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Improving the plight of fallen dancers: lessons learned from the Netherlands

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Improving the Plight of Fallen Dancers: Lessons learned from the Netherlands

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IMPROVING THE PLIGHT OF FALLEN DANCERS: LESSONS LEARNED FROM THE NETHERLANDS. Mary E. Air. Medical Center for Dancers and Musicians, Medisch Centrum Haaglanden Westeinde, The Hague, Netherlands; Yale University School of Medicine, New Haven, CT. (Sponsored by Thomas D. Stewart, Section of Psychiatry Consultation, Department of Psychiatry, Yale University School of Medicine, New Haven, CT).

Despite facing exceptionally high physical and psychological stressors, dancers in most parts of the world represent a marginalized and often neglected patient population. This study examined the physical, psychological, and health care access challenges of injured dancers in the Netherlands, a country which has remained grossly underrepresented in the performing arts medicine research literature, despite having a unique tetrad of universal health care access, a robust performing arts industry, leading clinical care in performing arts medicine, and tight-knit systems of networks and referrals between dance and medical institutions. The purpose was to determine the degree of psychological distress among injured dancers, and whether this distress persisted or resolved with resolution of the physical injury. Therefore, the Brief Symptom Inventory (BSI)®, (1) a well-known, and highly validated tool was used to screen for psychopathology in 154 pre- and post-retirement age injured Dutch dancers. In addition, a cross-sectional, descriptive survey and chart review were performed in this group to identify clinical features of dancers who were at highest risk for elevated distress, and to determine the physical outcomes of injured dancers in the Netherlands, their health care seeking behavior, and their perceptions of the medical industry when injured.

Dutch dancers sustained a low injury and surgery rate compared to available data from other countries, but the epidemiology of the injuries was similar. Dancers sustained an average of 1.5 injuries, most often to the knee or foot-ankle complex (30%, each). The surgery rate was 4% (6 of 154 dancers). Most injuries were chronic ($M = 20.6 \pm 25.3$ months), overuse-type injuries, and 40% of dancers did not know where or how the injury occurred. Pain and artistic compromise emerged as distinct entities of the injury process, with artistic compromise representing a variable of greater magnitude and duration than somatic pain.

Logistical and perceptual restrictions to health care were not reported by dancers in the study; only three younger (<35 years), foreign dancers lacked a primary care physician. No dancer reported monetary or insurance hindrances, or fear of going to the doctor. A small percentage of the younger group (18%), but none of the older dancers, reported that they felt the doctor would not understand them ($\chi^2=2.2$, df=1, $p=0.14$). Nevertheless, the majority of dancers were satisfied or very satisfied with their medical treatment before and after presenting to the dance medicine specialist (67% older dancers, 52% younger, $\chi^2=1.19$, df=1, $p=0.2$; 100% older dancers, 93% younger dancers, $\chi^2=1.46$, df=1, $p=0.2$, respectively). Dancers in both age groups most often sought first treatment from either a physiotherapist (36-40%) or a medical doctor (39-41%). The primary reason for not seeking treatment from a physician first was that dancers had already had access to a physiotherapist, and thought this treatment was sufficient. This attitude was opposite to reports of dancers' antagonistic perceptions of medical providers reported elsewhere.

Upon psychological screening, injured Dutch dancers performed poorly on the BSI, which revealed a high degree of persistent, elevated psychological distress in the study population. Sixty percent of dancers scored high enough for referral to a psychiatrist for at least one psychological dimension, 80% scored above the average of the normative Dutch adult outpatient population (dimensional score 5, Z >1.0 S.D.), and 20% scored "highly distressed" on a global measurement of psychological well-being (GSI score 6 or 7, Z >2 S.D.). Additionally, dancers who met criteria for referral were referable for multiple clinical dimensions (M=4.00). These findings were independent of age, gender, dance style, anatomic injury, professional experience, pain, and perceived level of artistic compromise due to injury. Somatic, cognitive, interpersonal sensitivity, paranoid, and anxious symptoms were the grounds for most referrals. However, overall there was little change in the psychological profiles of dancers and number of clinically significant dimensions, despite injury resolution (3.9±4.0 vs. 4.0±2.9 dimensions, p=0.9). On group analysis, clinical reduction in scores post-injury treatment was seen in phobic (50% reduction), somatic (44%), hostile (38%), and paranoid dimensions (38%); yet, on individual analysis, the number of dancers who changed from referable to non-referable status after injury resolution was equivalent to those who showed no change in their need to be referred (n=7, 41% vs. n=6, 35%). Student dancers emerged as a patient population with a particularly high level of persistent distress.

These results suggest that in this study population, where injured dancers displayed improved physical outcomes, health care seeking behavior, and doctor-dancer relationships than dancers in other parts of the world, high psychological distress was nevertheless a latent, if not independent, feature of the injury process. In the Netherlands and abroad, physicians, dance institutions, and instructors should be cognizant of overt and latent psychological distress among dancers and take measures to mitigate it including: increased education for patients and providers, increased support services at dance academies, and increased funding for research into the etiology of the distress.

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Introduction

The Dancer's Plight: Body

There are few vocations in which professional capital and personal identity are as dependent on the athleticism and aestheticism of the human body as dance. Sustained by years of discipline, training, self-management, and dance culture, the dancer's body is the crux of her person, passion, and profession.(2, 3) The dancer must be strong, yet flexible; muscular but skeletal; durable yet delicate; powerful but gravity-defying. Unlike other athletes, she is not simply judged by her body's performance, but by the way she looks. Her body is her equipment, and her sport thrives on the aestheticism of movements that push the limits of natural human physique.(4) As an artist, her body is both her instrument and creative masterpiece, which must be preserved with fine tuning and care.(5, 6)

Despite the essential importance of the dancer's body to the execution of the art form, however, the dancer's body is constantly put on the line in daily dance and non-dance activities. Among athletes, dancers sustain one of the highest rates of injury from years of extensive training and performing. Dancers pursue a considerably longer course of training than other accomplished athletes, and classical dance is thought to exceed professional sports in terms of the mental and physical demands of performance.(7-9) As a consequence, most dancers perceive injury as an inevitable part of a career, and 80%-97% of dancers report at least one injury per year.(10)

Whereas traditional native dances allow for more natural movement and body alignment, Westernized dance forms prioritize the aestheticism of position.(11) The majority of these positions are at the boundary of what is physically possible for the

human body.(5, 12, 13) This has historically been true for classical ballet, but even the aesthetic standards for current modern dance companies are on par with those of the ballet world.(14-17) Contemporary choreography continues to push these boundaries further, as choreographers must come up with increasingly avant-garde repertoire to survive in show business, and dancers must be increasingly acrobatic to keep up.(14, 18)

Such physical demands are not without consequence. The evolution of the physical human body lags behind the fast-paced evolution of the dance world. A dancer's bones, joints, ligaments, and muscles suffer repeated and excessive wear and tear which result in premature physical breakdown.(16, 19-24) This is particularly true in those dancers who refuse to accept, and work within, the natural limitations of their own bodies, as these dancers frequently "cheat" or "force" their positions. This can only be achieved through detrimental compensation at other joints along the kinetic chain. A common example is compensation for limited external rotation ("turn out") at the hip joint by forcing the turn out at the feet, to give the illusion of 180 degrees of external hip rotation. However, this can only be accomplished through hyperpronation of the feet, "gripping" of the floor with the toes, and torquing the knees out of proper alignment. Compensation at the subtalar joint produces tibial torsion and predisposes to patellofemoral and medial knee complaints. (8, 9, 25, 26)

Physical breakdown of the body forebodes the end of a dancer's performing career. Within the span of the past few decades, the average age of a dancer's retirement has witnessed a substantial drop from the mid-40s to mid-30s.(27-29) A dancer begins retirement planning even younger (late 20s). This is in stark contrast to the average 20 year-old, who is just starting a career rather than thinking about future retirement.(27)

Poor training facilities, taxing hours, negative energy [caloric] balance, fatigue, stress, and smoking only further contribute to the short lifespan of a dancer's body and accelerate her retirement.(16, 30-34)

The Dancer's Plight: Mind

There is growing interest in performing arts medicine societies to understand the dancer's psyche(7, 23, 35, 36) and, in particular, the psychological impact of a dance-related injury.(2, 37-40) It has been estimated that up to 50% of non-dance patients seen in general medical clinics are afflicted with mental, emotional, or personality problems;(41) with up to 80% of these cases representing anxiety or depressive disorders.(42) One might expect that the incidence among performing artists is just as high, if not higher. Artists have historically been thought of as quirky and special, if not peculiar, personalities. This has been demonstrated in verbally creative people (writers, poets),(43) but never in dancers. Despite the increasing body of knowledge about dancers' orthopedic complaints, little is scientifically known about dancers' psychological states, or their propensities for developing clinically detectable psychological symptoms over the course of their careers.(44) This is a complex issue which encompasses both long- and short-term, and internal and external influences on the dancer.

Dance training often begins during a critical early phase of psychological development: on average seven years for girls,(8, 9) though many start as young as age two years. Fusion of a dancer's self-identity with his/her occupational identity frequently occurs during adolescence (*i.e.*, a dancer's sense of who he/she *is* becomes one with what

he/she *does*).(38, 45) Not surprisingly, those who pursue dance become best suited to and most influenced by the subculture of the dance world over time.(46, 47) However, the standards for what is considered "normal" in this subculture (*e.g.*, body weight and flexibility) are actually considered "abnormal" or "exceptional" in the rest of the world.(36)

Highly competitive dance academies have been implicated in promoting such standards by fostering psychologically unhealthy atmospheres of workaholism, abnormal eating attitudes, body dissatisfaction, and low self-esteem.(41, 48) Additionally, dancers frequently dance to the exclusion of everything else, which diminishes exposure to potentially balancing forces of the non-dance world (i.e., beyond the realms of the dance studio).(3, 45) Ballet dancers in their early 20s are frequently tunnel-visioned on career development, often at the expense of development in other arenas.(27)This process is even greater among elite performers, who sacrifice personal development as the expense for performance excellence.(7) It has been hypothesized, therefore, that the culture of the competitive danceworld may have a pervasive influence on the development of certain troubled psychological characteristics among dancers from a very young age—ultimately producing fixed, one-sided, constricted and/or troubled personalities in adults.(7, 45)

Injury further sets the stage for potential psychological disturbances and/or crises. Despite the perceived inevitability of injury occurrence, even minor injuries threaten a dancer's career, livelihood, artistic expression, and the very embodiment of her identity.(3, 10) Therefore, while it is common in dance culture for injury and pain to be hidden, normalized, and even exalted features of the profession; behind the cakes of stage make-up and the curtain of on-stage ephemerality, an injury reminds the dancer of the

fierce temporal and corporal realities of her career. Furthermore, time-off to recover from injury forebodes an assembly of daily losses of status, roles, and opportunities for career advancement.(3) Therefore, the typical attitude—whether conscious or subconscious—of an injured dancer is to acquire higher pain tolerance, "dance through the pain," and delay seeking medical treatment when injured.(10, 49)

In addition, the dance industry's response to injury has historically been unempathic. With the exception of very large companies, who provide annual contracts and have many able-bodied understudies available, most smaller dance companies hire only as many dancers as are needed for a particular repertoire, and contracts/payment are based on the dancer's ability to dance the required hours and performances. In the case of an injury, the contract may be revoked, as well as the dancer's position within the company. (50) This somewhat harsh reality of the danceworld was confirmed in a study by Lee, who showed a critical lack of support structures within dance institutions to help dancers deal with, and confront their feelings of, disillusionment and loss at different times in their careers.(45)

Therefore, while the dancer's body is indeed one casualty of a rigorous dance career, the dancer's mind—inextricably linked to the physicality of the profession—cannot escape without profound repercussions either.

The Dancer's Plight: Access to Health Care

Despite facing exceptionally high physical and psychological stressors, dancers represent a marginalized and often neglected patient population in terms of health care. In many countries dancers are largely disconnected from medical resources readily available

to other professional athletes due to low income, tenuous job stability, lack of adequate health insurance, poor workers' compensation, and underdeveloped networking and referral systems between dance and medical institutions.(32, 51-53) This is particularly true in the United States, which lacks universal health care coverage; Japan, which has nationalized health insurance, but poor coverage of dance medicine services;(52) and Great Britain, where the time delay for approval of out-of-network dance medicine specialty services is inappropriately long, respective to the immediacy of a professional dancer's need to return to work.(54) Despite the efforts of such organizations as the International Association of Dance Medicine and Science,(55) Total Health Care Artists Japan (THCAJ) (52, 56) and Dance UK(54, 57) to address these issues, most dancers remain ill-equipped and on their own when injured.

In addition to infrastructural barriers to health care, perceptions of the medical profession are thought to restrict dancers' access to medical treatment. Dancers are uniquely challenging patients because the treating physician must not only possess basic knowledge of kinesiology and pathophysiology, but an understanding of dance technique and subculture in order to comprehensively treat the physical, psychological, and artistic compromises that ensue from a dance-related injury.(5, 12) Physicians equipped with such an understanding of performing artists are rare.(10, 32) Consequently, there are long-held, deeply-felt beliefs within the dance subculture that the medical profession is at odds with dancers' needs.(35) Approximately 90% of Japanese dancers interviewed report a need for physicians with an understanding not only of dancing, but of dancers' daily lives.(52) Dancers frequently report misunderstanding of their concerns by physicians, fear of being told they have to stop dancing, and lack of communication with

doctors among the top reasons for not seeking treatment from an allopathic medical doctor for their injuries.(2, 30, 32, 35, 52)

The Dancer's Plight: Infancy of performing arts medicine industry and limitations of its literature

The aforementioned plights of injured dancers are global. Dance is a part of every culture, and globalization has allowed for cross-cultural exchange of different dance forms. There is a worldwide demand for the promulgation and exchange of information regarding dance medicine; however, the performing arts medicine (PAM) field is very young in comparison with other medical specialties. The International Association for Dance Medicine and Science (IADMS), the largest organization for PAM enthusiasts, was established less than two decades ago.(55)

During these twenty years, PAM has seen an increase in interest in the field by physicians and physiotherapists worldwide, as evidenced by the growing membership in performing arts medicine societies, increased frequency of international conferences, and an expanding body of scientific literature.(58) Nevertheless, several challenges remain as a consequence of the field's novelty. Worldwide, few centers offer dance medicine training programs. There is currently no clear pathway for a student or medical resident whose primary discipline is health care or research to obtain an academic degree in dance medicine and science.(59) Finally, bridging the gap between the interest in dance medicine, dance science research, and tangible improvements in the clinical well-being of dancers has been slow, particularly outside the microcosms of elite dance companies in New York and Boston.(60)

The associated performing arts medicine literature is also small and frequently limited in scope.(61) Many dance medicine research studies are limited by small sample size and homogeneity of the study participants (i.e., members of one major professional ballet or modern dance company). (9, 15, 22, 39, 62-64) In reality, the majority of the dance world is comprised of amateur dancers (i.e. non-professional), but these individuals remain grossly underrepresented in the scientific literature.(60) Even among professional dancers, the majority are non-elite (i.e., typically freelancers, members of small pick-up companies, or show dancers) and are difficult to study as a homogenous group given the individual nature of their work, styles, contracts, and networks. Even less is known about the health care situation of dancers in non-English speaking parts of the world.(61)

A specific example of the limitations of the current PAM literature involves the study of health care seeking behavior of injured dancers. Available studies about the doctor-dancer relationship, dancers' perceptions of the medical industry, workers compensation for dancers, and dancers' access to general health care services have taken place in countries with historically elevated infrastructural barriers to care (USA, UK, and Japan). As such, it is difficult to isolate the root cause of the health care access problem among dancers and to determine where to make amendments first.(35) To better understand dancers' health care seeking behavior, environmental and psychological variables would need to be controlled, and results channeled towards effective change. In other words, if the problem were primarily due to lack of insurance coverage, such that dancers delay seeking treatment for economical reasons until the injury is severe enough that the only option is to stop dancing, this would suggest that efforts be instituted at the levels of dance companies and public policy to ensure adequate insurance coverage for

dancers. Conversely, if the problem were primarily based in the doctor-dancer relationship, such that in an equivalently priced fee-for-service system dancers preferentially seek out non-physician providers, this would support efforts to increase physician training in dance medicine. Currently, the answer remains unknown. Therefore, an important study for the PAM literature includes an examination of the health care seeking behavior and doctor-dancer relationships in countries with decreased infrastructural barriers to health care.

Another limitation of the current PAM literature is the dearth of research regarding the psychological impact of dance related injuries. This understanding is important in order to provide comprehensive healthcare to dancers who are fortunate enough to have access to medical care. Despite growing interest in comprehensive (physical and psychological) care, no medical study to date has rigorously examined the incidence of clinically significant psychopathological symptoms among physically injured dancers.

The role of routine, time- and cost-effective psychological screening in dancers has also not been investigated. There is a plethora of potential psychological survey instruments on the market, but all are of variable length, cost, quality, utility, and practicability.(65-67) None so far have been validated specifically for dancers. Only one medical study in performing artists was found in the literature to have used a very well-known and highly-validated screening tool for psychological symptoms: the Symptom Checklist-90-R (SCL-90-R).(68, 69) However, this is a long, time-consuming instrument and, in the study, was administered to uninjured dancers, actors, and musicians already seeking psychiatric services.(68)

While there has been considerable growth of the PAM industry, several obstacles remain in order for the performing arts medicine societies to actualize their missions of tangibly improving the health and well being of dancers worldwide. These obstacles include: addressing the health of the dance community at large in addition to the elite microcosms; increasing the number of, and improving access to, dance medicine clinics and services; addressing perceptual barriers between dancers and their medical providers; and implementing evidenced-based, comprehensive healthcare, which adequately addresses the physical and psychological aspects of a dancer patient's life. To this end, there is a current need for PAM research in three key areas: the healthcare status of dancers from underrepresented backgrounds and countries; the doctor-dancer relationship and health care seeking behavior of dancers in countries with diminished barriers to care; and the psychological profiles of injured and uninjured dancers worldwide.

Statement of purpose & hypothesis

Purpose

The purpose of this study was to examine the aforementioned physical, psychological, and health care access challenges of injured dancers in the Netherlands, a country which has remained grossly underrepresented in the PAM research literature, despite having a unique tetrad of universal health care access, a robust performing arts industry, leading clinical care in performing arts medicine, and tight-knit systems of networks and referrals between dance and medical institutions. Holland was additionally identified as an ideal country for the study because the Dutch population is small and homogeneous; the Netherlands is a socialist country with a stable government and longitudinal history of universal health care; and nearly all injured dancers in the Netherlands are referred to one performing arts medicine center of excellence, which is accessible within 3 hours from any part of the country. This referral center was founded at the naissance of the PAM industry, and continues to be run by an original forefather of PAM. Nearly all dancer patients have been seen exclusively by this single physician since the clinic's founding; and, on preliminary analysis, the type and frequency of Dutch dancers' physical injuries have been stable over 15 years.

Specific objectives and hypotheses:

1. To review the current performing arts and performing arts medicine industries in the Netherlands. Assessment will consist of literature and internet searches of existing registries of Dutch performing arts and PAM groups to determine quantity and type of dance companies, dance academies, and dance-affiliated

organizations. When possible, membership in these organizations will be ascertained in an attempt to quantify the number of professional, student, and amateur dancers, dance teachers, PAM specialists, and PAM enthusiasts in Holland. An online search will also be conducted of PAM interest groups to determine their mission statements and current activities to promote these missions. Data will be gathered from the Dutch Ministry of Health concerning the current laws around health insurance acquisition and coverage in the Netherlands. Finally, these searches will be followed by personal interviews with directors of leading Dutch dance academies and PAM groups to obtain qualitative data about current initiatives and challenges regarding the interplay of dance, health, medicine, and government in the day-to-day running of performing arts and PAM groups in Holland.

2. To examine physical outcomes of injured, treatment-seeking dancers at a major specialty clinic for injured performing artists in the Netherlands in terms of injury type, frequency, quantity, and severity; medical versus surgical management; pain; and artistic compromise due to physical injury. Assessment will consist of questionnaires evaluating self-reported demographic information, injury history, and treatment history. Diagnostic information, such as the treating physician's assessment, diagnosis, and plan for the dance-related injury, will be obtained through chart review of each study participant. Dance injuries, pain, and artistic compromise will be compared and contrasted between groups stratified according to gender, age, dance style, and professional status. We hypothesize that dancers will report pain and artistic compromise as separate features of the injury process,

with artistic compromise representing an issue of greater magnitude and duration than physical pain from injury.

3. To examine health care seeking behavior and perceptions of the medical profession injured Dutch dancers, including: preferred providers (allopathic versus allied medical professionals), time to seek medical treatment, satisfaction with basic and specialized care, and confidence in medical treatment. Assessment will consist of questionnaires designed specifically for this study. Within group differences will be examined with the aforementioned contrasts: gender, age, dance style, and professional status. We hypothesize that there will be no difference between groups. In addition, attitudes towards the health care profession will be contrasted pre- and post-treatment in the specialty clinic to determine whether attitudes improve after treatment with a dance medicine specialist (versus treatment with a non-PAM provider). We hypothesize that attitudes will be improved after treatment by a PAM specialist.
4. To examine the psychological health of injured dancers using the Brief Symptom Inventory®, a well-known, and highly validated tool. Dancers' scores will be compared to normative values for general Dutch adult outpatients. Psychological distress scores will also be correlated with descriptive data collected in Aim 2 to identify features of at-risk dancer patients who may require increased psychological support services during the injury process. We will then evaluate the change in psychological symptoms over time in comparison with completion of treatment and improvement in physical symptoms. We hypothesize that dancers will display an elevated level of psychological distress compared to the

general Dutch adult outpatient population, irrespective of injury treatment status. We anticipate that professionals will emerge as the at-risk patient population for elevated distress. We also anticipate that improvement in physical symptoms will be associated with improvement in selected dimensions measured by the BSI including somatization, anxiety, depression, and hostility. No change in other BSI dimensions, such as psychoticism, paranoia, or cognitive dysfunction is anticipated. Dancers' global BSI scores are also not anticipated to change.

Materials and Methods

Materials

Objective 1: Examination of the performing arts and performing arts medicine industries in the Netherlands

This information was collected by the author, herself a professionally trained dancer, during a 10-month tenure in the Netherlands. Primary data was collected during personal interviews with several leading dance medicine doctors, orthopedic surgeons, general practitioners (*huisarts),* physiotherapists, medical students, dance academy directors, dance instructors, dance students, current and former dance professionals, and injured dancer patients in Den Haag, Amsterdam, Leiden, Rotterdam, Utrecht, and Maastricht. Secondary data was obtained from the Dutch Ministry of Health (*Ministerie van volksgezondheid, welzijn, and sport)*, The Amsterdam Theatre School, the Dutch Theatre Institute (*Theatre Instituut Nederlands),* the Dutch Performing Arts Medicine Association (*Nederlands Vereniging voor Dans- en Muziek- Geneeskunde, NVDMG),* and

the Dutch Dancer's Health Care Foundation (*Stitching Gezondheidszorg voor Dansers, SGD).*

Objective 2: Demographic and epidemiologic data collection

As per protocol at the Medical Center for Dancers and Musicians (MCDM), all new patients and prior patients who have not been seen in more than one year receive a demographics questionnaire prior to evaluation by the physician(s). Every clinic patient file therefore has standardized and up-to-date demographics information in his/her chart. This questionnaire was originally created by the Director of the MCDM, and was minimally modified by the author (edits to the English translation). It inquires about the patient's dance training history, anatomical information (weight, height, flexibility, turn out), smoking history, and nature of the chief complaint (onset, duration, location, mechanism of causation, etc). The same demographics questionnaire that has been used since the Center's inception was also used in this study, with no modifications to the content that concerns this study.

Injury and chief complaint were measured as separate variables. Dancers indicated the anatomic location of their chief complaint(s) by choosing from a list of 24 body parts on the demographics questionnaire. Multiple responses were allowed, and the dancers could also write in their complaint(s). After the patient visit, the dancers' charts were reviewed by the author and diagnoses recorded. Injuries were defined as those indicated in the "assessment" portion of the chart review. The self-reported chief complaints were also tallied separately for comparison. In a pilot chart review in October 2007, it was found that in the majority of clinic cases, three or fewer actual injuries were

described by the physician, despite the dancer having multiple self-reported complaints. This provided the rationale for differentiating "injury" from self-reported/chief complaints in this study.

Objective 3: Survey Tools for Health Care Access and Perceptions of the Medical Profession

Two survey instruments were created by the author to collect epidemiologic data about the dance-related injury and the dancer's access to health care ("Health care access (HCA) survey"), and levels of pain, confidence, and satisfaction with medical treatment ("Perceptions survey"). These were reviewed by a panel of dance medicine experts at the MCDM and approved by the Medical Ethics Committee of Southwest Holland (METC ZWH). Content of these instruments is clarified below. Dutch and English versions were available. The Dutch translations were performed by native Dutch-speaking members of the MCDM team and medical student members of the NVDMG.

The HCA survey inquired about access to allopathic and allied medical health care prior to and up to the point of being seen in the dance medicine clinic. Additional questions included: duration of injury, length of time before seeking treatment for the injury, length of time before seeking treatment from a medical doctor (MD), and dance activity during injury. These were asked in a fill-in-the-blank style. Dancers indicated the setting in which the injury occurred, from whom they first sought treatment for the injury, and reason(s) why an MD was not seen first (if applicable) from a list of options, with the option to write in additional responses.

The Perceptions survey inquired about the perceived physical and psychological ramifications of injury, and the dancer's satisfaction and confidence with treatment providers and recovery, respectively. To measure pain, patients were first asked to indicate whether they were currently in pain, with "yes" or "no" answer choices. If yes, patients were asked to record level of their pain on a manual 100mm Visual Analogue Scale (VAS),

0 10

where "0" indicated "No pain," and "10" indicated "Extreme pain." The shape of the VAS, numeric parameters, and wording of the question (Dutch) were based on the VAS pain scale used in the RAND-36 Dutch Language Version, a reliable and validated health survey tool.(70) Fifty millimeters of pain was used as the cut-off between "high" and "low" pain.

Patients were asked about artistic hindrance due to pain with the following question: "How much has pain limited your artistry (ability to dance)?" (translated wording). The patient recorded artistic hindrance on an identical VAS as per above, but with "0" indicating "No limitation" and "10" indicating "Full limitation." No prior study was found in the literature to measure artistic hindrance as a variable, but for this initial exploration, a VAS was chosen in order quantify and compare results with level of pain.

Satisfaction with medical treatment received prior to and after treatment at the MCDM was asked with forced-choice response options: very satisfied, moderately

satisfied, neutral, moderately dissatisfied, very dissatisfied. Confidence in full recovery of the complaint for which the patient presented was also measured in a forced-choice style: completely confident, moderately confident, neutral, not very confident, not at all confident.

Objective 4: Survey tool for examining psychological health

Official copies of the Dutch version of the Brief Symptom Inventory (BSI®)(1) self-report questionnaire and user manual(71) were obtained from PITS B.V. (www.pits-online.nl). The BSI is a 53-item derivative of the Symptom Checklist-90-R (SCL-90-R),(69) a very well-known and highly-validated screening tool for psychological symptoms.(42, 65, 66, 68, 72) Both the SCL-90-R and BSI have been used as outcomes measures in an extensive array of research studies, among them a number of investigations focusing specifically on psychological screening.(66) Together, they have been used in over 1,000 published research studies worldwide, and they are available in over two dozen languages.(65, 67)

The BSI is designed to provide valid, multidimensional measurement of psychological distress in a 10 minute assessment period. Responses to the 53 items give an overview of patients' symptoms and their intensity in the seven days prior to evaluation. Each item represents a symptom which is rated on a five-point scale of distress. These points are tallied within each of nine psychological dimensions: Somatization (SOM), Cognitive problems (COG), Interpersonal Sensitivity (INT), Depression (DEP), Anxiety (ANG), Hostility (HOS), Phobic Anxiety (FOB), Paranoid Ideation (PAR), and Psychoticism (PSY). The breakdown of items per dimension is as

follows: SOM (7 items), COG (6), INT (4), DEP (6), ANG (6), HOS (5), FOB (5), PAR (5), PSY (5). Four additional items which do not fall into a dimension, but are included for clinical relevance (e.g., suicidality), create the total sum of 53 items.

Additional features of the BSI include "Global Indices," which provide an overall psychological distress level (Global Severity Index, GSI), level of intensity of symptoms (Positive Symptom Distress Index), and total number of self-reported symptoms (Positive Symptom Total). The GSI represents the best indicator of the depth of psychopathology,(73) and therefore was the only index used of the global indices.

When scoring the BSI, patients receive a raw score for each dimension, which is based on the magnitude of severity of his/her responses to the individual items. A divided raw score is calculated, and this is compared to normative values to assess the patient's wellbeing relative to the norm group. Separate normative values for psychiatric inpatients, psychiatric outpatients, community adult non-psychiatric patient respondents (≥13 years), and adolescent respondents are provided in the user manual.(71, 73) Normative values for community non-psychiatric adults were used as the reference group in this study.

The divided raw scores are stratified into clinical relevance categories based on Z-scores. A clinical score of 4 (*gemiddeld)* is average with respect to the norm group (-1.0 *SD* < Z < 1.0 *SD*). The Dutch BSI caseness criterion (i.e., the cutoff score at which a respondent is considered to be a "positive" case of psychological distress) is a score of 6 (high, *hoog*) or 7 (very high, *zeer hoog*) in a psychological dimension. A six corresponds to *Z*>+2.0 *SD,* and a seven corresponds to *Z*≥ +2.5 *SD*. These scores warrant clinical referral to a psychologist or psychiatrist. (1)

A comprehensive review of the criterion-oriented validity, reliability, and internal consistency of the tools has been well described. The BSI has demonstrated validity in a broad range of clinical research contexts,(72) and has an 84% sensitivity to detect clinical psychological distress and treatment-induced change.(42) The psychometrics of the BSI are explicitly defined in the BSI user manual and supporting review articles.(1, 42, 72, 73) The internal consistency (alpha) coefficients in the Dutch version of the BSI for the nine dimensions is as follows: SOM, 0.84; COG, 0.84; INT, 0.83; DEP, 0.87; ANG, 0.87; HOS, 0.85; FOB, 0.81; PAR, 0.81; PSY, 0.71; GSI, 0.96. Test-retest correlations at two weeks (r_{tt}) range from r_{tt}=0.71 (SOM) to r_{tt}=0.92 (GSI).(71) The GSI's stability coefficient of r_{tt}=0.92 provides assurance that the BSI represents consistent measurement across time.(72, 73) The overall (GSI) sensitivity and specificity of the Dutch tool for detecting psychological distress is 84% and 85%, respectively. Separate sensitivities and specificities are also available for each of the nine dimensions.(71)

Methods

Study participants

The study population consisted of all first-visit and end-treatment dancer patients at the Medical Center for Dancers and Musicians (MCDM) in the Hague, Netherlands and ancillary clinic in Amsterdam, from January 31st through May 7th, 2008. Eligibility for participation in the study was based on whether the dancer was either a first-visit or end-treatment patient. Dancers were not excluded based on age, dance style, experience, anatomic injury, or management (e.g. surgical vs. conservative). Nearly all participants

were native Dutch speakers. Full demographic information about the study population may be found in Table 1 and in *Results.*

Study protocol

The demographics questionnaire was mailed to patients prior to their appointment, as per clinic protocol. Additional copies were available for those patients who did not complete this portion at home. All other surveys were administered by clinic staff on-site. The patients manually filled in the questionnaires on their own. The HCA survey was administered to first-time patients only, as it inquired about access to health care prior to, and up to the point of, being seen in the clinic. Perceptions 1 was administered to first-time patients prior to being seen by the physician. Perceptions 2 was administered after the final visit. Dutch and English versions of these surveys were available. The BSI was administered to native Dutch-speakers (≥13 y) only, pre- or post-treatment depending on visit-status, as per the Perceptions survey administration.

In total, survey completion took a maximum of 15 minutes. Participation was voluntary. All patients received and signed informed consent papers prior to the study, and approval of the study method was also obtained from the Medical Ethics Committee of Southwest Holland (METC ZWH). The survey completion rates are included in Results under the section *"Study participation and demographic data."*

Each patient's chart was reviewed by the author after his or her appointment to determine the dancer's injury (-ies) and to collect relevant demographic information. All survey instruments were scored manually by the author, including the BSI. All Visual Analogue Scales were measured manually by the author to the nearest 0.5 millimeters

using the same ruler. The psychiatry department in our hospital agreed to accept patients who scored high on the BSI for referral. High scorers were contacted by a neuropsychologist in the clinic to discuss their scores prior to referral.

Data analysis

Financial records of the MCDM were analyzed by the author for the preceding three years (2005-2007), to ensure that the study population was similar in volume and patient type (new, returning, dancers, and musicians) to the average patient-population of the Center in the selected months (February, March, April, May). Volume and type of self-reported anatomic complaints in the study period were compared to available data from 1998 (unpublished) and 1993(25, 26) to control for change in injury-type/incidence as a compounding variable of dancers' perceptions and BSI scores. This data from prior years had been collected in the same manner with the aforementioned demographics questionnaire.

Dancers were divided, *post hoc*, into three groups: first-visit patients (Group 1, N=79), end-treatment (Group 2, N=43), and both (Group 3, N=32) to allow for comparisons between groups (Group 1 and Group 2) and individuals (i.e., pre- and post-treatment Group 3 members). Younger and older dancers were grouped according to the average dancer's retirement age of 35 years, unless otherwise noted. However, a lower age cutoff of 25 years was used when comparing BSI scores of professionals, students, and amateurs by age because students typically graduate from academies in their early twenties.

All data was analyzed using SPSS software, v10.0 for Windows. Results of means and standard deviation are reported in this paper as *Mean ± Standard Deviation.* Demographic data was analyzed with descriptive statistics. Data were analyzed with parametric testing whenever possible (e.g., t-tests for continuous variables, ANOVA for continuous variables of multiple groups). Chi-squared tests were used for categorical variables. Multiple ANOVA tests were corrected *post hoc* using the Bonferroni adjustment feature of SPSS. All p-values have been reported in consideration of the adjustments.

To determine mean dimensional BSI scores for the groups, divided raw scores were used rather than clinical scores, as the latter were categorical variables (despite being numeric). The resultant mean divided raw scores were converted *post hoc* into the average clinical scores for the group, according to the normative tables provided in the BSI user manual. Both values are reported in Tables 6 through 9. To compare BSI scores per dimension between groups, mean divided raw scores were also used. Scores for Groups 1 and 2 were compared with unpaired t-tests, and Group 3 participants pre- and post-treatment were compared with paired t-tests. Overall BSI profiles between groups were compared with Bonferroni adjusted ANOVA tests. Clinically significant change was considered in addition to statistically significant change (e.g., α=0.05). The threshold for clinically significant change was defined as reduction/increase in clinical score from/to a 6 (highly distressed), because a score of 6 represents the threshold at which patients are referred. Statistical and clinical changes are indicated in Tables 6-11.

Allocation of responsibility

The author accepts responsibility for the development of the research topic and protocol, creation of survey tools, implementation of survey tools, data analysis, and manuscript composition. Translations were performed and reviewed by several members of the MCDM team and medical students in the NVDMG. Boni Rietveld, M.D. performed all of the physical examinations on patients and voluntarily purchased the Brief Symptom Inventories. Gert-Jan de Haas, neuropsychologist, provided recommendations for use and training in scoring of the BSI as a screening tool for psychopathology. Inge Buyls and Yvette Schipper, administrative assistants, assisted the author in distributing the surveys via mail and on-site.

Results

Objective 1: The performing arts and performing arts medicine industries in Holland

Holland contains over 3,000 professional dancers, 1,000 dance teachers, and 100,000 amateur dancers divided among five major dance companies (>25 members), 49 smaller companies, five major dance academies, and numerous independent dance schools.(74) The Netherlands is home to several dance festivals per year, the largest being the biennial Holland Dance Festival in the Hague, which attracts millions of visitors, dancers, companies, and choreographers from around the world.

By law, all legal residents of the Netherlands are required to have a basic health insurance package, the contents of which are determined by the government. Expatriates can keep their international medical policies if they can prove adequacy of coverage; nevertheless, health insurance is a mandatory requirement for obtaining a residence permit for the country. Under the Dutch basic insurance package, which is available to all residents, dance medicine evaluation and treatment are fully covered. Physical therapy and certain alternative medicine services are currently covered under extra health insurance, but have historically been included in the basic package.(75)

For almost one decade, the Dutch government has provided a higher reimbursement fee to clinicians at the Medical Center for Dancers and Musicians for dancer and musician patient visits, as these visits tend to be longer and more in-depth than traditional orthopedic visits, and the rate of surgery is much lower among artist patients. This allows the MCDM to continue operation, despite lower clinic volume and surgeries than other orthopedic clinics. This governmental subsidy has been in place for seven years and was recently renewed for another seven years in early 2008.(76)

The highest concentration of dancer-patients in the Netherlands are seen at the MCDM in the Hague, which has an average of 1,200 dancer-patient encounters per year and continues to grow. Additional services are provided at off-site clinics in Amsterdam located within two dance schools and the Royal Conservatorium for Music. Dance-specific physical screenings are required for young dancers prior to enrollment in professional Dutch dance academies, and many schools refer pre-professional dancers directly to the MCDM for this evaluation. Large dance schools in the Netherlands are instilling health education and intervention programs within their own dance curricula. One of the largest dance academies, the Amsterdam Theatreschool, requires all students to participate in a 'Dance and Health' education program and physical fitness training. Additionally there is a research and development program focused on injury prevention among their student population, including the Healthy Dancer Diary project. (77)

The Netherlands is home to the Dutch Performing Arts Medicine Association (Nederlandse Vereniging voor Dans- en MuziekGeneeskunde, NVDMG), with 204 medical professionals and medical students, and the Dutch Dancer's Health Care Foundation (Stitching Gezondheidszorg voor Dansers, SGD). Both of these organizations' mission statements include improving the health and well-being of dancers through the exchange of information between dancers, healthcare workers, and researchers. Towards this end, the NVDMG sponsors a biannual continuing medical education course in dance and performing arts medicine for general practitioners and surgeons in the Netherlands.

Study participation and demographic data

In the study period, 219 dancer-patients were seen, of whom 177 were eligible for the study, and of whom 154 completed surveys (87%). There were 79 first-time patients (Group 1, 51%), 43 end-treatment patients (Group 2, 28%), and 32 patients at both times (Group 3, 21%) for a total of 111 first-time patients and 76 end-treatment patients. All participants completed the demographics survey, 97% of first time patients completed the HCA, 80% completed the Perceptions 1, and 100% of end-treatment patients completed Perceptions 2 questionnaires. Seventy-six percent of first-time patients (N=84) and 94% of end-treatment patients (N=71) completed the BSI, for an overall BSI response rate of 85%. Among those who did not complete surveys, the primary reason was lack of time prior to the appointment, particularly for first time patients who had to fill in multiple questionnaires. Five children were less than 13 years (3%), and twelve patients were non-native Dutch speakers (8%); therefore, these individuals were not eligible for the BSI.

The three groups did not differ significantly in terms of age ($F(2)=0.89$, $p=0.41$), gender ($\chi^2(2)=0.84$, $p=0.68$), years danced ($F(2)=0.21$, $p=0.81$), dance style ($\chi^2(16)=26.0$, $p=0.06$), experience level ($\chi^2(4)=8.22$, $p=0.08$), anatomical distribution of injury ($\chi^2(46)=39.7$, $p=0.73$), number of injuries ($F(2)=0.69$, $p=0.50$), or time to seek medical treatment ($F(2)=0.16$, $p=0.85$). Groups differed in duration of injury (Group 1, 12.3±18.9 months; Group 2, 32.9±37.5; Group 3, 25.3±37.1; $F(2)=7.05$, $p<0.001$). Overall demographic data for study participants is presented in Table 1.

Table 1. Dancers' demographic data

	Total dancers (N=154)		Younger dancers (<35y, N=121)		Older dancers (≥35y, N=33)		Significance
Descriptive data	Mean ± SD	Range	Mean ± S.D.	Range	Mean ± S.D.	Range	p-value
Age (years)	27.2 ± 13.8	(9-75)	21.0 ± 5.3	(9-34)	50.0 ± 11.7	(35-75)	<0.001
Years danced	16.9 ± 12.1	(0-69)	12.8 ± 6.0	(2-27)	33.6 ± 12.8	(5-69)	<0.001
Body mass index (kg/m^2)	20.8 ± 2.7	(12-29)	20.4 ± 2.4	(12-29)	22.4 ± 3.3	(18-30)	<0.001
Dance styles	2.0 ± 1.2	(1-5)	2.1 ± 1.2	(1-5)	1.3 ± 0.53	(1-3)	<0.001
Hours per week	19.4 ± 13.2	(1-56)	19.8 ± 12.5	(2-54)	17.8 ± 15.9	(1-56)	0.51
Hours per day	3.9 ± 2.1	(1-10)	3.9 ± 2.0	(1-10)	3.6 ± 2.3	(1-8)	0.54
Frequency data			N	%	N	%	
Gender							
Male	29	18.8%	20	16.5%	9	27.3%	
Female	125	81.2%	101	83.5%	24	72.7%	
Dance level							
Professional	53	34.4%	35	28.2%	18	54.5%	
Student	59	38.3%	58	48.7%	0	0.0%	
Amateur	42	27.3%	28	23.1%	14	42.4%	
Dance style							
Classical	78	50.9%	66	54.5%	12	36.4%	
Modern	74	48.3%	69	57.0%	5	15.1%	
Jazz	59	38.6%	54	44.6%	5	15.1%	
Folk	23	13.1%	16	13.2%	2	6.1%	
HipHop/Street	18	11.8%	20	16.5%	3	9.1%	
Latin/Ballroom	18	11.8%	10	8.3%	8	24.2%	
Show/Musical	16	10.5%	15	12.4%	1	3.0%	
Other	11	7.2%	7	5.8%	4	12.1%	

As shown, the majority of study participants were female (N=125, 81%). Eighty-percent of patients were under 35 years of age (N=121), and the average age was 27.2 ± 13.8 years. Average ages of the younger and older groups were 21.0 ± 5.3 years and 49.7±11.6 years, respectively (t= -20.6, p<0.001). The majority of the young population was comprised of students, 47.9% (N=58), and both professionals and amateurs were significantly older than the student group (33.4±13.3 vs. 30.3±16.8 vs. 19.4±6.0 years, respectively; $F(2)$=19.9, p<0.001). All dancers in the older group were either former

professionals or amateur dancers (54.5% and 42.4%, respectively) who had more years of dance experience than students (23.6±13.2 vs. 16.9±16.8 vs. 11.3±5.2 years, respectively; $F(2)=16.4$, $p<0.001$).

Modern dance (57.0%), classical ballet (54.5%), and jazz (44.6%) were the most common dance styles among the younger group, versus ballet (36.4%) and social dance (Latin and ballroom, 24.2%) among older dancers. Younger dancers danced more styles (2.1±1.2 vs. 1.3±0.53 vs., $t=3.7$, $p<0.001$) but amount danced per day and per week were the same between younger and older groups (18.8±11.7 vs. 17.8 hrs/wk, $t=1.7$, $p=0.51$; 3.9±2.0 vs 3.6±2.3 hrs/day, $t=0.61$, $p=0.54$).

Objective 2: Dance injuries and physical outcomes of Dutch dancers

Injury data is presented in Table 2. Dancers sustained an average of 1.5±1.2 injuries. On average, younger dancers reported more musculoskeletal complaints (up to 11), than older dancers (up to 4), but the injury rate (according to physician diagnosis) was similar between younger and older dancers (1.55±1.27 vs. 1.42±0.76, respectively, $t=-0.52$, df=152, p=0.60). The most frequent location of injury was in the knee (30%), followed by forefoot injuries (33% in older dancers vs. 18% in younger dancers, $\chi^2=3.5$, df=1, p=0.06). Younger dancers had approximately three times as many ankle injuries (14% vs. 4.7%, $\chi^2=3.9$, df=1, p=0.05). Hip and groin problems were approximately the same among younger and older dancers (14% vs 12%, respectively, $\chi^2=0.04$, df=1, p=0.8). Only six injuries necessitated surgery within the study period, evenly divided between younger and older dancers.

Table 2. Dance-related injury data

	Total dancers (N=154)		Younger dancers (<35y, N=121)		Older dancers (≥35y, N=33)		Significance
Descriptive data	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	p-value*
Injuries per dancer	1.5 ± 1.2	(1-6)	1.6±1.3	(1-6)	1.4±0.8	(1-4)	0.60
Duration of injury (months)	20.6 ± 25.3	(0-120)	17.8 ± 25.3	(0-120)	31.6 ± 44.8	(0-120)	0.03
Pain (mm)**							
Before treatment	33.9 ± 27.8	(0-98)	34.0 ± 28.3	(0-98)	32.6 ± 25.4	(0-84)	0.83
After treatment	25.3 ± 26.2	(0-94)	28.2 ± 27.1	(0-94)	16.3 ± 19.5	(0-57)	0.05
Artistic hindrance (mm)**							
Before treatment	56.0 ± 32.8	(0-100)	58.0 ± 32.6	(0-100)	49.3 ± 33.5	(0-95)	0.29
After treatment	37.5 ± 32.6	(0-100)	42.6 ± 32.8	(0-100)	23.7 ± 28.5	(0-83)	0.03
Frequency data	N	%	N	%	N	%	
Distribution of injuries	**(N=154)**		**(N=121)**		**(N=33)**		
Upper extremity	19	8.5 %	16	8.9%	3	7.0%	
Spine	29	13.1%	23	12.8%	6	14.0%	
(Lower)	(17)	(59.0%)	(12)	(52%)	(5)	(83%)	
Hip/groin	30	13.5%	25	14.0%	5	11.6%	
Knee	65	29.3%	52	29.1%	13	30.2%	
Ankle	27	12.2%	25	14.0%	2	4.7%	
Forefoot	46	20.7%	32	17.9%	14	32.6%	
Miscellaneous	6	2.7%	6	3.4%	0	0.0%	
Total number of injuries	222	100%	179	100.1%	43	100.1	
Injury location†	**(N-115)**		**(N=95)**		**(N=20)**		
Technique class	29	25.2%	24	25.3%	5	25.0%	
Rehearsal	19	16.5%	16	16.8%	3	15.0%	
Performance/Stage	11	9.6%	9	9.5%	2	10.0%	
Unrelated to dance	20	17.4%	18	18.9%	2	10.0%	
Unknown	36	31.3%	28	29.5%	8	40.0%	
Perceived cause	**(N=154)**		**(N=121)**		**(N=33)**		
Twist/sprain	26	16.9%	19	15.7%	7	21.2%	
Overuse	35	22.7%	30	24.8%	5	15.1%	
Technical failure	14	9.1%	13	10.7%	1	3.0%	
Age/degeneration	7	4.7%	3	2.5%	4	12.1%	
Break/accident	3	2.0%	3	2.5%	0	0.0%	
Unknown	66	40.9%	50	41.3%	16	48.5%	

* P-value obtained from the Student's t-test for continuous variables

** Measured by a manual 100mm Visual Analogue Scale

† Data collected from HCA survey of first-treatment patients

The majority of dancers' injuries were chronic conditions. Average duration of injury was significantly longer among older dancers than their younger colleagues (31.6 months vs. 17.8 months, t=2.2, p=0.03, Table 2). Eighty percent of dancers continued dancing despite being injured. Average reduction in hours danced per week due to injury was 25%. Professionals danced the most number of hours per week before injury (25.4±14.2 vs. 20.9±10.9 vs. 7.6±6.0 hours; $F(2)$=21.1, p<0.001) and while injured (16.8±13.9 vs. 14.3±11.0 vs. 6.4±6.11 hours; $F(2)$=7.5 p<0.001) than students or amateurs, respectively. Older dancers were more likely to continue to dance when injured than younger dancers (100% vs. 82%, $\chi^2(1)$=5.1, df=1, p=0.02), despite similar pain and perceived level of artistic compromise (pain: 32.6 vs. 34.0 mm on the VAS, t=0.22, p=0.83; artistic hindrance: 49.3 vs. 58.0 mm on the VAS, t=1.1, p=0.29, respectively).

The majority of dancers did not know what caused their injury (41-49%), nor the setting in which the injury occurred (29-40%, Table 2). Among the known causes of injuries, older dancers reported twist/sprain most frequently (21% vs 17%), whereas younger dancers reported overuse (25% vs 15%), but these responses were not significantly different (χ^2=0.56, df=1, p=0.45, and χ^2=1.37, df=1, p=0.24). However, older dancers' injuries were significantly more likely to be due to degenerative or arthritic factors than the younger dancers' injuries (12% vs. 2.5%, χ^2=5.56, df=1, p=0.02); and younger dancers reported more technical failure, such as landing inappropriately from a jump, than older dancers (11% vs. 3%, χ^2=3.89, df=1, p=0.05). Among the known settings in which injuries occurred, technique class was most common in both groups (26%). Younger dancers were more likely to have injuries in rehearsal

(17%) or in non-dance activities (18%) than older dancers (11%), but given the small number of older dancers who answered this question, significance was not achieved.

Dancers perceived pain and level of artistic compromise as different features of the injury process. Artistic compromise due to injury was consistently reported higher than somatic pain, both pre-treatment (56.0±32.8 vs. 33.9±27.8 mm, t= 6.6, p<0.001) and post-treatment (37.5±32.6 vs. 25.3±26.2 mm, t= 4.1, p<0.001), as shown in Table 2. While higher levels of pain were correlated with higher levels of artistic compromise both pre-treatment (Pearson's r=0.468, p<0.001) and post-treatment (r=0.523, p<0.001), 14% of first- and 23% of last-visit dancers with no pain reported significant residual artistic compromise (first-visit, 0.0mm pain vs. 49.5±27.3 mm AC, t=2.95, p<0.001; last-visit, 0.0mm pain vs. 35.4±28.3 mm AC, t=2.7, p<0.005). Furthermore, level of pain was not significantly improved with treatment (33.9±27.6 vs. 25.3±25.5 mm, t=1.6, p=0.1), whereas level of artistic compromise was significantly minimized (56.0±32.0 vs. 37.5±34.8 mm, t=3.2, p=0.002).

Overall, dancers did not differ in pain (F(2)=0.09, p=0.9) or perceived artistic compromise (F(2)=1.7, p=0.2) by dance experience level. However, among dancers with high levels of pain (>50.0mm, N=41, 29%), the majority were young (83%), and/or pre-professional students (49%). Patients with high artistic hindrance (>50.0mm, N=73, 52%) were also predominately young (82%) and/or students (41%). With treatment, older dancers showed significant reduction in pain (36.5±26.1 vs. 14.5±14.2 mm, t=2.3, p=0.03) and artistic compromise (59.8±32.0 vs. 29.0±32.0 mm, t=2.1, p=0.04). Younger dancers showed change in degree of artistic compromise only (59.3±32.4 vs. 40.5±35.4 mm, t=2.5, p=0.02), whereas pain levels remained constant (33.1±28.2 vs. 27.9±27.3

mm, t=0.8, p=0.4). Pain and artistic compromise did not differ significantly among dancers of different styles, gender, or anatomic location of injury.

Objective 3: Health care access and perceptions of the medical industry

Dancers' choices for first treatment providers when injured are presented in Table 3. Dancers most often sought first treatment from either a physiotherapist (36-40%) or a medical doctor, including both general practitioners (*huisarts*) and specialists (38.8-40.8%). These choices did not depend on age (U= 805, Z=-1.14, p=0.2). However, older dancers were more likely than younger dancers to "wait-and-see" for themselves whether an injury would get better, rather than seek treatment (14% vs. 4%, χ^2=4.1, df=1, p=0.05). Average time to seek treatment from a medical doctor was also four times longer among older than younger dancers (8.4 vs. 2.1 months, t=3.0, p=0.004). Only one patient in each group sought first treatment from a complementary or alternative medicine provider: one younger patient sought a chiropractor, and one older patient sought an acupuncturist.

Table 3. Access and perceptions prior to treatment with dance medicine specialist

	Younger dancers (<35y)		Older dancers (≥35y)		Significance
	Mean ± SD	Range	Mean ± SD	Range	p-value*
Time to seek medical treatment (months)	2.1 ± 5.8	(0-48)	8.4 ± 16.0	(0-48)	0.004
First treatment provider sought[†]	**(N=90)**	%	**(N=22)**	%	0.2
Teacher	14	15.5%	1	4.5%	
Physiotherapist	36	40.0%	8	36.4%	
*Allied health***	1	1.1%	1	4.5%	
General practitioner	22	24.4%	6	27.2%	
Medical specialist	13	14.4%	3	13.6%	
Wait-and-see	4	4.4%	3	13.6%	
Satisfaction with prior medical treatment[†]	**(N=80)**	%	**(N=18)**	%	0.2
Very satisfied	18	22.5%	9	50.0%	
Satisfied	24	30.0%	3	16.7%	
Neutral	26	32.5%	2	11.1%	
Mod. Dissatisfied	9	11.3%	4	22.2%	
Dissatisfied	3	3.8%	0	0.0%	
Confidence in full recovery[†]	**(N=72)**	%	**(N=20)**	%	0.03
Completely confident	12	16.7%	2	10.0%	
Moderately confident	32	44.4%	6	30.0%	
Neutral	23	34.7%	9	45.0%	
Not very confident	1	1.4%	3	15.0%	
Not at all confident	2	2.8%	0	0.0%	

* P-value obtained via student's t-test for continuous variables, and Mann-Whitney U test for nonparametric variables

** Includes: complementary and alternative medicine practitioners, masseurs, and chiropractors

[†] Data collected from HCA survey of first-treatment patients

Few logistical or perceptual restrictions to health care were reported by dancers in the study: only three younger dancers lacked a primary care physician in the Netherlands, and all were expatriates with foreign medical insurance policies. Reasons for not seeking treatment from a medical doctor first for the injury are listed in Table 4. Younger and older dancers' responses did not significantly differ (U=128, Z=-1.7, p=0.08). The primary reason in both groups for not seeking treatment from a physician first was that the dancers had access to an on-site physiotherapist through their dance academy/company or had pre-existing/on-going physiotherapy sessions. Approximately

one-third of dancers expected the problem to go away on its own, or with help from the other treatment sources, before it was necessary to see a doctor. No dancer reported monetary or insurance hindrances to acquiring an appointment, or fear of going to the doctor. A small percentage of the younger group (18%), but none of the older dancers, reported that they felt the doctor would not understand them; this difference did not achieve significance (χ^2=2.2, df=1, p=0.14).

Table 4. Dutch dancers' reasons for not seeking initial care from a medical doctor

	Younger dancers (<35y)		Older dancers (≥35y)	
Statements	N=35	%	N=11	%
"I didn't have a general practitioner"	3	8.6	0	0.0
"I couldn't afford the appointment"	0	0.0	0	0.0
"I thought it would take too long to get an appointment"	4	11.4	1	9.1
"I thought the problem would go away without a doctor's help"	10	28.6	4	36.4
"I was afraid"	0	0.0	0	0.0
"I thought the doctor wouldn't understand me"	6	17.1	0	0.0
Other:				
"There is a physiotherapist on-site at my school/company" or " I already have a physiotherapist"	12	34.3	6	54.5

Dutch dancers reported a positive relationship with the medical profession, including high satisfaction and confidence pre- and post-treatment (Tables 3 and 5, respectively). Overall, there was no difference in satisfaction with medical care prior to treatment at the dance medicine specialty clinic between young and old dancers (U=571, Z=-1.42, p=0.16). The majority of dancers in both groups were satisfied or very satisfied with their medical treatment prior to presenting to the dance medicine specialist (67% older dancers vs. 52% younger, χ^2=1.19, df=1, p=0.2, Table 3). Among those patients

who reported neutral to dissatisfied feelings towards prior medical care, younger dancers were more likely to report neutrality (33% vs 11%, χ^2=3.9, df=1, p=0.05). However, younger dancers were more confident than older dancers in a full recovery prior to being seen by the dance medicine doctor (61% vs. 40%, χ^2=3.8, df=1, p=0.06).

Time to receive an appointment with the dance orthopedic surgeon at the MCDM was an average of 2 weeks, with no difference between older and younger dancers (12.9 vs. 15.8 days, p=0.48, Table 5). Nearly every dancer seen in the clinic was satisfied or very satisfied after treatment by the surgeon (100% older dancers vs. 93% younger dancers, Table 5); however older dancers were significantly more likely to report very high satisfaction than younger dancers (U=355, Z=-2.5, p=0.012). Confidence after treatment did not differ between groups; approximately 80% of dancers in each group were moderately or completely confident in a full recovery. The distribution of confidence responses also did not differ (U=319, Z=-0.84, p=0.4).

Table 5. Health care access and perceptions post-treatment with dance medicine specialist

	Younger dancers (<35y)		Older dancers (≥35y)		Significance
	Mean ± SD	Range	Mean ± SD	Range	p-value*
Time to receive appointment (days)	15.8 ± 14.7	(1-90)	12.9 ± 11.7	(1-35)	0.40
Satisfaction with treatment	**(N=55)**	%	**(N=19)**	%	0.01
Very satisfied	32	58.2%	17	89.5%	
Satisfied	19	34.5%	2	10.5%	
Neutral	3	7.3%	0	0.0%	
Confidence in full recovery	**(N=49)**	%	**(N=15)**	%	0.3
Completely confident	17	34.7%	3	20.0%	
Moderately confident	22	44.9%	9	60.0%	
Neutral	7	14.3%	1	6.7%	
Not very confident	3	6.1%	1	6.7%	
Not at all confident	0	0.0%	1	6.7%	

* P-value obtained via student's t-test for continuous variables, and Mann-Whitney U test for nonparametric variables

Objective 4: Psychological health of injured Dutch dancers

Overall psychological distress

The psychological distress of injured Dutch dancers in this study, as measured by the BSI, is shown numerically in Table 6 and pictorially in Figure 1. As depicted, a high level of psychological distress was detected both pre- and post- treatment of the dance-related injury. Pre-treatment injured dancers scored above average than the normative population in eight of ten BSI dimensions (exceptions: COG, FOB), and post-treatment dancers scored above average in five of ten dimensions (exceptions: COG, INT, HOS, FOB, PAR).

Table 6. Overall BSI scores

Symptom	**First-visit patients (**N=84)			**Last-visit patients** (N=71)		
	Raw score*	**Clinical score****		**Raw score***	**Clinical score****	
Somatic	.40±.41	5	*Above average*	.39±.48	5	*Above average*
Cognitive	.63±.57	4	*Average*	.53±.56	4	*Average*
Interpersonal sensitivity	.59±.68	5	*Above average*	.45±.60	4	*Average*
Depressive	.40±.55	5	*Above average*	.43±.64	5	*Above average*
Anxious	.48±.49	5	*Above average*	.39±.47	5	*Above average*
Hostile	.39±.45	4	*Average*	.31±.53	4	*Average*
Phobic	.21±.35	5	*Above average*	.19±.24	3	*Below average*
Paranoid	.46±.47	5	*Above average*	.37±.45	4	*Average*
Psychotic	.31±.51	5	*Above average*	.26±.43	5	*Above average*
Overall distress	.42±.39	5	*Above average*	.42±.50	5	*Above average*

* Reported as Mean ± SD

* Scoring according to the normtable of non-patient community respondents provided by the BSI user manual.[1]

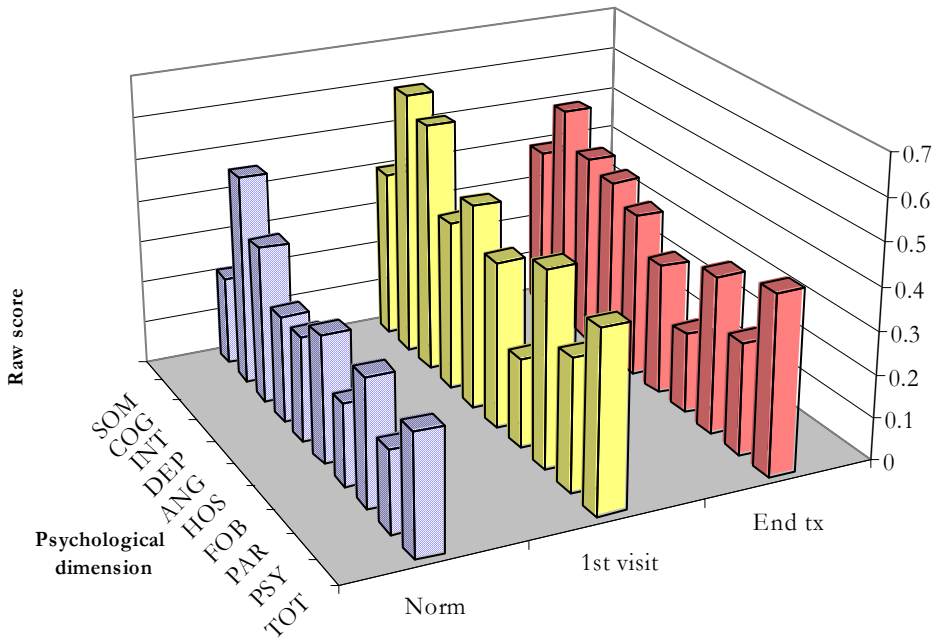

Figure 1. BSI scores of normative Dutch population, pre-treatment injured dancers, and post-treatment injured dancers.

Sixty percent of all injured dancers required referral to a clinical psychologist or psychiatrist based on BSI scores, having scored at least two standard deviations above the norm (clinical score ≥6) in at least one of the nine psychological dimensions, as shown in Table 7. This statistic was unchanged with treatment (63.0% first-visit patients vs. 56.4% end-treatment, $\chi^2(1)=0.4$, $p=0.67$).

Table 7. Number of patients requiring referral, and mean number of referable psychological dimensions per patient

	First-visit patients		Last-visit patients		First-visit dimensions*	End-treatment dimensions
	N	%	N	%		
Professionals	27	55.6	18	61.6	5.2±3.3	3.6±2.7**
Students	34	61.8	27	70.8	4.0±3.1	4.7±3.0
Amateurs	21	66.7	26	42.3	2.6±1.8	2.8±2.3
Overall	82	61.4	71	58.2	3.9±3.0	4.0±2.9

*Mean ± S.D
** Change significant at p=0.05

Among patients who warranted referral, symptoms commonly ran in clusters, with a mean of 4.0 clinically significant dimensions per patient, both pre- and post-treatment (Group 1, 3.6±3.0 vs. Group 2, 4.0±3.0 dimensions, t=-0.64, p=0.59; Group 3 pre-treatment 4.5±2.9 vs. post-treatment 3.9±2.5 dimensions, t=1.3, p=0.21). Somatic, cognitive, interpersonal sensitivity, paranoid, and hostile symptoms were the grounds for most referrals among first-visit dancers, and somatic, cognitive, anxious, and paranoid symptoms were the grounds among last-visit dancers, as shown in Table 8. Of the Global Indices, 20% of all dancers had an overall psychological distress level (GSI) that was high (6), or very high above (7) the global distress level of the normative population; these patients represented the most highly distressed patients in the study.

Table 8. Symptoms requiring clinical referral*

Symptom	First-visit (%, N=82)**	Last-visit (%, N=71)**
Somatic	29.8	26.8
Cognitive	27.4	25.4
Interpersonal sensitivity	27.4	22.5
Depressive	21.4	23.9
Anxious	23.8	26.8
Hostile	26.2	21.1
Phobic	14.5	15.5
Paranoid	27.4	23.9
Psychotic	21.4	19.7
Overall distress	16.7	22.5

*BSI score ≥ 6
** Sum ≠ 100%, pts had on average 4 referable symptoms

Eighty-eight percent of all first- and 76% of all last-visit dancer patients scored above average (>5 points) than the general population in at least one BSI dimension, with a mean of 5.2 above average dimensions (Group 1, 5.3±2.9 vs. Group 2, 5.4±3.2 dimensions, t=1.1, p=0.29; Group 3 pre-treatment, 5.3±3.7 vs. post-treatment 4.7±3.8 dimensions, t=1.9, p=0.06). Forty-six percent of dancers had an above average GSI distress level compared to the normative population.

Dutch dancers at-risk for elevated psychological distress

On adjusted ANOVA, male and female dancers did not differ in any BSI dimension, nor was there a significant correlation between dance style or anatomical injury and BSI scores. High pain and high artistic compromise (i.e. >50.0mm on the VAS) were independently associated with higher somatic scores in the pre-treatment group only (F(1)=4.1, p=0.05; F(1)=5.2, p=0.03).

Pre-treatment professionals suffered the highest psychological distress compared to amateurs and students ($F(2)=3.2$, $p=0.05$) as shown in Table 7. Professionals had substantially more clinical symptoms than amateurs (5.2±3.3 vs. 2.6±1.8 clinical dimensions, $t=2.3$, $p=0.02$), and slightly more than students (5.2±3.3 vs.4.0±3.1, $t=1.2$, $p=0.2$). However, unlike the other two groups, professional dancers significantly decreased in number of clinically referable symptom dimensions over the course of treatment (5.2±3.3 vs. 3.6±2.7, respectively, $t=2.1$, $p=0.05$). Post-treatment, students had the highest number of retained symptomatic distress compared to amateurs (4.7±3.0 vs. 2.8±2.3, respectively, $t=2.0$, $p=0.04$) and professionals (3.6±2.7, $t=1.2$, $p=0.2$).

This trend was reproduced across the nine BSI symptom categories and global score, as shown in Table 9 and pictorially in Figure 2. In the pre-treatment group, professionals and students scored above average levels of distress in 90% of the BSI dimensions. Post-treatment, professionals had significant statistical and clinical reduction in all but depressive, paranoid, and psychotic symptoms. Students continued at the same, or worse, levels of distress. Amateurs' BSI scores were "average" or "below average" both pre- and post-treatment.

Table 9. BSI scores by artist level, pre- and post-treatment

	Professionals				Students				Amateurs			
	First-visit (N=27)		End-treatment (N=15)		First-visit (N=33)		End-treatment (N=25)		First-visit (N=22)		End-treatment (N=24)	
Symptoms	R[†]	C[‡]	R	C	R	C	R	C	R	C	R	C
Somatic	.51±.43	5	.28±.26**	4	.42±.47	5	.66±.61	6*	.24±.2	4	.18±.23	4
Cognitive	.84±.72	5	.43±.44**	4	.60±.53	4	.77±.65	5	.43±.35	4	.32±.42	3
Interpersonal sensitivity	.63±.75	5	.42±.75**	4	.62±.73	5	.62±.66	5	.49±.49	4	.28±.36	4
Depressive	.54±.74	5	.37±.66	5	.40±.49	5	.68±.79	6*	.28±.40	4	.19±.25	4
Anxious	.56±.64	5	.39±.43**	4	.47±.48	5	.58±.56	5	.14±.27	3	.18±.29	4
Hostile	.36±.49	4	.13±.20*	3	.42±.47	5	.51±.70	5	.38±.30	4	.22±.38	4
Phobic	.27±.45	5	.16±.24**	3	.20±.30	5	.31±.35	5	.19±.28	3	.10±.18	3
Paranoid	.49±.53	5	.32±.36	4	.48±.51	5	.48±.54	4	.33±.21	4	.27±.39	4
Psychotic	.39±.62	5	.25±.34	5	.34±.52	5	.38±.56	5	.18±.23	3	.12±.23	3
Overall distress	.52±.5	5	.32±.31**	4	.43±.38	5	.55±.45	5	.31±.42	4	.22±.24	4

[†] Raw score

[‡] Clinical scores as determined by the BSI manual. 3=below average, 4=average, 5=above average, 6=high, relative to non-patient community respondents

* Change in raw score significant at p=0.05

** Change in raw score significant at p=0.005

The results of the BSI scores for professionals, students, and amateurs further stratified by age (25 years) are shown in Table 10. BSI scores were also stratified with an age cut-off of 35 years, but this data is not shown. Students could not be compared using these age cut-offs, as only one student was more than 25 years old (see *Methods*). In the pre-treatment group, both old and young professionals scored above average on 90% of BSI parameters, irrespective of the age cut-off (*i.e.*, at both 25 and 35 years). However, end-treatment professionals over 35 years old scored above average on only 20% (PAR and PSY), whereas those under 35 years scored above average on 70% of dimensions. Professionals over 25 years scored above average on 1 dimension (PSY) after treatment (10%), whereas those under 25 years remained above average on 9 dimensions. Students displayed a persistent level of elevated distress, scoring "high" or "above average" in all BSI dimensions. Young and old amateurs had "average" BSI scores on the majority of

dimensions, and either stayed at an average distress level or dropped to "below average" after treatment.

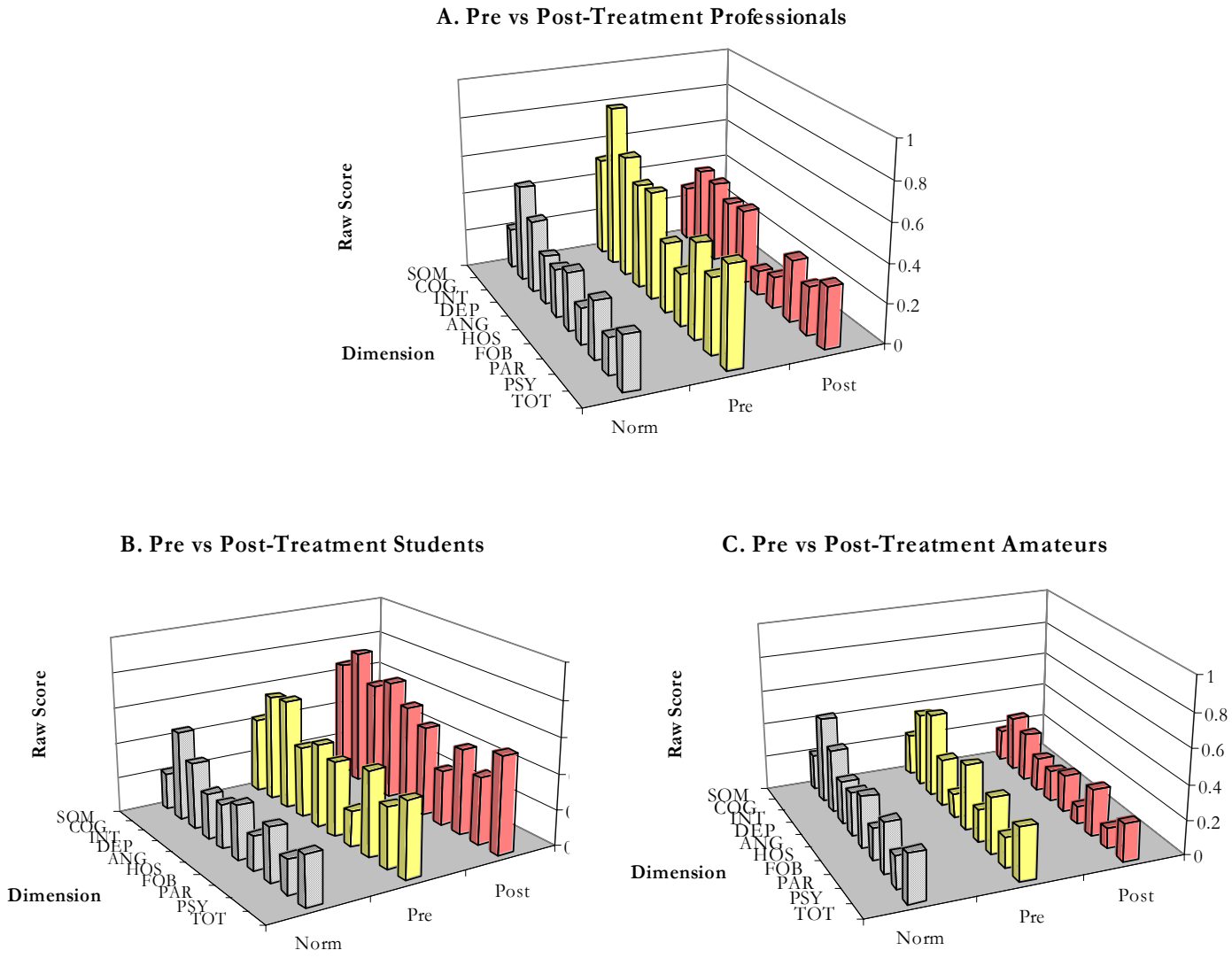

Figure 2. Psychological distress among professionals, students, and amateurs

Table 10. Clinical scores[‡] by age and professional status, pre- and post-treatment

	Professionals				Students				Amateurs			
	< 25 y		>25 y		<25 y		>25 y		<25 y		>25 y	
Symptoms	Pre (N=10)	Post (N=3)	Pre (N=17)	Post (N=12)	Pre (N=32)	Post (N=25)	Pre	Post	Pre (N=11)	Post (N=11)	Pre (N=12)	Post (N=12)
Somatic	6	5	5	4	5	6	--	--	4	4	5	4
Cognitive	6	3*	5	4	4	5	--	--	4	3	4	4
Interpersonal sensitivity	4	5	5	4*	5	5	--	--	4	4	4	3
Depressive	5	6	5	4*	5	6	--	--	4	3	5	4
Anxious	5	6	5	4	5	5	--	--	5	4*	5	4*
Hostile	5	4	4	3*	5	5	--	--	4	3	5	4
Phobic	5	3	5	3*	5	5	--	--	3	3	3	3
Paranoid	5	5	5	4	5	5	--	--	4	4	5	4
Psychotic	5	4	5	5	5	5	--	--	3	3	3	3
Overall distress	5	5	5	4*	5	5	--	--	4	3	4	4

[‡] Clinical scores as determined by the BSI user manual. 3=below average, 4=average, 5=above average, 6=high, relative to non-patient community respondents
* Change in associated raw score significant at p=0.05

Change in BSI scores with injury resolution

Group 3 patients were used to determine change in psychopathological symptomatology with injury resolution, as the same patients were evaluated before and after treatment of the dance injury. In this group, 59% of pre- and 55% of post-treatment patients had at least one clinically referable dimensional symptom (4.5±2.9 vs. 3.9±2.5 dimensions, t=1.3, p=0.21). On the group level, there was no change in the number of patients with high distress (GSI, 20.7%), or in the frequency of clinically significant cognitive (24.1%), depressive (24.1%), anxious (20.7%), paranoid (27.6%), or psychotic (27.6%) symptoms pre- and post-treatment. The biggest change between groups was seen in somatic (31.0% vs. 20.7%), hostile (27.6% vs. 20.7%), and particularly phobic symptoms (20.7% vs. 10.4%).

On a case-by-case basis, among pre-treatment patients who met minimum requirements for referral (N=17), only one patient (6%) did not warrant referral at the end of treatment. Seven patients (41%) decreased their number of clinical symptoms with treatment, six patients (35%) had the same number of symptoms, and four patients (24%) increased in number of clinical symptoms; however, no patient went from not needing referral pre-treatment to requiring it at the end of treatment.

Of the nine symptom categories, the greatest number of patients clinically changed (from a pre-treatment score of ≥6 to post-treatment score ≤ 5) in phobic (50%), somatic (44%), hostile (38%), and paranoid complaints (38%), as shown in Table 11. Cognitive, depressive, interpersonal sensitivity, and psychotic symptoms were less likely to clinically improve with treatment of the dance-related injury.

Table 11. Changes in psychological distress among individual patients*

Symptoms	Pre-treatment score ≥6 (N)	Post-treatment score ≤5 (N)	Percentage change (%)
Somatic	9	4	44
Cognitive	7	1	14
Interpersonal sensitivity	10	3	30
Depressive	7	2	28
Anxious	6	2	33
Hostile	8	3	37.5
Phobic	6	3	50
Paranoid	8	3	37.5
Psychotic	7	2	28.5
Overall distress	6	2	33

* Defined as a change in BSI score from 6 to 5 in one individual measured prior to, and after, treatment of 3 months

Discussion

This study was the first to examine the current health care situation—and specifically the psychological health—of dancers in the Netherlands, a country which has remained largely underrepresented in the performing arts medicine research literature, in an attempt to discover new ways for ameliorating the plight of fallen dancers, and to identify areas which have yet to be improved. This discussion will therefore be broken down per objective into the "lessons learned" from the Netherlands.

Objective 1: The performing arts and performing arts medicine industries in Holland

Lesson: The importance of a "Polder Model" approach to the care of injured dancers

The results suggest that despite being a small country, the performing arts and performing arts medicine industries in the Netherlands are thriving; however, more importantly, these industries are interconnected by national and local initiatives to improve dancers' healthcare:

The current national infrastructure ensures that all inhabitants of the Netherlands (both citizens and expatriates) are offered and covered by basic Dutch health insurance. This implies that all members of Dutch society, and therefore all dancers, have access to a general practitioner, primary care, and prescription medicine. The solidarity of the primary care field is exemplified, according to the author, by the fact that emergency rooms in Holland are even allowed to send patients home to their *huisarts* ("house doctors" or general practitioners), should their presenting condition be deemed non-

emergent. This is in stark contrast to the situation in the United States, where primary care is a struggling field and emergency rooms are increasingly being used for primary care services by the uninsured, where it is not a crime to be uninsured, and where the majority of dancers fall in the 40 million strong pool of uninsured Americans.

In return for the mandate that all Dutch citizens purchase health insurance, the government of the Netherlands ensures the vitality of the field of performing arts medicine via subsidies for providers who treat performing artists. This assistance ensures the survival of dance medicine clinics, as mentioned in *Results*, which would otherwise struggle financially due to the unique nature of the dancer-patient visit (e.g., lengthiness of the average dancer's visit, uniqueness of the injuries, profound psychosocial ramifications of the injury, and a strong predilection for non-operative management).

The national government's shared responsibility, or give-and-take approach, to the health and wellbeing of dancers is also reflected within the performing arts and performing arts medicine organizations within Dutch society. This study revealed that internal to the Netherlands is a very tight system of networks and referrals between dance institutions and the MCDM, NVDMG, and SGD. Knowledge of the MCDM's services is widespread throughout the Netherlands, Belgium, Germany, France, and UK and dancers are referred from all over the country and Europe for treatment. The MCDM gives back to the community as a whole by providing this treatment and dancers' screening examinations, interacting with the government to continue funding for dance medicine visits, and serving as the home base for the NVDMG.

In addition to the reciprocation between medical and dance communities, within each community itself was a united effort to increase awareness of dancer's health issues.

For example, the Dutch Performing Arts Medicine Association has performed extensive legwork to increase knowledge and training among the general medical community to deal with dance medicine issues themselves. In return for participation within PAM, the physicians receive CME credit. Within the dance community, the dance institutions reach out to their students through health education courses, and the dancers provide feedback in the form of online diaries and volunteering for research studies. Indeed, the Netherlands seems to have created microcosms of united efforts at each layer of society in a top-down approach to tackle dancers' health.

However, this teamwork between the government, insurers, providers, dance teachers, institutions, and students was not found to be specific to the PAM industry of the Netherlands, rather was a common feature of daily Dutch life. Repeatedly, interviewees in this study were proud to educate the author about Dutch culture, and in specific, about a general but very important tenet of Dutch society called the "Polder Model" approach. (78) This principle was brought up too often to be dismissed as irrelevant to the outcome of fallen dancers in the Netherlands. In brief, the Netherlands is below sea level and built on polders, or tracts of low lands reclaimed from the sea and protected by dikes. The phrase "polder model" dates back to the Middle Ages, when competing or warring cities in the same polder were forced to set aside their differences to maintain the dikes, lest they all be flooded by the North Sea. In recent times, the polder model has increasingly been used to describe Dutch politics and businesses,(79, 80) and refers to the ability to cooperate despite differences for the betterment of society as a whole. This pluriformity has been clearly shown to infiltrate the PAM industry, and thus

represents the first lesson learned from the Netherlands about creating a successful health care infrastructure for performing artists.

Objective 2: Dance injuries and physical outcomes of Dutch dancers

Lesson: Pain and artistic compromise are separate features of the injury process

The benefits of the current PAM industry in the Netherlands were apparent in certain physical outcomes of dancers in the study, such as a low injury rate, but overall the epidemiology of dance-related injuries and type of injuries seen in the Netherlands were not different from injuries cited elsewhere. Quantity, distribution, and mechanism of injury reported in this study were unchanged from a study at the MCDM 15 years prior, and similar to available data from other parts of the world. (9, 17, 19, 25, 26, 31, 32, 52) It is difficult to compare injury incidence data across studies due to differences in reporting, but approximately 1.5 injuries per Dutch dancer is at the lower boundary of what has been reported in the literature (1.25-4.6 injuries/dancer).(15, 63, 64) Additionally, surgical rates have not been published about dancers elsewhere, but the surgical rate in this study of 4% (6 individuals out of 154) is exceptionally low for an orthopedic clinic.

This study's findings that dancers' injuries tend to be chronic, overuse-type injuries, mostly occurring in the knee or foot-ankle complex are also similar to other published reports. (9, 17, 19, 25, 26, 31, 32, 52) Nevertheless, the chronicity of the injuries is concerning. On average, dancers reported that they had their injuries for one and a half years, despite being treated by a medical doctor after approximately 5 months of injury. Both of these measurements were assessed by retrospective self-report.

Therefore, it is uncertain how accurate the measurements were, or whether the exact injury diagnosed at MCDM was the same one to which the dancer him/herself was referring on the questionnaires. The dancer and doctor may have also had differing opinions about which chief musculoskeletal complaint actually constituted his/her primary injury (versus general musculoskeletal aches and pains, somatization, referred pain, secondary injury due to compensation at another injured joint, etc.) that had been bothering the dancer for the average of 20 months, because the questionnaires were administered prior to the visit with the clinician. However, if the dancers' injuries had indeed lasted 20 months, even after seeking medical treatment within 5 months, this might suggest that the injuries never fully healed or were inappropriately diagnosed/treated by the referring physician prior to the MCDM. If so, this would favor increased funding for continuing medical education classes among general practitioners, and would represent an area of improvement to be addressed within the Dutch medical community.

An additional area for improvement includes increasing awareness among dancers about the nature of their injuries—approximately 40% did not know how or where their injury occurred. This education is necessary in order to prevent injuries in the future from non-accidental causes (such as faulty technique, improper warm-up) and to improve the safety of dance facilities (such as floors).

Nevertheless, the unique lesson learned from the examination of physical outcomes of injured dancers in the Netherlands was that somatic pain and artistic compromise are different features of the injury process. This has never been studied before in the literature. Artistic compromise due to injury was consistently reported

higher than somatic pain, both pre-and post-treatment. Up to a quarter of dancers still had artistic compromise due to the physical injury, despite having no somatic pain. However, most importantly, level of artistic compromise was significantly improved with treatment, and was the only variable in this study to correlate with injury resolution (unlike pain or BSI scores). Therefore, while the VAS for artistic compromise has not yet been validated, this preliminary study suggests that it is an objectively measurable/quantifiable variable in dancers.

The clinical and practical importance of this lesson is the fact that with a VAS, the same dancer may be easily and cost-effectively monitored over time. Pain visual analogue scales are commonly used in primary care settings for this purpose.(65) However, dancers have previously been shown to have a high tolerance for pain, and the standard pain scale is not considered a useful monitoring tool in this group.(49) Therefore, in addition to monitoring BSI scores (discussed below), monitoring this variable with a simple VAS may provide useful information to physicians about injured dancers' wellbeing before, during, and after treatment.

Objective 3: Health care access and perceptions of the medical industry

Lesson 3: Improved access to specialty care improves the doctor-dancer relationship; nevertheless older and younger dancers differ in health care seeking behavior

This study was the first look at dancers' perceptions and health care seeking behavior in a country with universal access and reduced infrastructural barriers to healthcare. The results are promising because they suggest that the relationship between the medical industry and dancers is not universally dismal, as once thought. In addition,

the reduced logistical barriers of the Netherlands healthcare system, as described in *Results, Objective 1*, are not just theoretical, but effectual: improved access to care translates to more access by dancers. This is an important finding, given the historical perceptions of the doctor-dancer relationship from dancers in the rest of the world. Indeed, in the Netherlands injured dancers most often sought attention first from a medical doctor or licensed physical therapist than a non-medical provider. This is in contrast to reports elsewhere that allied health care, masseurs, and Pilates/Yoga teachers are popular resources among injured dancers.(16, 30, 52)

Most insightful into the perceptions of Dutch dancers towards the medical industry, however, were the reasons given for *not* seeking medical treatment first. The bulk of the reasoning for not presenting to a physician was because the dancers had readily available access to a physiotherapist, and moreover felt that this treatment would be sufficient. Perhaps increasing access to physical therapists in other countries is a valuable alternative to dancers if barriers to allopathic medical care are otherwise too high. A cost-benefit analysis would be helpful in this regard.

Monetary or insurance reasons were not mentioned by any dancer as being prohibiting factors to seeking or acquiring medical care. Fear of doctors in general, and fear of being misunderstood in particular, were only minor contributors to the delay in seeking allopathic evaluation. Most Dutch dancers were satisfied or more than satisfied with their treatment prior to evaluation by the dance medicine doctor and were confident in their recovery. Therefore, positive doctor-dancer relationships do exist, and the example set in the Netherlands can be used as an initiative to spearhead doctor-dancer relations elsewhere.

While Dutch dancers seemed to have good access and feelings towards the medical industry from interactions with their general doctors, these variables improved with treatment by trained performing arts medicine doctors. Dancers were seen quickly in the clinic, with only a two-week waiting time, and left treatment with greater satisfaction and confidence that at first presentation. This suggests that satisfaction and confidence are variables that can be improved in a dancer after interaction with a dance-medicine specialist. This lesson is in favor of continued dance-medicine training among medical doctors, as provided by the NVDMG, for CME credit. New York University's Harkness Center for Dance Injuries has recently also begun to offer workshops in dance medicine for interested physicians in the United States. With these new, annual courses, a longitudinal study of New York City dancers' satisfaction with doctors over time would be a valuable research endeavor.

Finally, an unexpected finding of this study was that younger and older dancers differed slightly in their perceptions of the health care industry (in terms of satisfaction and confidence) but greatly in their behavior. The most important finding was the difference in delay to seek medical treatment. Older dancers waited longer to seek treatment than their younger counterparts, and reported to manage the injury by themselves more often. Older dancers were also significantly more likely to continue to dance when injured than younger dancers, despite that pain and perceived level of artistic hindrance were similar in both groups. Therefore, an area for improvement in dancer's health, even within the Netherlands, is to equalize behaviors and perceptions among younger and older dancers.

These findings may be explained by the fact that older dancers are more experienced with injury and have acquired a higher pain tolerance. Post-retirement age dancers may also not have as pressing of a time constraint to heal. Older dancers were shown to be less confident in recovery prior to treatment with a dance medicine specialist, which may also foster reluctance to seek help for injury. However, from a health care access standpoint, another hypothesis to explain these discrepancies in behavior relates to networking. As aforementioned, there is a very tight referral system between dance academies and major dance companies in the Netherlands with the MCDM. A concern that arises from this study's results is whether once dancers have graduated or retired from these facilitative environments they also lose contact liaisons with the medical system. This is a variable to be explored, and should include younger free-lance dancers, as they also lack the support network of a company or school.

Objective 4: Psychological health of injured Dutch dancers

Lesson: Dutch dancers have a high level of psychological distress that is independent of physical injury. Young student dancers are at the highest risk for poor psychological outcome

Finally, the present study was the first to use the Brief Symptom Inventory to screen a broad range of non-psychiatric, outpatient, injured dancers. Since its creation, the BSI has shown validity and reliability as a screening tool for psychopathology in a variety of clinical research studies,(42, 65, 66, 72) but this is the first study to suggest that it is also a useful and practicable screening tool in an outpatient group of non-psychiatric

dancers to assess level of distress and need for referral to a clinical psychologist or psychiatrist.

Despite the previously mentioned benefits about the Netherlands as it pertains to injured dancers, the magnitude of psychopathology detected in this portion of the study was very concerning—sixty percent of dancers met requirements for psychiatric referral and were significantly distressed in an average of four dimensions. Improving the psychological health of injured dancers remains the largest area for improvement within the performing arts medicine industry in Holland. Eighty-percent were more distressed than the general population, and 20% had high or very high distress scores on the Global Symptom Index—the best measure of psychological discomfort.(42, 68, 69, 73) Results were similar between this study and Cohen's, in which performing artists scored significantly higher than the general adult population on 100% of dimensions.(68) These results were expected in Cohen's group of artists seeking outpatient psychotherapy, because "any group that initiates psychotherapy would be expected to have symptomatology above that of the norm." (68) However, while a certain degree of distress was *also* expected in our study population given the postulates mentioned in the introduction (i.e., *The Dancer's Plight: Mind),* the magnitude of psychopathology detected was not. These results promote further understanding of the degree of psychological impact of dance-related injury, and call for awareness among physicians to inquire about covert psychological distress in patients who may overtly present with orthopedic complaints.

The robustness of the dancers' psychological distress despite treatment was also concerning. The BSI has proven sensitivity in the detection of treatment-induced

psychological change in a variety of short- and long-term medical and psychotherapeutic interventions.(67, 72) In this three-month study, the "above average" level of distress did not change with treatment; there was no change in the number of patients needing referral pre- and post-treatment; nor was there a difference in the number of clinically significant symptoms per patient over time. Individually, clinical reduction from a score of 6 to a 5 occurred at approximately the same frequency as clinical stagnancy in scores.

There are several possible explanations for these findings. One is that the psychological recovery from injury is slower or occurs later than physical recovery, particularly if the psychological symptoms developed over time as a result of the chronicity of the injuries or chronic pain/artistic compromise, rather than at the immediate onset of physical trauma. The second is that the psychological impact of injury is more profound than the physical impact, similar to the way in which artistic compromise was determined to be a ramification of greater duration and magnitude than physical pain. Third is that there is a discrepancy between what doctors and dancers consider to be "end-of-treatment," as the end of medical treatment is not synonymous with return to 100% of pre-morbid dance level. Follow-up assessment at the end of physical therapy (if prescribed) or after self-reported return to 100% dance activity with the BSI might be useful in this regard. Finally, the psychological symptoms may have represented primary rather than secondary problems; in other words, latent psychological distress rather than symptoms that arose in the context of injury. This explanation remains a critical research question with profound impact on the management of dancers' wellbeing: if psychological distress is mostly primary (i.e., inherent to the dancer), this would favor increased psychological support services throughout dancers' careers at the

level of dance academies and companies. If it represents a secondary phenomenon (i.e., related to the injury), this would favor increased psychological support during the acute and subacute phase of injury, particularly on the part of the treatment team. At present, the current results cannot determine whether the psychological distress detected in this study represented traits or simply protracted states of distress because it is unknown whether the dancers suffered from these symptoms before the injuries occurred. In the future, augmentation of the BSI (a state-detecting tool) with a tool designed to detect traits would be useful, as well as a prospective study of BSI scores in uninjured dancers who then go on to become injured.

An additional proposition of the hypothesis was that certain features of dancers' psychological distress would be more dependent ("state-like") on the physical injury than others. The results are in support of this proposition, as well. The following psychological symptoms are more amenable to change with treatment of the dance-related injury, including fear, somatization, hostility, and paranoia. This symptom cluster is logical: a dancer in the acute phase of bodily injury in the waiting room of a physician's office would understandably have greater pain, fear, worry, and upset than one who has just been told that they are at the end of treatment. In particular, phobia emerged as a symptom that was quite amenable to change: 50% of patients experienced an individual clinical reduction in BSI score, and the post-treatment group scored "below average" overall. Having a diagnosis, a treatment plan, or simply seeking help from a dance medicine specialist may be an important step in the psychological recovery of injured dancers.

Conversely, depressive, anxious, cognitive, and psychotic symptoms were more resistant to change. This was also not surprising, given that clinical depression, generalized anxiety, attention deficit disorder, and psychoticism are themselves longitudinal illnesses. However, it cannot be concluded whether patients who were significantly distressed in these BSI dimensions also met DSM-IV criteria(81) for the corresponding psychiatric disorders.

The most significant finding of the BSI study was the discrepancy in scores of dancers of different experience (professional/student/amateur). Students emerged as a high-risk population that should be studied more carefully. Professionals showed significant psychological improvement after treatment in both quantity and severity of clinical symptoms; however, students suffered from a persistent level of high-distress symptoms, despite treatment and/or injury resolution. That the study was able to identify any features of individuals 'at risk' for poorer psychological outcome after injury is important, because previous studies in dancers have suggested that response to injury is highly individual.(10, 38) More importantly, this finding is evidence in favor of increased support services at students' dance academies in order to deal with the psychological ramifications of injury.

To explain the discrepancy in BSI scores between students and professionals requires consideration of internal and external factors to the dancer; however, inherent factors to the dancer (e.g., age) likely play a bigger role than environmental factors (e.g., competitive stress). Environmental factors are similar in that both students and professionals face similar pressures within academies and companies for roles and career advancement. However, age repeatedly appeared as a significant variable in this study for

BSI scores, pain, artistic compromise, behavior, confidence, and satisfaction. This held true even professionals, students, and amateurs were stratified by age, despite that students tend to be younger by default. Nevertheless, age alone may be confounded by other variables. With age comes not only emotional maturity, but more experience with injury, treatment, and recovery. Data about previous injury was not collected in this study, and would have been beneficial for this discussion.

The most important lessons nevertheless remain that the psychological plight of injured dancers is tremendous, even in the Netherlands; is independent of physical injury; and clearly represents the largest area of concern to be addressed within this country and abroad.

Limitations of the research

The author recognizes that these studies are but a cross-section of the Dutch dancing population at a particular time, and do not capture every dancer in Netherlands. The study involved treatment-seeking patients, and therefore did not assess injured, non-treatment seeking dancers. The study could have also been improved by increasing the number of dancers involved, particularly older dancers. However the reasoning behind the methodology of a three month study for Objectives 2-4 was to collect data during one dance season. The distribution of younger to older dancers (approximately 4 to 1) may have been corrected by extending the study period for older dancers, but the distribution in the study approximated normal clinic flow, and extending the study would have included older dancers in the summer season, which tends to be more relaxed than the fall and spring company seasons. Additional limitations include the self-reported nature of

several of the questionnaires, as previously discussed. Use of a survey that measured traits in conjunction with the BSI would have also helped elucidate the minimal change in psychological distress that occurred with injury resolution.

Strengths of the study include the breadth of dancers included, the volume and currency of data, and the chart-review aspect to injury reporting in addition to the patient complaints. Few reports have been published about the Dutch dancing population, and many studies in dancers have otherwise been collected in large, professional dance companies of one dance genre. More research into the relationship between dancers and the medical industry as well as dancers' psychological health is needed before institutional change is warranted at the level of governments, dance academies, or doctors' offices, and this study is intended to be used as a stepping stone for larger research projects aimed improving the delivery of health care to dancers.

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