A Survey of Health, Training, and Injuries in Different Levels and Styles of Dancers

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A group of female ballet and modern dancers, professional and university, were given a questionnaire concerning health practices, training practices outside of dance, recent injury, and other related issues in order to examine potential differences among the groups.

The health habits and training practices of dancers have been an object of dismay for many health science researchers.[1,2,3,7] While most of the concerns have been raised about dietary practices,[2,3,7,21] other investigators have researched injury patterns[17,19,20,22] and still others have examined the assumptions many dancers make about their own physical conditioning.[6,9] Although many inferences can be made from the data, a number of questions remain as to the general relationship of dancers to their own training and well-being. Also, few of the previous studies compared different factions of the dance world, such as ballet and modern. Therefore, a general health and training questionnaire was administered to a group of female ballet and modern dancers, professional and university, in order to elucidate their attitudes toward and practices in these areas, as well as to examine any potential differences among these groups. This questionnaire was given as part of a larger physiologic profile conducted by the same authors, the results of which have been presented elsewhere.[4]

Previous Data on Dance Training

Qualitative observations of dance training have indicated a vast range of physiological and intellectual approaches to the development of the performing dancer. A negative atmosphere concerning the psychology of dance training has been reported. Gordon[10] and Vincent[21] reported what they considered to be physical and mental abuse of elite ballet dancers, particularly in the demands of rehearsal time and excessively low body weight. Puretz[15] compared subjective analyses of body image in females following one semester of college modern dance training as opposed to a semester of physical education. The dance group's body image was significantly lower after the course than at the beginning, whereas the participants in the physical education class (which included stretching, strengthening, and cardiovascular conditioning) reported a more positive body image by the end of the course. Pathological eating behaviors[1] and low nutritional levels[2,3,7,13] have been observed in professional ballet dancers and were concluded to be related to director and peer pressure toward excessive thinness.

In terms of dance injuries, Solomon and Micheli[20] observed a wide range of injuries specific to various styles of modern dancing, suggesting a specificity of training relative to individual choreographers and/or technique. However, the authors noted that a majority of the dancers studied trained in several modern styles simultaneously. This was attributed to the eclectic nature of the dance profession today, wherein a dancer no longer associates himself or herself with one specific choreographer but rather prepares for the possibility of dealing with a variety. Injury histories were divided into those attributed to microtrauma (overuse, gradual deterioration) and those related to macrotrauma (sudden impact). The majority of injuries, 68% were determined to be a result of microtrauma, whereas only 32% were related to macrotrauma.

In other injury-related research, the knee was reported to be the joint most frequently injured by dancers, with ankle, back, and foot injuries following in varying orders depending on the study.[17,19,22] In general, ballet dancers were reported as sustaining more ankle and foot injuries, whereas modern dancers tended toward more knee and back injuries. The use of pointe shoes by ballet dancers, and more work on the knees and greater range of trunk move-

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TABLE 1. Descriptive Characteristics of UB, UM, PB, and PM Dancers and Entire Group (Mean ± Standard Deviation)

	UB *n = 10*	*UM* *n = 11*	*PB* *n = 9*	*PM* *n = 9*	*Entire Group* *N = 39*
Age (yr.)	19.3 ± 1.8	26.5 ± 4.8	23.7 ± 3.8	30.4 ± 3.0	24.9 ± 5.3
Ht. (in.)	65.3 ± 2.0	64.5 ± 1.4	65.9 ± 2.5	63.7 ± 2.9	64.9 ± 2.3
Wt. (lbs)	117.7 ± 10.4	119.8 ± 11.1	119.4 ± 9.3	114.9 ± 13.0	118.1 ± 10.8
% Fat	14.2 ± 3.2	14.7 ± 3.4	14.1 ± 1.9	12.2 ± 2.1	13.8 ± 2.9
Yrs. in program	2.4 ± 0.7	3.3 ± 1.3	5.4 ± 2.4	5.6 ± 3.0	4.1 ± 2.3

ments in modern choreography, were cited as possible reasons for this distinction.

Methods

Subject Selection

Subjects were volunteers drawn from the advanced performing groups of the University of Utah Ballet and Modern Dance departments and the professional dance companies of Ballet West, Repertory Dance Theatre, and the Ririe-Woodbury Dance Company, all based in Salt Lake City, Utah. These groups were approached for volunteers to examine specifically possible similarities and distinctions among different levels and styles of female dancers.

By level, the subjects were categorized as either university or professional. The university subjects were limited to those females between the ages of 18 and 37 who were in the advanced levels of dance technique classes at the University of Utah. The professionals included those dancers who had performed consistently with one of the three companies listed for at least one year and were between the ages of 18 and 37. By style, the subjects were categorized as ballet or modern. The ballet subjects were those who worked primarily on pointe shoes and performed a predominantly classical ballet repertory, as defined by their professional or university affiliation. The modern subjects worked either barefoot or in nonpointe shoes and performed primarily works of modern choreography, also as defined by their affiliation. All subjects performed and received the majority of their training in their respective category, with no subjects participating in any combination situations (i.e., overlapping university and professional work). Although, arguably, some contemporary ballet choreography may appear "modern" and vice versa, the company's and university's chosen definitions for style of dance were used for classification.

A total of 39 subjects participated and were divided into four groups: professional ballet (PB), professional modern (PM), university ballet (UB), and university modern (UM). The PB dancers (n = 9) were from a ballet company consisting of approximately 25 female dancers (depending on the number of apprentice members employed). The PM dancers (n = 9) were from two separate modern companies (all of the 4 female dancers of one company and 5 of the 6 female members of the other participated in the study). The university dancers, both ballet (n = 10) and modern (n = 11) were drawn from groups with approximately 12 to 14 female members each.

A questionnaire addressing such issues as general health, dieting practices, training, injuries, and other lifestyle characteristics was completed by each subject. The purpose was to glean information concerning the training and nontraining practices of dancers that might help explain the occurrence of certain results obtained in a physiologic profile of these same subjects,[4] as well as to screen for any potential health or injury problems that might interfere with testing for the profile study. The questionnaire is included in the appendix to this article.

The self-reporting nature of the questionnaire presents certain limitations relative to data interpretation; however, this research was conducted in a little explored area (comparisons between different types of dancers), and the information was intended to be useful on a general level. Specifically, the data are particularly limited with regard

TABLE 2. Results of Questionnaire on Health, Injury, and Extra Training (Percent and Number)

	University		*Professional*		*Entire Group*
	BALLET (n = 10)	MODERN (n = 11)	BALLET (n = 9)	MODERN (n = 9)	*(N = 39)*
Major injury	10.0* (1)†	18.0 (2)	44.4 (4)	22.2 (2)	23.1 (9)
Minor injury	60.0 (6)	72.7 (8)	88.9 (8)	88.9 (8)	74.4 (29)
Extra aerobic training	50.0 (5)	63.6 (7)	33.3 (3)	88.9 (8)	59.0 (23)
Extra weight training	0.0 (0)	27.2 (3)	0.0 (0)	33.3 (3)	15.4 (6)
Recent dieting	20.0 (2)	18.0 (2)	0.0 (0)	11.1 (1)	12.8 (5)
Birth control pills	30.0 (3)	27.2 (3)	0.0 (0)	22.2 (2)	20.5 (8)
High dance stress	40.0 (4)	27.2 (3)	77.7 (7)	44.4 (4)	46.2 (18)
Moderate home stress	30.0 (3)	45.5 (5)	33.3‡ (3)	66.7 (6)	43.5 (17)
Alcohol consumption	70.0 (7)	81.8 (9)	100.0 (9)	100.0 (9)	87.2 (34)
Smokers	10.0 (1)	27.2 (3)	11.1 (1)	22.2 (2)	17.9 (7)
Children	0.0 (0)	0.0 (0)	0.0 (0)	11.1 (1)	02.6 (1)

*Percent of total group respondents.
†Number of subjects making up percent.
‡The one respondent who reported high home stress is included in this group.

to confirmation by a physician of injuries, to limited statistical analysis because of the subjectivity of the variables as well as the small sample sizes, to differences in mean ages between the groups, and to the relative weighing of the samples as compared to the respective population (i.e., the PB sample was smaller relative to the number of dancers in that population than the other three groups).

Results

Descriptive data ($M \pm SD$) for each group are presented in Table 1. By age, height, weight, and percent body fat these dancers closely reflect other dance groups that have been represented in the literature. The groups were similar in terms of anthropometric characteristics; however, distinct differences in mean ages did exist, with the modern groups older than the ballet. Results from the health and training questionnaire are presented in Table 2. More PB subjects than those in the other groups reported having sustained at least one major injury (44.4%) as well as minor injury (88.9%) in the year prior to testing. As a single group, major injuries were reported by only 23.1% of the subjects, whereas minor injuries occurred in 74.4% of the respondents. Professional modern dancers reported engaging in aerobic training outside of their normal dance activities more than the other groups (88.9%), with only 33.3% of the professional ballet dancers engaging in such activities. Only 6 of the 39 dancers reported engaging in any resistive weight training, 3 professional modern and 3 university modern dancers. Recent dieting to lose weight was reported by only 12.8% of all the dancers. Of the total group, 20.5% reported using birth control pills.

A majority of professional ballet dancers reported high stress levels related to dance (77.7%), whereas only 27.2% of the university modern dancers reported dance-related stress as high. In terms of alcohol consumption, 87.2% of the total group and 100% of the professional dancers reported consuming light to moderate amounts of alcohol on a regular or occasional basis (no dancer consumed what would be considered a heavy amount). Only 17.9% of the dancers (7 subjects) reported that they smoked and no dancer reported smoking more than one pack of cigarettes a day. A professional modern subject had one child while none of the other subjects reported having any children.

Discussion

The discernment of detailed information from self-reporting questionnaires is admittedly limited; however, general trends were evident among these groups. Specific differences emerged according to group, and although the purpose of this study was only descriptive, the results may aid future researchers in explaining variations which may be observed among distinct groups of dancers.

It is often difficult to ascertain the incidence of dance injuries, as many clinical pathologies are considered by dancers not to be "injuries" but a normal byproduct of dance training.[6] Therefore, the subjects were not only asked about "injuries" (major injuries) but also were asked if they had experienced any physical "nuisances" (minor injuries) that interfered with, but did not completely stop, their dancing. For the entire group, 23.1% (9 subjects) reported having sustained a major injury while 74.4% (29 subjects) responded that some recurring physical problem occasionally disrupted their dancing. That the majority of these dancers indicated the occurrence of chronic overuse syndromes may be a reflection of the findings of Solomon and Micheli[20] who reported that 32% of the modern dance injuries surveyed in their study were related to sudden impact while 68% were related to repetitive microtrauma.

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Injuries by site and by severity (major or minor) for each group are presented in Tables 3 and 4. Injuries involving the ankles (12 reports, primarily tendinitis) and back spasms (11) were most common, followed by various knee problems (9), foot pain (7), shin splints (3), hip problems (2), and hamstring pulls (2). Several dancers reported having multiple problems. The ballet dancers tended to report more ankle (9) and foot (7) problems, and the modern dancers reported more back pain (9) and knee problems (6). These results are in agreement with those reported previously in the literature[17,19,22] and are probably indicative of distinct stresses put on the body by different styles of dance. Professionals reported a slightly greater number of total injuries (27) as opposed to university dancers (19), which might be expected due to more total time spent dancing.

TABLE 3. **Reports of Injury by Body Site for UB, UM, PB, and PM Dancers and Entire Group (Number Reported*)**

	UB (n = 10)	*UM (n = 11)*	*PB (n = 9)*	*PM (n = 9)*	*Entire Group (N = 39)*
Ankle	3	1	6	2	12
Back	1	4	1	5	11
Knee	1	3	2	3	9
Foot	3	0	4	0	7
Shin	0	1	0	2	3
Hip	0	1	1	0	2
Hamstrings	1	0	0	1	2

*Several dancers reported having injuries in more than one area of the body. These reports are for major and minor injuries combined.

TABLE 4. **Reports of Major and Minor Injury for UB, UM, PB, and PM Dancers and Entire Group (Number of Injuries Reported*)**

	UB (n = 10)	*UM (n = 11)*	*PB (n = 9)*	*PM (n = 9)*	*Entire Group (N = 39)*
Major injuries	1	2	6	3	12
Minor injuries	8	8	8	10	34

*Several dancers reported having injuries in more than one area of the body, some with combinations of major and minor injuries. These values should not be confused with *number of subjects* who reported sustaining major or minor injuries as reported in Table 2.

Extra training practices were analyzed in terms of aerobic activity and weight training, although the specific type of outside training activity was specified by the subject in response to a general question. The responses described best fit into either an "aerobic" (typical responses were "I take aerobics classes" or "I swim about a mile three times a week") or "weight training" (e.g., "I work out at the university weight room") classification. Although dance has been described in the literature as a predominantly anaerobic (nonendurance) activity,[11] the goal of the research was to examine what types of activities the dancers participated in outside of their normal dance training.

In terms of extra training, 59.0% of all dancers studied reported engaging in extra aerobic activity, whereas only 15.4% reported participation in any form of weight training. This 15.4% was accounted for solely by the professional and university modern dancers, as no ballet dancers reported working with weights. As previously noted, the professional modern dancers engaged in extra aerobic activity the most (88.9%), with professional ballet dancers reporting the least aerobic activity (33.3%).

Although it is not the intention of this paper to examine the correlations between the results of the questionnaire to those of specific physiologic tests, it seems pertinent to note that in the final results of the profile, the PM dancers demonstrated significantly higher $\dot{V}O_2$ max values (i.e., higher aerobic capacities) than the PB dancers. Several possible reasons for this difference in addition to the extra aerobic training factor were noted, including the greater number of injuries among the PB dancers.[4]

The difference in participation in these activities may be a result of attitudes toward extra aerobic and weight training. These, in turn, may stem from the cultural and/or aesthetic traditions inherent in the modern and ballet fields. Ballet has traditionally embraced a classically defined, conservative approach to training, predicated on the notion that most physical activities other than ballet are ultimately detrimental to the dancer's technique.[10] Rebellion against the accepted form has been characteristic of modern dance from its inception. Although modern dancers have defined their own precise standards of aesthetics, these standards still entail a broader range of acceptable body types and approaches to technique than classical ballet. It is perhaps more "socially" acceptable in a modern dance environment to use extra aerobic or weight workouts to augment dance training than it is in a ballet atmosphere. Also, specific training techniques promoted for these modern dancers via either university kinesiology courses or specific dance instructors may have been of influence.

Much attention has been drawn to dancers' inadequate eating habits in the scientific literature;[1,2,3,7] however, only 12.8% of the entire group reported any form of recent dieting (within 3 or 4 weeks). In fact, none of the professional ballet dancers, the group to which eating disorders are most heavily attributed,[1] reported any recent dieting. At first consideration, this seemed in conflict with other reports in the literature. However, upon further investigation, it was determined that the notion of "dieting" may have a much different definition for the dancer than for the average person. Although none of the professional ballet and only two of the university ballet dancers claimed any dieting, 14 out of the 19 ballet dancers estimated their approximate daily caloric consumptions below 1500 kcal when questioned verbally (all were acutely aware of the caloric content of their food). They, however, did not consider this intake as dieting; this was "normal." When questioned further, most commented that they considered a full-fledged diet to be less than 800 kcal per day. Within this group there appeared to be two distinct types of dancer; those who were naturally quite thin and at times had to make an effort to eat enough to maintain their energy levels, and those for whom excess weight was a constant concern. In terms of the modern dancers, 6 of the 20 dancers reported recent dieting. When questioned further, several of these dancers reported a tendency to diet a week or two prior to a performance, or even completely fast the day or two before a performance (particularly the university dancers). Caloric consumption was highly variable in this group among those who felt they knew what their's was. Clearly, careful questioning and food intake measurements with regard to diet practices are needed to accurately assess dancers' eating habits. Such precise measurement was beyond the limits of this study and further questioning was conducted only to elucidate potentially contradictory results. Therefore, these findings on dieting attitudes should be considered descriptive and only general, at best.

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While 30.0% of the UB, 27.2% of the UM, and 22.2% of the PM groups took birth control pills, none of the PB group did. The reasons for taking the pills (i.e., contraception vs. hormonal regulation) were not explored, nor were inquiries made as to other methods of birth control. The majority of female dancers may be using other forms of contraception to avoid the side effects of birth control pills such as water retention and/or increased appetite, but this suggestion is merely speculative.

Stress levels experienced at home and in the subjects' respective dance environments were assessed to determine if overt stress affected any of the other variables in the profile. Although the interpretation of the term "stress" is particularly subjective, it was felt that such information might provide a basis for examination of possible differences between different types of dancers, especially since previous authors had indicated particular problems in this area for dancers in general.[10,15,21] Also, because one of the goals in these university dance departments was to prepare students for professional work, it was felt that the dancers' feelings regarding their dance and home environments as students and as professionals were important.

As a single group, the ballet dancers reported higher stress levels related to dancing than did the modern dancers, with the greatest number of professional ballet dancers reporting high levels (77.7%). It should be noted that this particular ballet company was in the midst of a change in artistic

directors and had also recently experienced the untimely death of their ballet mistress. Also, the professional dancers as a group experienced more stress related to dance than did their university counterparts. The reporting of greater stress among the professionals could be due to either a perceived lack of control over their dance environment or to truly greater environmental stress in a professional dance atmosphere, such as more rehearsal time, more traveling due to touring, and/or a longer investment in their profession.

Home stress was generally reported as one point lower than or equal to stress related to dance, with only one dancer (PB) reporting high home stress. Most of the dancers (77.7%) were not married and only one dancer had a child. Whether dancers differ from other career-oriented women of similar age groups in this respect would require specific comparisons to a control group. Also, possible reasons regarding marital and/or child-bearing status were not explored.

In terms of alcohol consumption, 84.6% of the dancers consumed light to moderate amounts of alcohol. The fact that 100% of the professional dancers engaged in social drinking most likely reflects various social and cultural aspects of professional performing. Most performances are followed by receptions featuring "wine and cheese" so the dancers can mingle with the supporting patrons. On extended tours, hotel cocktail lounges may often be the only respite from hotel rooms and alcoholic consumption may serve as a social accoutrement. Peer pressure may be another factor, as well as use of alcohol for its relaxation or sedative effects.

Although no data on cigarette smoking in dancers have ever appeared in the literature, it is a common conception that many dancers are heavy smokers. The data collected from these dancers do not support this assumption, with 17.9% smoking from less than half a pack to one pack of cigarettes per day. Compared to athletes, this value may be considered high, but it is a low percentage considering the view by some that "all" dancers smoke. The relatively low incidence of smoking probably reflects the influence of the national health and fitness trend on dancers. One subject, a professional modern dancer who taught and performed extensively, expressed the opinion that she was tired of the "neurotic, unhealthy dancer stereotype" and felt compelled to present a role model of health and fitness to her students in an effort to dispel such notions. While the environment of the study should be considered (Salt Lake City is a particularly conservative area), the discrepency between alcoholic consumption and cigarette smoking tends to point to influences other than or in addition to a conservative living environment.

Conclusions

The results of this questionnaire have demonstrated that differences in health and training patterns may exist among various levels and styles of dancers; however, the findings are limited due to the small sample size. The modern dancers in this study tended to engage in more extraneous aerobic and weight training than the ballet dancers. The ballet dancers reported more ankle and foot injuries, whereas the modern dancers reported a predominance of back and knee problems. Less than 20% of all the dancers smoked cigarettes while 100% of the professional and 76% of the university dancers consumed light to moderate amounts of alcohol. These professional dancers reported greater stress relative to their dance and home environments than the university dancers. Dietary practices were difficult, if not impossible, to accurately assess from a questionnaire format, although some trends towards inadequate nutritional practices were noted. Although the subjective nature of the questionnaire and small sample sizes limit the inferences that can be applied to the represented populations, it is hoped that these data will help to confirm trends cited elsewhere in the dance literature and point to other areas for further investigation. In general, it appeared that health and fitness trends had an effect on the training and health attitudes of these dancers, but that more carefully controlled study was needed to determine the exact nature of this inference.

Recommendations

It is recommended that future investigators compare these results with those of a larger sample and follow-up questionnaire data with verbal interviews, particularly in the areas of dietary practices and injuries sustained (or confirmation by a physician in the latter case). An attempt to correlate data from such surveys to performing capabilities would also strengthen the applicability of such research (i.e., does participation in extra aerobic training enhance dance performance either through increased overall endurance or perhaps reduction of body fat?). Also, further study should include male dancers as well as participants in other types of dancing. Dancers from various urban or suburban areas may well present with differing responses on certain issues due to the environmental influences unique to particular areas of the country.

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APPENDIX

The Questionnaire

Name _____

Date of Birth _____

Gender _____ Height _____ Weight _____ Age _____

1. What is your current principal style of dance training (i.e., ballet, modern)?

2. Do you dance in a university or a professional situation?

3. If professional, how many years have you been dancing professionally?

4. If university, how many years have you been dancing in a university dance department?

5. Within your style of training, do you work with one or two principal choreographers, or a variety?

6. Within the last year, have you sustained any major injuries, something that kept you from dancing for more than 2 or 3 weeks? If so, what was the nature and location of that injury (i.e., ankle sprain, torn knee cartilage, stress fracture in the foot, etc.)? How long were you off dancing?

7. Do you have any recurrent physical "nuisances" (i.e., shin splints, pain behind the knee cap, muscle cramping, etc.) that interfere with but do not stop your dancing? If so, please describe the problem in your own words.

8. Have you recently (within the last 3 or 4 weeks) been on a diet to lose weight? About how long did you diet and how much did you restrict yourself in terms of number of calories per day?

9. Do you engage in any training programs outside of your normal technique classes and rehearsals (i.e., weight training, aerobic dance classes, special conditioning exercises, swimming, etc.)? If so, what does your program consist of and how many hours a week (on the average) do you devote to it? If you do this at only certain times during the year, please specify when.

   About how long have you been working out at these extra activities?

10. Have you had surgery within the last 5 years? If so, for what problem?

11. Do you have any children? What are their ages?

12. Are you currently taking birth control pills? If so, what is the tradename of the prescription (if you know it)?

13. Are you currently taking any medication as prescribed by a physician? If so, please specify the name of the medication and the problem it is prescribed for (to the best of your knowledge).

14. Would you classify your working environment as:
    a. Very stressful
    b. Moderately stressful
    c. Little or no stress

15. Would you classify your home environment as:
    a. Very stressful
    b. Moderately stressful
    c. Little or no stress

16. Do you consume alcoholic beverages? If so how often:
    Rarely or occasionally _____
    On weekends and special occasions _____
    Regularly, but not more than 3 times a week _____
    Almost every day _____
    More than once a day _____

    If so, is your intake usually:
    Light (1 mixed drink or 2 glasses of wine or beer) _____

    Moderate (2–3 mixed drinks, 3–6 glasses of wine or beer) _____

    Heavy (4 or more mixed drinks, more than 7 glasses of wine or beer) _____

17. Do you smoke cigarettes?
    If so, how many per day?
    Less than 1/2 a pack _____
    1/2 to 1 pack _____
    1 to 2 packs _____
    2 to 3 packs _____
    More than 3 packs _____

18. Do you have any physical history of chest discomfort, pressure, or pain?
    If so, please specify.

19. Do you have any physical history of heart arrhythmias (unusual heart rhythms as diagnosed by a physician), shortness of breath, or high blood pressure? If so, please specify.

20. Is there a history of coronary heart disease in your family before the age of 60 (i.e., heart attacks)?