and Hodge90 have shown that amotivational tendencies ("Do I have to do this?" "Is it worth it?") are a particularly strong predictor of burnout risk, and we believe
these are precisely the kind of tendencies that are likely to be evoked by long-term training overload without adequate recovery. When specific factors associated with self-determined motivation are examined, findings indicate that burnout risk is also linked to low levels of perceived autonomy, competence, and relatedness within the performance setting. Importantly, these relationships have been specifically confirmed in a longitudinal study of more than 200 vocational dancers by Quested and Duda. In that study, decreases in the satisfaction of autonomy, competence, and relatedness needs during the school year were associated with increases in global burnout scores over time.

Assessment Strategies

The monitoring of training distress indicators on a regular basis will provide information about dancers' mental and physical state as well as their performance readiness at any given point in time. Regular monitoring will also encourage evidence-based decision-making about adjustments to training regimens. Table 1 provides an overview of instruments and strategies that have been used for this purpose. Several elements of the table are worthy of comment.

Firstly, the published literature contains very few examples of the systematic use of these instruments and strategies to assess training distress symptoms among dancers. However, they have been shown to reflect training distress in a wide range of other physical performance settings, and there is every reason to believe that they would be equally valid in dance. For example, the Perceived Stress Scale (PSS) and the Daily Analysis of Life Demands for Athletes (DALDA) have both been shown to change in a predictable manner as a function of variations in training load and performance demands. Similarly, the full-length Profile of Mood States (POMS) as well as more abbreviated versions, have been shown to exhibit dose-response sensitivity to training loads in many different sports. There is also evidence that POMS-derived items are sensitive to exercise-related mood changes among dancers.

Secondly, somatic symptoms and sleep difficulties have often been assessed on an ad hoc basis using visual analogue scales, numerical rating scales, log-books, or diaries. However, if a more detailed monitoring of somatic symptoms is desired, then multidimensional questionnaires could be used. Similarly, a detailed analysis of sleep quality could be obtained via administration of standardized questionnaires, such as the Pittsburgh Sleep Quality Index, or the use of night-time motion sensors.

Thirdly, there is a growing body of evidence connecting elements of self-determination theory to burn-out risk, so we believe that the ongoing assessment of training distress symptoms should include measures addressing various aspects of the self-determined motivation continuum. A variety of existing measures could be used for this purpose. One such measure is the Behavioral Regulation in Sport Questionnaire (BRSQ), which assesses amotivation, controlled extrinsic motivation, autonomous extrinsic motivation, and intrinsic motivation. Although we are not aware of any studies that have modified the frame of reference for the BRSQ to

<table>
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<th>Assessment Options for Training Distress Indicators</th>
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<td>Daily Analysis of Life Demands for Athletes</td>
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<td>Profile of Mood States (POMS)</td>
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<td>Symptoms of Illness Checklist (SIC)</td>
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<td>Ad hoc Visual Analog or Numerical Scales</td>
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<td>Sleep Diary or Logbook</td>
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<td>Pittsburgh Sleep Quality Index</td>
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<td>Recovery-stress Questionnaire for Athletes</td>
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<tr>
<td>Multicomponent Training Distress Scale</td>
<td>X</td>
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<tr>
<td>Behavioral Regulation in Sport Questionnaire</td>
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assess this continuum in dancers, it would certainly be possible to do so.

Finally, two assessment approaches deserve detailed consideration because: 1. they have been developed specifically for the purpose of monitoring training distress symptoms, and 2. they contain multiple subscales that assess many of the training distress indicators shown in Figure 1. For those reasons, they are cost-effective alternatives to the use of separate instruments targeting different training distress symptoms. The REST-Q Sport is a 76-item questionnaire that assesses general stress, social stress, fatigue, lack of energy, somatic complaints, sleep quality, and physical recovery. Findings from several studies suggest that the REST-Q Sport provides useful information about changes in training distress levels.113-117 On the other hand, psychometric analyses have raised some concerns about the instrument's proposed subscale structure,118 and its length could reduce compliance in situations where repeated assessments are needed.

The Multicomponent Training Distress Scale (MTDS) is a shorter, 22-item instrument that can be used to assess multiple aspects of training distress simultaneously.60 The MTDS combines measures of perceived stress with measures of mood disturbance and symptom intensity to analyze six key training distress indicators: perceived stress; general fatigue; depressed mood; somatic symptoms; sleep disturbances; and energy or vigor. This instrument has a clean factor structure, and all of the factors exhibit positive correlations with measures of burn-out risk among athletes.60 Moreover, its length makes it a user-friendly alternative to the REST-Q Sport in situations where continual, long-term monitoring of training distress could be important (e.g., in vocational training programs) or where intensive monitoring over a shorter timeframe would be desirable (e.g., prior to major performances).

Conclusions

Examination of the sport science literature suggests that an imbalance between training-specific stressors, additional psychosocial stressors, and recovery activities can negatively affect physical states, mental states, and readiness to perform. Consistent with a broader theoretical perspective provided by stress and coping research, this discussion has indicated how these stress and recovery processes might operate in dance environments. Thus, it contributes to the literature by providing a domain-specific elaboration on some of the factors and processes that have been discussed more generally by researchers interested in the connections between stress, health, and well-being.12-18,49 At the same time, our analysis reveals that there have been relatively few empirical studies of training distress among dancers, so the undertaking of more domain-specific investigations is to be encouraged. Doing so will permit testing of relationships similar to those suggested by our analysis and will also provide information about other factors that influence the stress response (and therefore training distress symptomatology) in dance. Factors such as perceived control,40 evaluative threat,19 and motivational climate120 have received attention in this regard, but other proposed moderators of the stress response, including personality, social support, coping strategies, and family systems, could also be examined.13,14,17,18,49 Also, we encourage the use of self-report instruments to further investigate the practical suggestions we have offered regarding the monitoring of training distress indicators. The regular and systematic use of such instruments could provide valuable information for the management of workloads and training environments among vocational and professional dancers. This in turn could help to optimize performance potential and at the same time, safeguard the performers' physical and mental health.

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