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## Skill Acquisition in Ballet Dancers: The Relationship Between Deliberate Practice and Expertise

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THE FLORIDA STATE UNIVERSITY

COLLEGE OF EDUCATION

SKILL ACQUISITION IN BALLET DANCERS: THE REALATIONSHIP  
BETWEEN DELIBERATE PRACTICE AND EXPERTISE

By

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## ABSTRACT

This study investigates the skill acquisition process of ballet dancers from a cross-cultural, expert-performance perspective. The role of deliberate practice activities in the development and maintenance of ballet expertise was examined using self-report measures. The results of this study are consistent with speculation by dance researchers and expertise research in other domains, indicating that at least 10 years of training are required to reach expert levels. The results of this investigation support the idea that there is an unquestionable relationship between ballet training and the ultimate level of dance expertise. Dancers who reached the highest levels tended to begin their performance careers at entry level positions in international companies and then make their first soloist debuts in the same companies before reaching principle status. The significant relationship between accumulated hours of practice by age 17 and acquired level of expertise by age 18 among the male and female professional dancers across all three countries is important because it provides evidence to support the fundamental assumptions of expertise theory, namely that consistent engagement in deliberate practice is necessary for the development of expertise. Furthermore, the unique cross-cultural differences provide additional support for the relationship between training and expertise. The differences in dance skill found in this study can be accounted for by divergence in training rather than by other variables such as innate talent or genetic predispositions. Specifically, long hours of deliberate practice under the direction of qualified instructors, accumulated over an extended period of time is associated with the expert level of performance in dance.

## CHAPTER 1

### *Literature Review*

#### *The Study of Expertise*

*To what degree is what we know about dance consistent with expertise research from other domains?*

*What is the relationship between dance training and the ultimate level of dance expertise?*

There have always been individuals who excel in a given area. Exceptional scientists, artists, and athletes carve their names in our history books by breaking world records, out-performing their predecessors, and pushing the known limits in a given domain. The study of expertise aims to better understand the skill acquisition process by uncovering the mechanisms by which exceptional skill is acquired and maintained. The study of the development of expertise and the associated knowledge structures is becoming a major focus for both general and applied psychology and even includes other developing domains such as cognitive engineering (Salas & Klein, 2001). Despite the increased interest in the study of expertise development, only a few domain-specific studies have been conducted in the area of dance.

Although early research has shown that classical ballet exceeds even professional football in terms of the mental and physical demands (Nicholas, 1975), only limited research has been conducted on the skill acquisition process of ballet, and on the developmental trajectory of classical dancers. Consistent with the findings from expertise research in other domains, that have shown that at least 10 years of training are necessary to reach expert levels (Ericsson & Lehmann, 1996), Schnitt & Schnitt (1987) theorized that in order to produce an elite dancer, 10-15 years of training starting at an early age are required to refine the requisite movement skills of ballet. According to others, in order to achieve the physical requirements necessary to execute classical ballet techniques properly, dancers pursue an arduous course of training that is considerably longer than that of other accomplished athletes (Dunning, J., 1985 as cited in Hamilton, Hamilton, Meltzer, Marshall, & Molnar, 1989).

Although there is no clear answer to the question “what is the minimum number of years of training required to develop expertise in dance?” there is no doubt that rigorous training is critical for dancers. It is my belief that dancers are not fundamentally different from experts in other psychomotor domains. Therefore, I assume that the differences in dance skill can be accounted for by divergence in training rather than by other variables such as innate talent or genetic predispositions.

Research in many other domains such as chess, music, medicine, and sports (Ericsson, 1996; Ericsson & Smith, 1991; Hoffman, 1992; Starkes & Ericsson, 2003) reveals that expert performance is achieved through extended hours of deliberate practice. In regard to expert performance, it is important to differentiate between practice and deliberate practice. As defined by Ericsson and colleagues (2002), deliberate practice is “goal-directed training activities, often designed by teachers or coaches with the explicit goal of improving specific aspects of an individual’s current performance.” The underlying assumption of deliberate practice is that expert performance is acquired gradually and that performance improvement depends on the ability to isolate sequences of simple tasks that the learner can successively master by repetition with feedback and instruction (Ericsson & Lehmann, 1996).

In contrast to play, deliberate practice is a highly structured activity designed to produce mastery of a specific goal (Ericsson, Krampe, & TeschRomer, 1993). Practice, as it is different from deliberate practice, is exemplified by recreational golfers and musicians who consistently engage in the activity for months and even years and yet never significantly increase their skill level. Therefore, extended experience in a domain does not always lead to improvements in performance, but consistent engagement in deliberate practice activities does.

During deliberate practice sessions, individuals are challenged to go beyond their current abilities. In order to benefit from engagement in this type of activity, the performer must concentrate completely on the task at hand. Therefore, deliberate practice sessions can only be sustained for limited periods of time. It is important to mention that the specific types of deliberate practice activities vary according to domain, the needs of the individual, and the level of acquired skill. However, in all areas, deliberate practice activities are demanding training sessions that are targeted at

improving or acquiring a skill. Simply practicing a skill that is already acquired does not constitute deliberate practice. Eventually, the need for specific types of deliberate practice activities (e.g., scales and arpeggios for musicians) diminishes for individuals who have already attained technical mastery. However, the need for deliberate practice activities designed to master new skills is always critical for performers wishing to improve their skills (Ericsson, 2002).

When a student is initially attempting to learn a new skill, the role of the instructor is critical for the successful acquisition of the target skill. Instructors facilitate the learning process by breaking down new skills into manageable chunks, directing the deliberate practice activities, and most importantly, providing the necessary corrective feedback and motivation. As the level of expertise increases, the expert performer begins to form mental models or representations of the ideal execution of the desired skill. Once a dancer acquires the necessary mental representations, current performance can be improved by making technical adjustments through deliberate practice activities in order to mimic the desired performance without the need for an instructor.

Consistent engagement in deliberate practice activities affects the dancer's entire professional career. It allows the developing dancer to acquire complex mental mechanisms that mediate superior performance. These same mental representations eventually allow the dancer to take on the role of the instructor for himself or herself, which then facilitates the learning process and leads to continual performance improvement as long as the deliberate training practices are maintained.

Skilled dance performers are often able to execute even the most difficult tasks correctly with apparent ease. It is perhaps because of this that the female ballet dancer has been stereotypically equated with weightless, ethereal creatures of fantasy such as sylphs and fairies, who smoothly glide on pointe. The seemingly effortless performance of experts frequently leads to the belief in talent; the notion that certain individuals excel in general characteristics such as intelligence, memory, speed, or flexibility due to divine intervention or some genetic factors (i.e., nature) rather than to training (i.e., nurture).

The relationship between nature and nurture has been a long-standing debate (See Howe, Davidson, & Sloboda, 1998) since it is related to the quality of instruction and the amount of learning needed to acquire skills and establish a knowledge base. However, most people would agree that nurture plays a significant role in the development of expertise and that in order to reach any significant level of expertise in a given domain, the performer must have the desire to excel and obtain domain-specific knowledge and skills that are acquired through practice and feedback.

*Does training account for how elite dancers acquire physiological adaptations that facilitate the execution of the classical ballet syllabus?*

According to Garrick & Requa (1994) there are few artistic or athletic activities that have the same emphasis on anatomical aspects as ballet. With few exceptions in sports (e.g., gymnastics and figure skating), the technical form of the athlete is sometimes taken into consideration, but it is never the primary consideration. In ballet, however, the form of the movement or the position is of the utmost importance. Temporary physical adaptations must take place in a dancer to facilitate the execution of the classical ballet movements. For example, the ability to rotate or turnout the hip is fundamental, giving freedom of movement in every direction (Kushner et. al., 1990). Even the five fundamental ballet positions of the feet and body are based on the turned-out position (Bennell et. al., 1999). Research today suggests that early training is necessary for classical ballet dancers to adapt their hip joints for maximal turnout (Miller, Callander, Lawhon, & Sammarco, 1984).

Consistent with this line of thought, other researchers have shown evidence that training is indispensable in the development of dance expertise involving flexibility. Kushner et al (1990) found that remarkable flexibility achieved by dancers is directly related to training and the age at which training begins. Similarly, it was found that forward flexion is acquired and developed only after four or more years of dance training (Klemp & Chalton, 1989). In fact, consistent with work by Ericsson and Lehmann (1996), the majority of the differences in physical skills between professional ballet dancers and individuals in the general population can be accounted for by the intense training that exposes certain body parts to specific stimulation well outside the normal range.

Whereas some researchers have speculated that there may be differences among dancers in their ability to control their turnout, selection cannot be completely discounted as a means to explain why some individuals choose to pursue dance while others do not. However, research in other domains has shown that nearly all of the mental and physiological factors that differentiate experts from novices can be accounted for by the specific adaptations acquired through intense training rather than innate talent or genetic factors. For example, the size of muscles and bones, the flexibility of joints, and increased range of motion of the limbs are all determined by practice activities, particularly when training begins at a very young age. According to Lehmann and Ericsson (2000), these adaptations are so specific that selection of individuals in those domains appears unlikely. For example, the growth of muscles and the thickening of the bones of tennis players (restricted to the arm holding the racquet), the optimization of metabolism of runners (for particular running speeds and different lengths of races), the size of the hearts of endurance runners, and the outward range of motion of dancers' hips are all cases of physiological adaptations resulting from training. Perhaps the most convincing evidence for the training effect on such adaptations is that physiological changes revert to the "normal" state once the training is stopped (Ericsson & Lehmann, 1994). Such modifications would be expected only for acquired rather than for innate characteristics.

*Is perceived talent related to the level of acquired dance expertise?*

To the best of my knowledge, genetic predispositions (with the exception of height) and innate talent have not been empirically proven to account for expertise in any domain. However, the idea of perceived talent may be linked to skill acquisition in various ways. If a young, aspiring dancer is seen as being talented, he or she will most likely be given opportunities early on that will set him/her apart from other students.

Bloom (1985) claimed that in order to reach the highest level of skill acquisition in any domain, access to the best training resources was essential. When a young dancer is identified as talented, s/he often benefits from the opportunity to engage in special training activities such as special master classes and even understudying for sought-after parts. Once a dancer is given a unique opportunity,

s/he may build a reputation that will open other doors in the future. Additionally, the opportunities in themselves can be motivating experiences and aid in the development of an internal locus of control, which in turn may provide the dancer the drive to engage in deliberate practice throughout his/her career.

Although the idea of talent alone cannot account for differences between expert and novice dancers, the idea of perceived talent may. It is important to take into consideration the notion of perceived talent in dance because it leaves open the following possibility: a dancer has reached a professional status because of access to the best training opportunities, resulting from having been identified as talented early in the training process. Whether or not there is such a thing as innate talent, the belief that one is talented may be positively related to the development of subsequent expertise because those who share that perception provide the student opportunities to engage in deliberate practice activities, which consequently lead to critical physiological adaptations.

Expertise research (Ericsson, 1996, 1997, 1998; Ericsson & Charness, 1994, Ericsson, Krampe & Tesch Romer, 1993; Ericsson & Lehmann, 1996, Ericsson and Smith, 1991) provides compelling evidence to support the notion that skill acquisition and the development of expertise is not limited to a select group of talented individuals, but rather is available to motivated individuals who are willing to pursue excellence in any domain. Learning any new skill is a gradual process that requires time, practice, and feedback; and reaching expert levels of performance in any area requires higher levels of motivation, consistent engagement in specific practice activities, and corrective feedback.

*Is motivation necessary for dancers to engage in effortful training activities? What can we learn from the study of motivation in other domains?*

If one believes that learning is an active process requiring conscious and deliberate activity, it is logical to assume that motivation (or attitude towards learning) is critical in order achieve competence and particularly expertise in any domain. In fact, motivation is thought to be an essential component of effective learning (Graham & Weiner, 1996; Pintrich & Schunk, 2002 and Linnenbrink & Pintrich, 2002). Research has shown that expert performance can be viewed as the end product of an extended series of cognitive and physiological adaptations resulting from the regular engagement in deliberate

practice activities (Ericsson, 2001). In general, people prefer engaging in less effortful, more enjoyable activities that satisfy short-term goals (Ericsson, 2002). Because engagement in deliberate practice is not inherently enjoyable and requires a great deal of effort, motivation is thought to be critical for the student to attend to a task and to exert effort (Ericsson, et al., 2002)

Several studies (House, Keely, and Hurst, 1996; House, 1993; DiPerna & Elliot, 2002) support the notion that the ability to learn is not sufficient to determine performance and that in order to learn there must be a desire to do so. There is a gap in the research; a lack of work exploring the relationship between motivational factors and deliberate practice. However, the large body of work on motivation and academic performance may provide useful information that is applicable to the development of expertise in ballet.

Researchers (DiPerna & Elliot, 1999, 2002, 2002) who have studied academic performance consider motivation an academic enabler (a nonacademic skill, which contributes to academic success). The notion of academic enablers stems from the work of Gresham and Elliott (1990), Malecki (1998), Wentzel (1993), and Wigfield and Karpathian (1991), who explored the relationship between non-cognitive indicators and academic achievement. The work on motivation as an academic enabler is usually grouped into four general areas: self-efficacy, attributions, intrinsic motivation, and goal orientation. A brief review of these areas follows.

The first area of motivation aspects, adaptive self-efficacy, can be described as an individual's set of beliefs about his or her capabilities in a particular context or specific domain (Bandura, 1997). Unlike general self-esteem, self-efficacy is always context specific. Interestingly, research has indicated a positive correlation between self-efficacy and academic success (Bandura, 1997; Pintrich, 2000; Pintrich & DeGroot, 1990; Pintrich & Schunk, 2002; Schunk, 1989, 1991). Specifically, students who have higher self-efficacy are likely to engage in more difficult classes (Eccles, 1998), work harder, and succeed more often (Pintrich, 2000; Pintrich & DeGroot, 1990; Wolters, Yu & Pintrich, 1996) than learners with lower self-efficacy.

It is feasible that the principles governing these findings can be extended into the area of skill acquisition in dance. It is likely that self-efficacy is closely linked to the idea of perceived talent.



Specifically, if an aspiring dancer is told that s/he is talented and s/he believes this to be true, I would expect the dancer's self-efficacy to increase. Additionally, if higher self-efficacy leads learners to work harder, engage in more difficult training activities, and therefore succeed more often in other domains, the same relationships could be expected in dance.

The second area of motivation as an enabler of success, attributions, is based on Weiner's Attribution Theory (1996), which attempts to explain why events occur. Weiner's research (1985, 1986) relates learners' attributions of success and failure to one of many variables such as environmental, personal, knowledge-related, or ability-related. Positive, adaptive attributions are associated with internal factors such as higher expectations for success, enhanced self-efficacy, and positive affect (Weiner, 1986). These outcomes are positively correlated with engagement and study skills as well as achievement (Linnenbrink & Pintrich, 2002).

Intrinsic motivation (motivation to engage in an activity for its own sake) is a third motivational enabler of success. One of the defining features of intrinsic motivation is high personal, task-specific interest (Linnenbrink & Pintrich, 2002), reflecting interest in a domain-specific task (Hidi & Harackiewicz, 2000). Personal interest is considered to be somewhat stable over time (Malone & Lepper, 1987) and has the ability to affect achievement (Linnenbrink & Pintrich, 2002; Mitchell, 1992). Personal interest has been found to be positively associated with achievement (Krapp et al., 1992), the use of deeper cognitive strategies (Schiefele, 1991), and increased attention and persistence (Heide & Harackiewicz, 2000). In the domain of dance, one could argue that a measure of intrinsic motivation is the dancer's willingness to engage in activities that require concentration and are not inherently enjoyable, but are important for improving the dancers' performance.

The fourth area of motivation is goal orientation. According to goal theory, there are two general goal orientations (mastery and performance outcomes) that reflect the purposes individuals are pursuing when approaching and engaging in a task (Linnenbrink & Pintrich, 2002). Adaptive goal orientation as an enabler of success is based on research findings suggesting that mastery goals foster a host of adaptive motivational, cognitive, and achievement outcomes (Ames, 1992). In dance, I expect

that both mastery and performance outcomes are required in order to achieve success as a professional dancer.

*Are there other ways in which motivation relates to career success?*

In dance, as in other domains of expertise, it is likely that the role of motivation is critical to reaching professional status. In dance, as in music, performers are faced with fierce competition, and few students ever achieve professional status. According to the US Census, fewer than 30% of performers in music and dance are employed full-time in their domains of expertise (Hamilton, Kella, & Hamilton, 1995).

At an early age, most aspiring dancers are probably aware of the low probability of reaching professional status as a ballet dancer. Published opinion (Pickman, 1987), research (Macchi & Crossman, 1996), biographies of well-known expert dancers (Vilella & Kaplan, 1992; Kirkland, Lawrence, & Lawrence, 1986; Vilella, Kaplan, 1992), and even popular movies (*The Turning Point*, 1977; *Dancers*, 1987; *Center Stage*, 2000) illustrate the lifetime of personal sacrifices (diminished family time, struggles with eating disorders often to the point of near-death, decision to pursue dance over academics, and professional obstacles such as occupational stress, injury, and short-lived professional career expectancy) that classical ballet dancers must face in their pursuit of a professional career in ballet. Indeed, the decision to pursue a career in classical ballet in and of itself can be seen as a sacrifice. The short-lived duration of a performance career in dance (most professional dancers end their performance careers by the age of 35) combined with the early training required to succeed as a dancer, often results in unemployment at a comparatively young age with minimal preparation for making a career transition (Pickman, 1987). LeBlond (1982) described this sacrifice as a “blinder’s phenomenon,” in which a near-hysterical concentration on classical ballet technique begins at a very early age, when dancers shut themselves in a studio to perfect their steps and therefore systematically disqualify themselves from learning anything else in the outside world.

Despite the highly competitive and demanding nature of ballet and the expected hurdles a dancer must face, the number of students (supported and encouraged by families) who aspire to a

professional career in dance does not diminish. In the US, the study of dance is part of the lives of several million students at any given time (Schnitt & Schnitt, 1987). It is even likely that the number of girls who study dance may well exceed the number of girls who participate in organized sports.

It is well known that in order to have a successful career in ballet, dancers must be thin, strong, and have a high pain tolerance (Hamilton, Kella, & Hamilton, 1995). Thus, I expect that to achieve expertise in dance, the developing dancer must engage in extended effortful training necessary for the physiological changes to occur. Participation in such extended and effortful training would likely be unpleasant yet critical for performance improvement. It is likely that motivation to engage in strenuous training is required. Therefore, in this study I wish to explore whether or not there are psychosocial factors that may be related to motivational processes of expert dancers. Previous research (Patterson, Smith, Everett, & Ptacek, 1998) revealed a correlation between psychosocial factors and training. For example, social support has been positively associated with success in dance; perhaps because of the increased training. The authors suggest that the intense demands and competitive environment of the ballet world may be the reasons why social support appears to be so important for dancers. Previous work (Cohen & Syme, 1985; Isaacson & Janzon, 1986; Sarson et al., 1990) has also revealed that individuals who perceive themselves as lacking in social support progress significantly more poorly on a series of psychical and psychological well-being measures. Moreover, perceptions of social support appear to buffer the impact of occupational stress while increasing feelings of self-worth (Patterson, Smith, Everett, & Ptacek, 1998).

Social support may also be related to access to essential training opportunities necessary for the acquisition of skill in dance. Because engagement in ballet typically begins at such a young age, the parents/caregivers are indispensable during the onset of classical ballet training. When a young child first begins to dance, parents/caregivers must provide financial and emotional support, as well as transportation to and from dance activities. If the necessary support system is not available, it is functionally impossible for a pre-pubescent youth to actively pursue a career as a professional ballet dancer. Even in countries such as Russia, where daily support from families (i.e., transportation and financial provisions) is not required for children to obtain the best training in the country, the parent(s)

of the young student must agree to allow the child to relocate to a year-round conservatory where he or she can pursue a professional dance career.

### *Measurement Issues*

#### *What are the best ways to measure the development of expertise in dancers?*

Studying expertise in any domain presents unique challenges for attaining valid and reliable information about skill acquisition. A study on expertise must identify objective and reliable measures of skill acquisition in the domain of interest. Identifying such measures presents many challenges (Côté, Ericsson & Beamer, submitted); however, there are specific procedures that allow researchers to obtain valid and reliable data about experts' engagement in domain-specific activities via questionnaires, which I discuss below.

#### *Invariance of goals and criteria.*

There are several domains of international expertise in which the goals and values of the activity are invariant across cultures. In these domains there have been extensive efforts to develop methods of measurement and evaluation that minimize cultural bias. In fact, there are clear criteria for the measurement of individual performance in such areas as the 100 yard dash, shot putting, swimming, and rifle shooting; as well as other domains of expertise, such as chess (Ericsson, 1996; Ericsson & Lehmann, 1996). For example, based on the time required to run 100 meters or to swim 200 meters freestyle, or the results of chess tournaments, it is possible to rank-order the performance of all competitors in a domain. Many domains of expertise organize regularly scheduled competitions to measure the level of individuals' performance under standardized circumstances.

There are also many domains in the performing arts in which regularly scheduled international competitions are held, such as piano, violin, and dance competitions. The latter include the USA International Ballet Competition, the Moscow International Ballet Competition, and International Ballet Competition Vaganova-Prix. Today it is standard practice among many artists to apply for jobs in symphonies and ballet companies in countries beyond their native land, suggesting a shared

standard for evaluating performance in the classical domains of music and dance. Students and teachers in these domains have ample access to audio and video tape recordings of the best international performances, tapes that contribute greatly to setting uniform performance standards for the training of ballet dancers across cultures. Thus, the ultimate goals for professional performers in these domains can be described as international rather than culture specific.

*Objective measures of attained ballet performance.*

The evaluation of level of expertise is not, however, as clearly identifiable within some domains. One of the fundamental obstacles in studying expertise can be identifying (or developing) an objective measure of performance. The assessment of expertise among ballet dancers presents some of these challenges in measurement. Because it is not feasible to present all dancers with the same set of tasks or situations in order to measure their performance, other means for measuring performance must be developed.

A problem in the assessment of an individual's expertise can be seen in group activities (e.g., a basketball team) where that the objectives of the team and the process of working together may obscure an individual's skill level. The same may be said of fine art performances such as orchestras. However, in many team sports it is possible to infer level of individual performance by the relative standing within a team and the general level of performance of the team. The most salient, useful piece of information that can be attained about the skill of individual team athletes is the selection of an athlete to a team at the highest level of competition such as from regional to national or national to international (Côté, Ericsson & Beamer, submitted). In sports, trainers seek to recruit the best possible players for their team at the regional, national, or international level.

There is a clear parallel between team sports and ballet in the assessment of expertise. Although ballet dancers are not officially rank-ordered according to specific objective standards such as in chess, there is a hierarchical system between and within ballet companies that may be used as a measure of attained level of dance expertise. This hierarchical system allows dancers to be grouped with other dancers who have reached a comparable level of dance skill. There are two steps in the

process: first, assessing the level of the ballet company, and second, establishing the dancer's rank within the company.

By measuring the level of the ballet company (for which the dancer is currently performing), it may be possible to capture one aspect of an individual's level of achievement in ballet performance. Ballet companies are considered either pre-professional or professional. Professional ballet companies are then ranked according to their reputation; namely regional, national or international. A regional ballet company regularly performs for local audiences, does not typically go on tour, and as a result, does not have an established reputation outside the local area. In contrast, nationally renowned ballet companies regularly go on tours, performing for audiences nationwide. International ballet companies tour and have an established reputation internationally.

The highly competitive nature of ballet makes it logical to assume that the highest skilled dancers are hired to perform with professional companies. The process of finding the best dancers and promoting them to companies at higher levels (with better reputations and better salaries) makes it plausible to argue that the level of the company hiring a dancer is an objective measure of the dancer's attained level of performance.

There is a hierarchical organization within dance companies that can be an indicator of the achieved level of dance skill. The entry level dancers within a company are referred to as the *corps de ballet*, the more highly skilled dancers are called *soloists*, and the most highly skilled dancers are titled *principal dancers*. In most ballet productions, roles are assigned according to several factors, including (but not limited to) technical proficiency, artistic ability, and physiological characteristics such as gender and height. The least challenging roles are assigned to the *corps de ballet*, the demanding roles are assigned to *soloists*, and the most challenging parts are given to the *principal dancers*.

A key assumption in the study of expert performance in many domains is that the superior performance achieved by experts can be objectively and repeatedly measured under standardized conditions (Ericsson & Smith, 1991). I have chosen to study dance in its naturally occurring setting because of the controlled conditions under which professional dancers regularly perform. Ballet companies, like other businesses, are influenced by economic factors. More specifically, to stay in

business, dance companies must sell sufficient tickets to make a profit or at least to cover operating costs. Therefore, dance companies cannot afford to cast dancers who are not technically able to perform the assigned roles. Executing a solo dance variation (at an acceptable performance level) at a minimum requires a dancer to be able to consistently reproduce his/her performance. This is the cornerstone of expertise theory (Ericsson, Krampe, and Tesch-Romer, 1993), the reliable reproduction of performance.

According to Ericsson (2000), the primary characteristic that distinguishes experts (in golf) from less accomplished individuals is that their performance is more consistent. If this holds true in dance, then more highly skilled dancers should have attained control over their ability to execute ballet movements and reproduce their performance consistently. Achieving a predictable and high level of skill in performance is necessary for a dancer to be cast in more challenging roles during public performances. Based on this logic, a dancer's position within a company is an objective measure of acquired dance skill.

To more readily study expertise in ballet, it is necessary to have objective indicators of technical ability that can be easily measured without having each dancer submit to a series of skill-related tests. Combining the level of the ballet company (regional, national, or international) with each dancer's rank within the company (corps, soloist, or principal) creates a comprehensive system for evaluating dance performance. By identifying when a dancer was first offered a specific position, it is possible to attain a reasonable measure of the dancer's performance throughout his/her dance career.<sup>1</sup> Thus, while finding objective indices of current and past level of acquired dance skill can be

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<sup>1</sup> The hierarchical levels within and between dance companies provide an objective index of a dancer's achievements at any given time during his/her career. However, it is important to verify the stability of this measurement system. A preliminary analysis of this hierarchical measurement system reveals that progression to higher levels within this system is not uncommon, but always occurs gradually over the course of years, suggesting that this system is a relatively stable indicator of dance performance.

challenging, using the hierarchical system between and within ballet companies can be used as a clear indicator of expert performance.

*Measurement of factors influencing development of expert performance.*

I was most interested in identifying early developmental variables that may predict an eventual level of expert performance in dance. The impact of developmental issues on the acquisition of ballet expertise has not been widely studied. Developmental factors that may explain individual differences in achieving expert performance in domains of expertise are numerous. Furthermore, the scarcity of expert performers at the higher levels effectively rules out inductive methods in which promising critical factors are identified with correlational methods using very large samples and populations. Studies restricted to the use of smaller sample sizes require a theoretical framework that guides the identification of quantifiable critical factors, which may be reasonably related to performance.

The theoretical framework of the acquisition of expert performance (Ericsson, 1996, 1998, in press; Ericsson, Krampe, & Tesch-Romer, 1993; Ericsson & Lehmann, 1996) contends that the level of acquired performance in domains of expertise such as the arts, professions, games, and sports is closely related to the amount of prior training and deliberate practice. Reviews (Ericsson et al., 1993) show that practice behavior is very regular from day to day and week to week. Specifically, expert performers are able to recall the ages at which they increased their level of practice, ages at which they achieved critical milestones, and other such factors relevant to their career development.

Based on a review of past methods of eliciting information about elite athletes' development, Côté, Ericsson, and Beamer (submitted) developed an interview procedure for collecting reliable and valid information about the acquisition of those techniques which lead to elite performance in sports. If it is possible to adapt the central principles of this methodology to questionnaire development, then I can obtain valid and reliable data about dancers' engagement in various dance-related activities and identify the effects of that engagement on the development of performance.

The training of musicians and the training of ballet dancers share some commonalities. One is a widely accepted organized curriculum in each domain. It is likely that the similarities between these



domains also extend to the ability to recall practice history and to engagement in domain-related activities. Studies of expert musicians (Ericsson et al., 1993) reveal the ability of experts to estimate accurately the amount of their past and current practice. Thus I expect the same in the assessment of such training practices among dancers.

According to Côté, Ericsson & Beamer (submitted), it is possible to obtain an overview of developmental milestones that have occurred in athletes' careers such as the age at which they first participated in organized competitions, or similarly, it is possible to gather verifiable data about the ages at which dancers reached specific milestones in their careers such as attending a summer program or performing a variation on stage.

Thus, building on the methodology of previous researchers in expertise, it is possible to develop a framework in which an individual's practice history and the sequencing of the achievement of critical milestones can be accurately and reliably obtained. In sum, the expert-performance construct offers a framework to study expertise in dance, namely that the amount and quality of practice is predicted to be positively correlated with the level of attained performance. The amount and quality of practice is presumed to be correlated with a number of highly memorable events and habitual behaviors that can be recalled by expert performers many years later and thus reliably measured.

The theoretical linkage between expert performance theory and dance expertise has not been established but is the topic of this current investigation. In this study I extend earlier work on the acquisition of expert performance to ballet by identifying critical developmental events and habitual training behaviors of dancers, and examine their relationship to deliberate practice and attained level of expert performance.

### *Cultural Differences*

*What are the cultural and gender differences in the training trajectories of dancers?*

While elite dancers are judged on an international level, training occurs within the context of a culture. Historically some countries (such as the former USSR) have a reputation for producing the

best ballet dancers in the world. In Russia, the Soviet ballet was often referred to as the national pride (Fetisova, Y. V, 1991), and in the 1930's, it was widely believed that only Russians could become great ballet dancers (Kirstein, 1974). Although this belief is held no longer, some unique differences in training techniques have been observed across countries, at least anecdotally.

Cultural training differences may be lessening as the training opportunities have increasingly become more international, but no one has scientifically studied differences in training across cultures within the context of expertise. However, I would expect that each culture would have an average age at which a dancer (with a professional trajectory) is expected to have accomplished various milestones. I predict that there are cultural differences in developmental and training factors resulting from cultural expectations. More specifically, Russians often do not have rigorous organized ballet training until they are approximately 9 or 10 years old; however, once training is initiated, it is quite intense. On the other hand, American and Mexican families tend to enroll their children in dance quite early, but intense training does not begin until somewhat later. I believe that it is the consistent engagement in intense training of Russian dancers that leads to their perceived superiority over dancers from other countries. The data collections from a cross-cultural population (US, Mexico, and Russia) will allow the investigation of cultural differences in the development of dance training.

### *Gender Differences*

In ballet, the focus is on physical beauty and athletic prowess (Hamilton & Hamilton, 1991, Hamilton et al, 1992). However, generally speaking, dance is considered a "feminine" profession with the ballerina as the main focal point, while the male dancer is limited to moments of technical display (Gruen, 1975). Interestingly, results from one study (Sanguinetti, Lee, & Nelson, 1985) indicate that sex-typed motor-skill activities (such as ballet) affected participants' performance estimates. Specifically, males' expectancies were higher on the male tasks, and females' were higher on the female tasks. Given the sex-typed nature of classical ballet, one would also expect to find gender differences in many aspects of dance skill acquisition and expertise.

Some studies of dancers have found gender differences in training and psycho-social variables (Kalliopuska, 1989 & 1991, Neumarker, Bettel, Neumarker, & Bettel, 2000; Shapiro, 1979; Hamilton,

Kella, & Hamilton, 1995). But most relevant, studies have found males to have a later starting age (Hamilton et. al., 1989; Kushner et. al., 1990) and five to six fewer years of dance training (Gruen, 1955; Skrinar and Zelonka, 1978) than females. This being the case, one wonders how it is possible for males to reach the same technical level as females. One possibility is that they do not. Despite a late entry into dance, males are strongly encouraged to continue their training because of the limited number of young males in the domain (Schnitt & Schnitt, 1987). Because of the scarcity of males in the dance world, men might not be held to the same high standards as women. In fact, Hellerman and Skrinar (1984) suggest that male dancers might be perceived as being at the same level as women when in reality they are below women.

According to Hamilton et al. (1992), men can begin training at an older age and are not expected to have the turnout and point of the foot and ankle that female dancers must have. An alternative explanation for the gender differences in ballet training is that men simply progress faster than their female counterparts do. It is possible that young males have access to more movement experiences than young females do and consequently develop a more varied movement vocabulary during childhood that may facilitate the acquisition of dance skills.

### *Summary*

Over the years, ballet and other forms of dance have evolved into highly popular, rigorous, competitive, and internationally renowned activities. Today, millions of people study ballet every day all over the world. Classical ballet has prospered, and nearly every American city has its own civic or regional ballet company. Although the popularity of ballet differs according to country, most major cities in the world have ballet companies that perform at a very high level. However, some countries—such as Russia—historically have attained a higher international reputation for the performance of their ballet dancers than other countries (Fetisova, 1991).

The world of ballet has changed very little over several hundred years (Ryan & Stephens, 1987) in that the ballet syllabus and the structure of technique classes remain the same. However, the physical demands for technical proficiency constantly increase. Unfortunately, few research studies have focused on uncovering the development of expertise in dance performance. We understand little

about the impact of differences in training upon dancer's development and ultimate level of acquired expertise. This is the focus of the present study. Specifically, I examined the acquisition of skills involved in high levels of dance performance from an expert-performance perspective.

Based on the previous work conducted and the theories of expertise, I proposed that our theoretical understanding of development of expertise and deliberate practice is applicable to ballet dancers, and therefore would be reflected in their training and performance. That is, consistent with the theory of expertise (Ericsson et al., 1993; Krampe & Ericsson, 1996; Ericsson & Lehmann, 1997), I expected that level of attained expertise in ballet would be reflected in training, deliberate practice, early exposure to critical developmental milestones, and early availability of renowned trainers. To examine these issues the current study investigated the training histories and dance related developmental milestones in male and female professional dancers from three different cultures, US, Mexico and Russia. These variables were also obtained from university dance majors in the US. Based on the theory of the development of expertise more explicit hypotheses are summarized below.

### *Hypotheses*

*Based on what we currently know about expertise and dance, what can we expect to learn from this study?*

First, I hypothesized that dance training would be positively correlated with level of acquired expertise. That is, training will be associated with level of expertise. Specifically, I predicted that level of expertise will be correlated with intensity of practice and training milestones (e.g., age of initiating dance, hours of practice, the age at which the dancer first performed, and the age in which s/he first relocated to attend a ballet program).

Secondly, as described above, requirements for men and women in professional ballet appear to differ; therefore, I predicted that training histories would reflect gender differences. I expected that, men and women would differ in their training and acquisition of developmental milestones. I

predicted that women will initiate and reach each training milestone at an earlier age as well as accumulate more hours of practice.

Thirdly, I expected that training and developmental milestones would differ according to country of origin. I predicted that both male and female dancers from countries with more rigid dance training practices would reach training milestones at an earlier age and will have accelerated performance careers.

At this time, there are still considerable distinctions between training practices in various cultures. There are cultural differences in expectations for training practiced. Thus, I would expect to see these differences reflected in intensity of practice and training milestones (e.g., age of initiating dance, hours of practice, the age at which the dancer first performed, and the age at which s/he first relocated to attend a ballet program). Similarly, I expected to find differences across cultures in training (e.g., dancers' engagement in weekly activities such as taking ballet class, rehearsing for dance performances, performing, and body conditioning). Additionally, I expect cultural differences in the exposure to information regarding dance. However, it is important to note that regardless of country of origin, I expected level of expertise can still be predicted by the intensity of dance training, developmental milestones, and other involvement in dance activities.

#### *Motivational Characteristics of Dancers*

Motivational differences between experts and non-experts have not been extensively studied. However, in the current study I explored some psychosocial variables that may be related to such motivational differences. Because of the extensive emotional and financial involvement required of the families' of professional dancers. I also anticipated that professional dancers would have more family support for dance related activities than the university dance majors. Furthermore, I also anticipated that professional dancers compared to the university dance majors would report sacrificing social interactions with friends who are not engaged in dance as well as minimizing engagement in non-dance activities.

Finally, I also expected to find that dancers differ from non-dancers (e.g. age and gender matched individuals from a general population sample) in their social support. Because of the commitment and resources that are needed to engage in the extensive training that is required to become an expert level performer, I anticipated professional dancers would have more social support than non-dancers.

## CHAPTER 2

### *Method*

#### *Participants*

It is typically assumed that there is consistency within cultures and differences across cultures in regard to training patterns. In order to investigate the degree to which this is true in dance, participants were solicited from the United States, Mexico, and Russia. Some 224 male and female professional dancers from these three countries completed questionnaires translated into their native languages. Table 1 shows the number of professional participants by country and gender.

I was most interested in studying the development of skill acquisition in ballet dancers. In order to obtain more information about the developmental training differences among dancers and to increase the diversity in dance expertise, I solicited information from two groups of dancers within the US, professional and pre-professional. The university dance majors were only solicited from the US partially because of convenience, but also because (to the best of my knowledge) the US is the only country that offers dance as a college major. Using dance majors at a leading academic institute will allow for age-matched comparisons between the professional and pre-professional groups.

In regard to sample selection, participants were solicited from each country's top international level ballet companies. An attempt was also made to include companies at the regional and national level whenever possible. The average response rate was 95.5%. Because of stratification of levels of dance expertise and the large sample size, I presume that the data obtained is representative.

#### *Materials*

A questionnaire (found in Appendix 1) was created to assess critical variables in the development of dance expertise. The questionnaire is rather extensive and consists of 21 sections. The major topic areas are demographics, ballet practice history, performance career, weekly activities, social support, perceived talent, family support, goals, concentration required for activities, perceived

importance of activities, and enjoyment of activities. More specifically, information was collected on the ages at which dancers first engaged in dance, when they first engaged in supervised training, and when the time commitment to domain-specific practice first reached various levels. Dancers were also asked about other salient and significant events, such as when they first gave various types of performances in front of public audiences. Most of these events would have to follow each other in a sequential order. For instance, it is unlikely that someone would perform in front of an audience without prior involvement in ballet and without supervised training.

Following earlier studies of expert musicians (Ericsson et al., 1993; Krampe & Ericsson, 1996; Ericsson & Lehmann, 1997) I collected information about dancers' time allocation during a typical week. I was interested in differences in the skill-related distribution of time spent engaged in three types of dance-related activities. The first is time spent in rehearsal, practice, and physical conditioning; the second, time spent observing other dancers by videotaped performances and/or public performances; finally, time reading dance magazines.

Items were designed to measure the age at which dancers first attained certain performance levels. Development of practice was also measured using questions that asked at which ages dancers first began training for at least 1, 3, 5, 10, 15, 20, and 30 hours per week. Questions designed to measure developmental milestones, daily life, family background, and motivational characteristics were also included. Both the questionnaire and the cover letter were translated into Russian and Spanish and were reviewed by native speakers from both countries.

To assess beliefs about perceived talent, the questionnaire included items where dancers could indicate if they were ever told they were talented or gifted in dance. Subsequent items asked about the age of talent identification, the person(s) who identified the dancer as talented and the beliefs of the dancers were also included. Specifically, dancers were asked to indicate whether they believed they were talented and why (e.g., others opinions or internal feelings).

Dancers' social support was assessed using two items from a scale of Social Support derived from the CSHS (Sachs-Ericsson and Ciarlo, 1992). The first item asked participants how many people



they know who care a lot about their well-being, including people that they might only be able to reach by telephone or letter. The second item asked participants how many people they know who would help or comfort them if they were in trouble or needed sympathy. The response options were: None (coded 0), One (coded 1), Two (coded 2), Three (coded 3), Four (coded 4), or Five or more (coded 5). The questionnaire also had two additional items asking participants how many (of the previously identified individuals) were NOT involved in dance.

For the present study I selected a sub-sample of the CSHS respondents, who were 30 years of age and younger (N=1385), as a sample of the general population. These CSHS epidemiological data was used in some analyses to compare social support of the dancers compared to general population age matched comparisons.

An earlier version of the questionnaire was used in a previous study (Sachs-Ericsson, Ericsson, & Ureña, unpublished manuscript), and overall there were no problems with regard to the clarity of the questions. However, the first version of the questionnaire did not include *not applicable, N/A*, as an option for many items. As a result participants were forced to either leave items blanks, or indicate they had never achieved a milestone by placing a 0 or some other mark. Therefore, the original questionnaire was modified to include N/A boxes for certain items. Additionally, the format of some items was slightly revised for ease of response. Specifically, the questionnaire used for the present study included more check boxes with responses (i.e., yes no) rather than blanks for the participants to write in their responses.

The validity and accuracy of responses was verified by using historical data of a small group of dancers. Informed consent was obtained from the participants who then answered a subset of items from the questionnaire including the age at which they first increased their weekly ballet practice hours, attendance at ballet classes, and achieved dance milestones. This information was then compared to historical data including hand-written dance studio attendance records (in some cases dating back 15 years) and published program biographies. Additionally, because parents often provide transportation to dance classes and keep scrapbooks of their children's dance careers, the parents of some participants were interviewed. Despite some missing data and the limited size of the convenience

sample used for these comparisons, the information obtained indicated that dancers were able to recall their past dance training and performance history with accuracy. Of the 18 participants, all were able to recall correctly the age at which they achieved dance developmental milestones as well as their dance training history. Only one of the participants miscalculated (underestimated by one year) the age at which she began training for five hours per week.

### *Procedure*

Prior to the distribution of the questionnaires, ballet companies and university ballet programs were identified and their participation was requested. For those companies and programs that agreed to participate, a contact person within each organization was identified. These individuals were contacted by telephone or e-mail and informed of the purpose and procedure of the study. The contact persons received a packet by mail containing cover letters, questionnaires, and pre-stamped self-addressed return envelopes. They then distributed the material to the dancers who completed the questionnaires and returned them in the pre-stamped envelopes. The cover letter and the questionnaire can be found in Appendix 1.

The response rate of all questionnaires was monitored; the details can be seen in Table 2. The high response rate of 95% was encouraging. While I personally knew only one of the contact people who distributed the questionnaires, the other contact people appeared to be quite motivated to assist because of their interest in the results of this study. In the past I have found that dancers are very willing to participate in research studies. In the comments section on the final page of the questionnaire, many of the respondents wrote encouraging comments such as “this is an interesting study...” and “good luck on your project” and “...best of luck in the future.” Some participants were so interested in the research findings that they included their names and contact information so that they could be notified of the results, and some asked to be informed of any future studies. I should mention that the only incentive used was an opportunity to be entered into a drawing for one of three VISA gift cards in the amounts of \$300.00, \$150.00, and \$75.00. Interestingly, only 56 of the 232 dancers chose to return the anonymous raffle ticket included at the end of the questionnaire.

Upon receipt, the questionnaires were sorted and filed. Prior to analysis, the questionnaires were screened to ensure that a sufficient number of items in each section had been answered. At least three questions in each section of the questionnaire had to be completed in order for the questionnaire to be included in the analysis. Of the 262 questionnaires that were completed, 24 were not included in the analysis because the participants removed the first page of the questionnaire, which contained demographic information as well as questions related to the development of ballet practice and milestones. Additionally, 5 of the returned questionnaires were not included in the analysis because the dancers were the artistic directors of the companies. While I think it is unlikely that artistic directors are fundamentally different from other professional dancers in terms of their development, their daily lives and goals are certainly different from those of the professional dancers. Finally, there was one more questionnaire that was not submitted to analysis. The respondent reported being 81 years old, and since it is likely that this was an error (I found no company that was currently employing an 81 year old female dancer), I excluded the questionnaire.

### *Design*

The professional dancers were divided into six groups according to gender and country of origin (Mexico, Russia, and the United States of America). Comparisons were made within a single country (the US) between professional and university dance majors with respect to their level of dance expertise, development of training, social support, weekly engagement of activities, dance goals, and perceived talent. Similarly, comparisons were made between countries with regard to professional dancers' training, social support, dance goals, and so forth.

## CHAPTER 3

### *Results*

The results section has four parts. The first section describes the demographics of the sample. The second section examines the developmental paths of the professional dancers, focusing on the developmental differences as a function of gender and country of origin. The third section looks at individual differences among professional and university dance majors in a single country (the United States) to assess developmental correlates of adult level of dance achievement. Finally, the fourth section addresses the relationship between motivation, goal-orientation, social support, and dance expertise among all respondents.

### *Demographics*

The participants in this study included a total of 200 (92 male and 108 female) professional dancers, performing at the time of the survey with ballet companies in the United States, Mexico, and the former USSR. 32 pre-professional (1 male, 31 female) dancers enrolled in universities in the US also participated in this study. For more details on the number of participants according to location, see Table 1. The age range was 18-39 with a mean of 22.19. Participants reported highest educational level reached ranged from high school graduation or GED to an earned Bachelor's in Arts degree.

### *Developmental Paths of Professional Dancers as a Function of Their Culture and Their Gender*

In the following section I discuss information on the development of ballet practice, ballet milestones, training history, and then conclude with an analysis of dancer's time allocation in his/her daily lives.

*Development of ballet practice and the amount of accumulated practice.*

To study the development of dance performance across countries with distinct training patterns, I focused on aspects that could be generalized, such as the weekly hours of practice. The dancers were asked to report the ages at which they increased their regular practice to a longer weekly duration, namely “how old were you when you first began consistently training for 1, 3, 5, 10, 15, 20, and 30 hours per week?”

A repeated-measures ANOVA for professional dancers with country as the between-groups variable and the age of first reaching practice at 1, 3, 5, 10, 15, 20, and 30 hours as the within-subjects variable showed a reliable deviation from sphericity; therefore, the Greenhouse-Geisser estimates for degrees of freedom were used. The analysis of within-subjects effects revealed a reliable effect of practice duration,  $[F(1, 180) = 2065.73, p = .001]$ . The main effect of the between-groups manipulation (country) was also reliable,  $[F(1, 180) = 10223.53, p = .001]$ . The interaction between practice duration and country was significant  $[F(2, 180) = 123.18, p = .001]$ .

Further analyses were conducted to determine the nature of the interaction. Interestingly, the Russian dancers had a distinct pattern of intensity of practice. While they were the oldest to start 1 hour of training per week (9.65 years old), they were the youngest to increase the intensity of practice to 10, 15, 20, and 30 hours per week. Bonferroni post-hoc tests confirmed that Russian dancers differed from both the US and Mexican dancers ( $p < 0.001$ ). Specifically, the Russian dancers attained 10 hours of practice when they were 11.6 years old, 1.39 years earlier than the US dancers and 3.07 years earlier than the Mexican dancers.

The interaction between the developmental increases in weekly practice time makes it difficult to assess whether the total amount of practice accumulated before adulthood differs among the professional dancers from different countries. To estimate the amount of practice for all professional dancers accumulated by the age of 17, the weekly duration of practice was estimated based on the information about at what age the different weekly durations were first attained. Each number of weekly training hours was multiplied by 52, the number of weeks in a year. The results of a two-way ANOVA of the accumulated hours of practice by age 17 revealed a main effect of country  $[F(2, 191)$

= 120.48,  $p < .001$ ], a main effect of gender [ $F(1,191) = 20.66$ ,  $p < .001$ ], and an interaction of country and gender [ $F(2,191) = 7.87$ ,  $p < .001$ ].

Examining the main effect of country, Bonferroni Post Hoc Tests revealed the Russians were significantly ( $p < .001$ ) different from the US and Mexican dancers such that the Russian dancers had accumulated more practice hours (8006) by the age of 17 than the dancers from the US (4689) and from Mexico (4752). The main effect of gender was such that females overall accumulated more practice hours than did males. Further inspection of the data revealed that the interaction of gender and country represented the finding that the US female dancers had significantly more practice hours than did their male counterparts (5,702.095 and 3,675.036, respectively). For the Mexicans however, the difference in practice hours between female and male dancers (5,323.235 and 4,181.455, respectively) was not reliable. Interestingly, there was little difference between the female and male Russian dancers (8,097.143 and 7,914.400, respectively).

#### *Expertise and practice hours.*

I was most interested in discovering if the number of accumulated hours of practice is related to the level of expertise. For the purpose of this analysis I used the hierarchical system, which incorporates the company level and the dancer's ranks within a company and is described in Table 3. I examined the relationship between accumulated hours of practice by age 17 and acquired level of expertise by age 18 among the male and female professional dancers across all three countries. The relationship was significant [ $r(195) = .442$ ,  $p < .001$ ].

#### *Ballet milestones.*

The questionnaire was designed to assess typical milestones in the development of ballet dancers. Such milestones included the ages at which the professional dancers first engaged in dance, decided to become professional dancers, made dance their major priority, devoted nearly all free time to dance training, began to monitor their weight, relocated to attend a yearly ballet school. For men, I assessed when they attended their first men's class, and for women, at what age they began training on pointe. Differences in the age of reaching each milestone were examined for country as well as gender.

The results from the 2-way ANOVAs and means for professional dancers by country and gender can be seen in Table 4.

The results provided some very interesting information about country and gender differences. The age that the professional dancer "first participated in supervised technical ballet training" revealed a main effect of gender,  $[F(1,193) = 41.081, p < .001]$ , and a main effect of country,  $[F(2,193) = 12.527, p < .001]$ , and a reliable interaction of gender and country  $[F(2, 193) = 11.859, p < .001]$ . Post-hoc analysis indicated that the US dancers were significantly different from the Russians ( $p < .001$ ), and different from the Mexicans ( $p < .01$ ). Specifically, dancers from the US started dance at a reliably earlier age (7.38) than Mexican (8.94) dancers and Russia dancers (9.64). Additionally, results revealed that male professional dancers started dancing at a later age than female professional dancers (9.80 years and 7.85 years, respectively ( $p < .01$ ).

Because of the later starting age of males, differences in the age of first starting dance by country of origin were examined according to gender. Results for the male dancers showed significant difference by country  $[F(2, 88) = 4.770, p = .011]$ . More specifically, male US dancers began supervised dance at age 9.07, Mexicans at age 11.50, and Russians at age 9.72. Results for the female professional dancers showed significant difference by country  $[F(2, 105) = 20.409, p < .001]$ . Specifically, US female dancers began supervised dance at age 6.29, Mexicans at age 6.82, and Russians at age 9.55. In sum, there appears to be reliable differences in the starting ages for supervised practice in dance.

The age at which participants first decided to become professional dancers was analyzed, and there was a main effect of gender,  $[F(1,192) = 15.435, p < .001]$ , a main effect of country  $[F(2,192) = 204.119, p < .001]$ , and a reliable interaction of gender and country  $[F(2, 192) = 3.809, p = .024]$ . Post-hoc analysis showed that the Russian dancers were significantly ( $p < .001$ ) different than the dancers from Mexico and from the US. Specifically, the Russian dancers were on average 9.64 years old when they decided to become professional dancers, the Mexican dancers were 15.81, and the US dancers were 14.96.

The interaction between gender and country represents the finding that among the Russian dancers there were minimal difference between men and women in the age at which they decided to become a professional dancer. Where as in the US and Mexico women decided at a younger age than did males to become a professional dancer (mean differences 1.55 and 2.05 years, respectively).

The age when participants made dance their major priority was also examined and results revealed a main effect of gender,  $[F(1,194) = 17.016, p < .001]$ , a main effect of country,  $[F(2,194) = 291.585, p < .001]$ , and a reliable interaction of gender and country  $[F(2, 194) = 6.060, p < .003]$ . Post-hoc analysis again revealed the Russians (who where on average 9.64) significantly differed ( $p < .001$ ) from the Mexicans (15.90) and the Americans (15.31) in the age at which they made dance their major priority.

An analysis of the age at which dancers first devoted nearly all free time to dance training also revealed a main effect of gender  $[F(1,190) = 9.891, p = .002]$ , a main effect of country  $[F(2,190) = 196.872, p < .001]$ , and a reliable interaction of gender and country  $[F(2, 190) = 5.249, p < .006]$ . On average the Russians were 9.64 years old when they first began devoting nearly all free time to dance, 5.98 years earlier than the US dancers, and 6.29 years before the Mexican dancers.

Results from an analysis of the age at which dancers began to monitor their weight revealed a main effect of country  $[F(2,91) = 80.597, p < .001]$  but no main effect of gender. However there was a significant interaction between country and gender  $[F(2,91) = 16.054 p < .001]$ . Post-hoc analysis revealed that dancers from all three countries significantly differed ( $p < .001$ ) from each other. The Russian dancers were 9.64 when they began to monitor their weight for dance, while the US dancers were 14.58, and the Mexican dancers were 17.41. The pattern of weigh monitoring by gender was different by country. Interestingly, most US males reported never having monitored their weight for dance. The age at which Russian males and females began to monitor their weight was quite similar, whereas for the Mexicans the women reported monitoring weight earlier than did the men.

Next, I examined the ages at which dancers relocated to attend ballet school. Among the US dancers only 21.4% had relocated. Among the Mexican dancers, only 32.3% had relocated. However,



among the Russian dancers, all the men and women had relocated. [ $\chi^2(df=2)= 121.22, p < .001$ ]. Among those who did relocate to attend a yearly ballet school indicated a main effect of country [ $F(2,118) = 609.661, p < .001$ ] but no main effect of gender. However, there was an interaction between country and gender [ $F(2,118) = 9.378 p < .001$ ]. Post-hoc analysis indicated that dancers from all three countries significantly differed ( $p < .001$ ). Specifically, the Russians were the youngest (9.64 years old) to relocate to attend a yearly training ballet school, while the dancers from the US were 16.53, and the Mexican dancers were 17.7 Russian Male and female dancers did not differ on age of relocation nor did the US dancers. Mexican females (17 years) were on average younger than male dancers (19.25).

I examined the age at which the male professional dancer first attended a men's class and for female professional dancers started to train on pointe. A one way ANOVA of the age at which male dancer attended a men's class revealed significant results [ $F(2,89) = 31.505, p < .001$ ]. Not surprisingly, the Russian dancers were the youngest 11.69 to attend a men's class, the US dancers were 14.90, and the Mexican dancers were 17.73 years old. For the female professional dancers, the age at which they began training on pointe was the only milestone that was not found to be significantly different according to country of origin. The average age was 11.96.

#### *Performance career and training history.*

To investigate the development of expertise in professional dancers, the participants' on-stage performance careers were examined. The questionnaire included items that asked for the name and location of each company with which the participant had performed. Participants were also asked to describe the type of company (e.g., pre-professional, regional, national, or international). Some very interesting patterns were identified among dancers at the highest levels of expertise. Dancers who reached the highest levels of dance skill were much more likely to begin performing at lower levels in higher level companies and work their way up the ranks. That is, dancers who were performing as principles in international companies tended to begin their performance career as apprentice or corps member of international companies, then make their first soloist debuts in the same companies before reaching principle status.

Most interestingly, the highest level dancers were also attending training programs associated with the professional companies they later joined. This finding is most relevant because it provides evidence to support the idea that the opportunity for high caliber training is directly related to level of ultimate expertise. In this regard it is also noteworthy that the US professionals attended prestigious summer and year-long training programs that most of the university dance majors did not.

*Daily lives of professional dancers in different countries.*

To further examine distinctions between countries, the relationship between the weekly hours engaged in daily activities (such as ballet class, rehearsals for dance performances, actual performances, physical/body conditioning, and hours per week engaged in sleeping including napping) and country of origin was examined. All professional dancers were compared across countries and the analyses revealed that there were reliable difference in the amount of time dancers spent per week taking ballet class [ $F(2, 197) = 14.114, p < .001$ ], engaging in body conditioning exercises [ $F(1, 121) = 21.793, p < .001$ ], attending live performances [ $F(2, 25) = 5.444, p < .011$ ], and socializing with other dancers [ $F(2, 140) = 920.436, p < .001$ ]. Bonferroni post-hoc analysis revealed that the US dancers spent less time taking ballet class (1.85 hours) than the Mexican dancers (2.00 hours) and Russian dancers (2.00 hours). Further, Russian dancers reported spending significantly more time (12 hours per day) socializing with other dancers than did the U.S dancers (2.61 hours) and the Mexican dancers (1.33 hours). Subsequent inspection of daily activities revealed that the Russian dancers included dancers practice-related activities as also being social interaction whereas the US and Mexican dancers did not. Table 5 provides a complete listing of the average hours of time engaged in weekly activities for professional dancers by country.

To examine if there were any gender differences in the weekly activities, Univariate ANOVAS with country and gender as the between-subject factors were performed and the only significant interaction was on the time spent attending live performances. Results revealed a main effect of country [ $F(2, 23) = 14.539, p < .001$ ], gender [ $F(1, 23) = 12.553, p < .01$ ], and a significant interaction of country and gender [ $F(1, 23) = 12.553, p = .002$ ]. Overall, the US dancers spent .43 more hours attending live performances than did dancers from Russia and Mexico. Specifically, the US men

reported spending an average of 2 hours per week attending live dance performances while the US women only 1.2. There were no gender differences among Mexican and in Russian dancers.

In sum, the results from these analyses reveal that early developments of professional ballet dancers differed reliably between the three countries. However, the final level of attained performance and daily lives of ballet dancers in professional companies are remarkably similar.

#### *Extracurricular activities.*

To investigate the cultural and gender differences in the time intensive requirements of pursuing classical ballet as a career, I examined the extracurricular activities of all professional dancers. The participants were asked to indicate which activities (e.g., dance, music, visual arts, theater, team sports, individual sports, other) they had engaged in on a regular basis during childhood (age 6-12), adolescence (age 13-16), and adulthood (17+). There were some significant cultural and gender differences, which are described below. Table 7 provides a complete listing of the percentage of dancers that engaged in each extracurricular activity by country and gender.

There appear to be gender differences during childhood, which then lessen as age increases. Specifically, there were gender differences in engagement in dance, music, theater, and team sports during childhood. During adolescence, gender differences were only found in engagement in dance and team sports, and no differences during adulthood. However, the cultural differences that were identified appear to remain the same throughout the life stages.

Of particular interest are the gender and cultural differences in the engagement in team sports and dance. The differences in engagement in team sports were intriguing in that none of the Russian dancers ever engaged in team sports, while 10% of the US males and 12% of the US females reported involvement in team sports during childhood. During adolescence, 10% of the US males were still involved in team sports compared to only 2% of the females. Among the Mexican dancers, results revealed clear differences in engagement in team sports. Specifically, during childhood and adolescence, none of the females reported engagement in team sports while 100% of the males reported involvement in team sports. Interestingly, many of the Mexican male participants indicated

(either on the margin or writing the word soccer next to the appropriate check box) that the team sport they were involved in was soccer. None of the Russian male or females reported engaging in sports.

Consistent with the findings reported above regarding the starting age of initiating dance, analyses revealed that the engagement in dance during different life stages showed significant differences by country. Analyses indicated that while all of the female dancers reported engaging in dance, for the males only 82% of the US and 61% of the Mexican reported involvement in dance during childhood. As adolescents, the gender differences begin to lessen with 92% of the US males and 71% of the Mexican males reporting engagement in dancers. Not surprisingly, the male and female Russian dancers always reported engagement in dance.

Perhaps the most telling evidence of cultural differences in engagement in extracurricular activities can be seen in the distinct trends, which are unique to each country. The Russian dancers had little variability in their responses; they all consistently engaged in dance and music training as children and adolescents and reported the only activity in which they were involved during adulthood was dance. The Mexican dancers were somewhat similar to the Russian dancers in that they had limited variability (e.g., engagement in dance and team sports were the only extracurricular activities that varied between genders) and as adults reported involvement only in dance. The US dancers, however, reported engagement in multiple activities throughout all stages of life. While the percentage of US dancers who reported involvement in extracurricular activities decreased as age increased, US dancers continued involvement in activities other than dance as adults.

*Developmental Individual Differences in Attained Ballet Performance among Dancers within a Given Culture:  
Comparison of Female University dance majors and Professional Dancers*

In this section I examine evidence on individual differences in the developmental paths of ballet dancers in a given country and assess their relation to the level of attained adult performance. I then analyze the data from US professional dancers along with supplementary data from university dance majors to allow an examination of a broader range of attained ballet performance. Again

because of the small sample size on male university dance majors, only females were included in the following analyses.

*Development of practice.*

The first significant event in dancers' careers is their introduction to supervised dance training. Results from a one-way ANOVA indicate that there are no differences between female professional and university dance majors in regard to their introduction to supervised dance training. Similarly, when the development of practice was analyzed, the only significant difference was the age at which dancers first began consistently training for 30 hours per week. Most interestingly, only 25% of the university dance majors reported ever training for 30 hours per week compared to 84% of the professionals. Among the few university dance majors that attained 30 hours of practice, surprisingly, the university dance majors were younger than the professionals when they first increased their training to 30 weekly hours (14.50 and 17.85, respectively) [ $F(1,65)=12.712, p<.001$ ]. Most importantly, even though the dancers initiated dance at the same age, there were considerable differences in the accumulated hours of practice by age 17 [ $F(1,72)=5.756, p<.05$ ] and 18 [ $F(1,72)=9.025, p<.05$ ] with the professionals attaining more hours of practice than the university dance majors. Namely, the professionals reached 1,194.04 more hours by age 17 and 1,685.27 more hours by age 18 than the university dance majors.

*Ballet milestones.*

The analysis of developmental milestones for the US pre-professional and professional male and female dancers revealed no differences in the ages in which they first began dance training, decision to dance professionally, first began to monitor their weight, moved to attend a yearly ballet school, and began training on pointe. However, expertise differences were found in the age when dance became a major priority [ $F(1,99)= 16.58, p<.001$ ] and when dancers devoted nearly all free time to dance [ $F(1,99)= 14.162, p<.001$ ]. Specifically, the professionals were older than the university dance majors (15.3 and 12.9, respectively) when dance became a major priority and when nearly all free time was devoted to dance (15.6 and 13.06, respectively).

### *Daily lives.*

To examine differences in the daily lives of female US professional and university dance majors, I compared their estimated duration of weekly activities with the means shown in Table 6. The results revealed significant differences in the amount of time spent performing [ $F(1,105)= 4.539$ ,  $p = .035$ ], sleeping [ $F(1,137)= 6.030$ ,  $p=.015$ ], socializing with other dancers [ $F(1,101)= 8.251$ ,  $p=.005$ ], and socializing with non-dancers [ $F(1,70)= 16.646$ ,  $p=.001$ ]. More specifically, professional dancers spend more time socializing with other dancers (8.60 vs. 5.47 hours) and slightly more time sleeping (7.67 vs. 7.01) than did the university dance majors. Not surprisingly, the university dance majors who were attending universities, spent more time socializing with non-dancers (4.46 vs. 2.00 hours) than did the professional dancers. Interestingly, the university dance majors reported spending slightly more time performing than did the professionals (2.67 vs. 2.02).

### *Extra-curricular activities.*

Many activities (e.g., dance, music, visual arts, theater, team sports, individual sports, other) dancers engaged in during childhood, adolescence, and adulthood were found to differ between professional and university dance majors. Because of the previously identified gender difference and the lack of males among the university dance majors, only the female dancers were compared. A greater percentage of university dance majors engaged in music, visual arts, and theater as teenagers. Specifically, 54.8% of the university dance majors compared to 21% of the professionals engaged in music [ $F(1,71)=9.584$ ,  $p=.003$ ]. Participation in visual arts was also different [ $F(1,71)=4.666$ ,  $p=.034$ ], with 38% of the university dance majors and only 16.7% of the professional dancers reporting involvement in music as teenagers. Finally, participation in theater [ $F(1,71)=4.666$ ,  $p=.016$ ] was also more prevalent among university dance majors (41.9%) than in professional dancers (16.7). As adults, university dance majors also engaged in music [ $F(1,71)=6.297$ ,  $p=.014$ ] and visual arts [ $F(1,71)=4.693$ ,  $p=.034$ ], 34% more than their professional counterparts 9.5% and 11.9% respectively.

### *Motivation, Goal-Orientation, and Social Support*

I was most interested in studying the relationship between dance expertise and motivational factors such as perceived talent, attributions, dance related goals, social and family support, and motives for engagement in dance activities.

#### *Perceived talent.*

Participants were asked a series of questions about perceived talent. The first question, were you *ever* told that they you were talented or gifted in dance, revealed no significant difference between countries because all dancers responded that they had been told they were talented or gifted in dance. However, a main effect of country [ $F(2,192)= 115.21, p=.001$ ] and a main effect of gender [ $F(1,192)= 11.907, p=.001$ ] was found for the *age* at which they were first told they were talented or gifted. Bonferroni Post-hoc analysis reveal that the Mexican dancers differed significantly from the US and Russian dancers ( $p=.001$ ) and that the Russians differed from the US dancers ( $p=.004$ ). In all three countries men were told that they were talented at a later age than women. Specifically, US men were told that there were talented at age 9.39 while US women were 7.82. The Mexican males were 16.93 and women were 14.88 years old when they were told they were talented, and the Russian males were 9.72 while the women were 9.55 years old when they were identified as being talented. Table 8 provides a listing of responses for all questions according to country and gender.

Although all dancers reported being told they were talented and nearly all indicated they were told they had the capacity to become professional dancers, some interesting cultural patters emerged from the analysis of items related to perceived talent. All Mexican dancers indicated that multiple people including friends, family, dancers, and dance instructors told them they were talented and had the capacity to become professional dancers. The ages at which the Mexican dancers were identified as talented and as having the capacity to dance professionally were the same for both questions and also significantly older (16.93 for men and 14.88 for women) than dancers from the US (9.39 men and 7.82 women). It is of interest to note, however, that the Russians also had some unique trends including the gender similarity in the age at which they were identified as talented and capable of dancing professionally (9.72 men and 9.55 women).

To examine attributions, respondents were asked to what (internal feelings or others' opinions) they attributed their belief about whether they were talented and had the capacity to dance professionally. Interestingly, the Russian dancers appear to have significantly more internal attributions about their talent and capacity to become professional dancers than participants from the other countries. Specifically for both items 1 and 2, 70% of Russians attribute this belief solely to internal beliefs. In contrast, both Mexican and US dancers predominately attribute this belief to a combination of internal and external attributions. (Please see Table 8 for details including significant statistics for all of the analysis performed on items in this section.).

*Perceptions of talent: comparison of university dance majors with professionals.*

I was also interested in exploring the relationship between perceived talent and level of expertise by comparing university dance majors with professional female dancers.

Although all professional dancers (100%) reported that they were told they were talented, only 91% of the university dance majors indicated being identified as talented [ $\chi^2(1)=4.239, p = .04$ ]. The professionals reported being told they were talented at a significantly younger age (8.47) than the university dance majors (11.41) [ $F(1,95)=14.911, p=.0012$ ]. Similarly, differences were found in that 99% of the professional dancers reported being told they had the capacity to become professional dancers as compared to 81% of the university dance majors, [ $\chi^2(1)=5.927, p = .02$ ].

Not surprisingly, there was a significant difference [ $F(1,91)=36.577, p=.001$ ] in the age that dancers were told they had the capacity to dance professionally. The professionals were 9.71 years and the university dance majors were significantly older, 15.36 years. The difference in the percentage (99%) of the professional dancers who believed they had the capacity to dance professionally did not differ significantly from the university dance majors (88%).

Next, I examined differences between groups involving attributions regarding their beliefs in their abilities. Participants were asked about their beliefs in relation to internal attributions, external attributions, or a combination of internal and external attributions. Of the professional dancers, 7% reported their beliefs about their talent resulted from others' opinions, 9% from internal feelings, and



84% from a combination of the two. Of the university dance majors, 16% indicated that their beliefs resulted from others' opinions, 25% from internal feelings, and 50% from both [ $\chi^2(1)=6.824, p = .03$ ].

When asked about their beliefs regarding their capacity to become professional dancers, professionals indicated percentages similar to their talent attributions (7% external, 6% internal and 87% external and internal). The university dance majors indicated 23% external attributions, 31% internal, and 46% both external and internal [ $\chi^2(1)=5.927, p = .02$ ]. For a complete listing of the percentages for each item in the perceived talent section, please see Table 9.

#### *Social support.*

I was interested in determining dancers' level of social support compared with general population data. To determine the dancers' level of social support, participants were asked two questions: "How many people do you know who care a lot about your well-being, including people you might only be able to reach by telephone, letter, or email?" and "If you were in trouble or needed comfort how many people do you know who would help you?" These two items were taken from the Colorado Social Health Survey (CSHS; Ciarlo, Shern, Tweed, Kirkpatrick, & Sachs-Ericsson, 1992) and the dancers' responses (ranging from 0 friends to 5 or more friends) were compared to the general population sample matched on age.

Results from a one-way ANOVA revealed significant results for both items and no gender differences. Dancers differed from the general population, in that they reported having more friends [ $F(1, 1615)= 12.991, p < .001$ ] and having more people that they could count on in times of need [ $F(1, 1615)= 16.889, p < .001$ ]. Examination of the distribution of the data revealed that 98.7% of all dancers reported having five or more people who cared a lot about their well being compared to 91% of the general population. Further, among the dancers, 97.8% reported that they had five or more people who would help them if there were in trouble compared to only 86.7% of the general population.

When dancers' responses to social support items were compared among the three groups of professional dancers, some interesting results were found. To obtain more information about the

nature of dancers' social support, follow up questions were added to the items derived from the CSHS. The dancers were asked to indicate how many people they know, *not* involved in dance, who care about them and would help them if needed. Results from a one-way ANOVA revealed that while there were no cultural differences in the number of people who cared about the respondents' well-being, there were cultural differences in the dancers' reports of the number of these people who were *not* involved in dance (e.g., "how many are NOT involved in dance"):  $F(2,229)= 5392.48, p<.001$ . For the Russian dancers, their entire support system was involved in dance, whereas it was almost the opposite for the Mexican and US dancers. Specifically, all Russians reported "0" people who cared about their well being were not involved in dance compared to 94% for the US dancers and 100% for the Mexican dancers. Analysis also indicated that there were no gender differences in regard to social support.

Results also revealed significant differences among the countries in the number of people who respondents indicated would help them if they were in trouble or needed help [ $F(2,229)=5.282, p=.006$ ], and in the number of these people that were not involved in dance [ $F(2,228)=1824.76, p<.001$ ]. Further examination of the data revealed that 100% of the Mexicans and Russians reported that they knew five or more people who would help them whereas only 85% of the Americans did. Similarly and again indicating that the Russian dancers' social network is entirely linked to dance, Russian dancers indicated that *all* of the individuals who would help them if they were in trouble were in dance. In contrast, 100% of the Mexicans reported that 5 or more of these people were *not* involved in dance. There was more variability among the US dancers; specifically, 86% said 5 or more of the people were *not* involved in dance.

The final two items in the social support section had to do with conflict: "Was there any conflict in your family regarding your decision to dance?" and "Did your dancing put you in conflict with your peers?" Results from chi-square analysis revealed cultural differences in the presence of family conflict [ $X^2(2)=9.524, p < .01$ ] and conflict between peers [ $X^2(1=2)=19.549, p < .01$ ]. Specifically, Russian and Mexican dancers indicated that there was neither conflict in their family nor conflict among their peers regarding their decision to dance. However, for the US dancers, 7%

reported conflict in their family and 14% indicated that their dancing put them in conflict with their peers. Again, no gender differences were identified.

In sum, results reveal that the professional dancers have more social support than age-matched comparisons of the general population and that while there appear to be several cultural differences in respect to social support, no gender differences were identified for any of the items in this section. In order to investigate the relationship between social support and expertise, pre-professional and professional dancers within a single country were compared.

*Social support and family conflict comparisons between university dance majors and professionals.*

Social support was also examined for pre-professional and professional dancers within the US. There were *no* differences between groups in the *number of people who cared about the dancers' well being*. However there were differences in the number of people who dancers reported would *help and comfort* them if needed [ $F(1,100)=5.001, p=.028$ ]. The professionals reported having *more* people that would help or comfort them than did the university dance majors. Inspection of the distribution of the data indicated that 84% of the university dance majors compared to 94% of the professionals reported that they knew 5 or more people who would help and comfort them.

Next I compared the extent to which the professionals' and university dance majors' support systems were involved or not involved in dance, related to the two social support items described above. For their first item *number of people who cared about the dancers' well being*, there were differences between the groups in the number of people in their social support network who were involved in dance [ $F(1,100)=4.6379, p=.034$ ]. Much of the professional dancers' support system was outside of dance. Inspection of the distribution of the data indicated that for the professional dancer, the vast majority (94%) of the people who cared about them were *not* involved in dance. Among the university dance majors, they indicated that 81% of the people who cared about them were *not* involved in dance. Surprisingly, the non-professionals actually had somewhat more support from dance related individuals. However for the next social support item people who would *help and comfort them*, there were no significant differences in the number of these individuals who were or were not involved in dance for professionals compared to the non-professionals.

Very interesting differences emerged in the degree of conflict reported by the professionals and the university dance majors in regard to family conflict regarding their involvement in dance. Specifically, there was a difference between professional and university dance majors in the presence of conflict in their family regarding their decision to dance [ $X^2(1)=7.363, p < .01$ ]. Only a small percentage (7%) of the professional dancers reported experiencing conflict in their family regarding their decision to dance. In contrast, one-third (34%) of the university dance majors indicated experiencing conflict in their family regarding their decision to dance.

#### *Cultural Differences and Family support.*

Participants across each country were asked to indicate how supportive their families were of their efforts to dance in relation to providing financial support, emotional support, providing transportation to dance activities when necessary, and attending their dance performances. Participants were asked to indicate their response by placing a mark on a line anchored by "not at all" to "greatly". Each line was then measured. For ease of interpretation a z-transformation was then computed for each item (e.g., each item was transformed to have a mean of 0 and a SD of 1).

Participants' responses were then compared across countries. Results from a one-way ANOVA revealed that the only significant differences among countries were in regard to providing financial support [ $F(2,197)=43.440$ ] and attending dancers' performances [ $F(2,197)=192.514, p=.001$ ]. Moreover, there were no gender differences.

For financial support, post hoc analysis revealed that the Russian families were significantly less supportive than the Mexican and US families,  $p=.001$ . Specifically, Mexican dancers reported that their families were the most financially supportive (.54), followed by the US dancers (.42). The Russians reported that their families were the least supportive (-.60).

In regard to families attending the participants' dance performances, post-hoc analysis indicated that Russians were significantly different from the other countries. Specifically, the Mexican dancers reported that their families were most supportive (.71), followed by the US dancers' families (.69). The Russian dancer's families were least supportive (-.94),  $p<.001$ .

*Professional and university dance majors and Family support.* Interestingly, no differences were identified and there were no significant differences in family support when US professional dancers were compared to the university dance majors.

*Cultural differences in the importance of Goals.*

Dancers were asked to indicate how they would rate the importance of each of the four goals. Again, dancers indicated their response by placing a mark on a line anchored by "low priority" to "high priority". A Z-transformation was again computed such that each item would have a mean of 0 and a SD of 1. Moreover, higher scores indicate that the goal is more important. The goals included: 1) to be a well-known professional dancer, 2) to be a well liked dancer in your company or studio, 3) to be admired for having a beautiful body, and 4) to be the most highly skilled professional dancer. In the following analyses I compared the importance rating of each goal separately across countries.

For the first goal (to be a well-known professional dancer), a two-way ANOVA revealed no main effect for gender but a main effect of country [ $F(2,197)=10.580, p<.001$ ]. For the Russians this was a more important goal than for the dancers from the other countries. This goal was least important for the Americans. Post-hoc analysis revealed that mean for the US dancers (-.46) was significantly lower ( $p=.001$ ) than the Russian dancers (-.45). The Mexican dancers' (.09) rating fell between the US and Russian dancers, and this difference was not significant.

Next I examined the goal of the dancers' desire to be well liked. Analysis revealed a main effect of country [ $F(2,194)= 51.63, p<.001$ ], no main effect of gender, and a significant interaction of gender and country [ $F(2,194)= 3.88, p=.022$ ]. Russians indicated that their desire to be liked was more important than the Mexicans and Americans. Post-hoc tests revealed that the Russians (.58) significantly ( $p<.001$ ) differed from the US (-.43) and Mexican (-.46) dancers. The interaction between country and gender represented the finding that for Russians, there was no difference between men and women in desire to be liked. However, US women reported wanting to be liked more than men; the opposite was true of the Mexicans.

Next, analysis of dancers' desire to be admired for having a beautiful body showed a main effect of country [ $F(2,192)= 13.080, p=.001$ ] but no main effect for gender, and there was no interaction. Post hoc tests showed that the Russian dancers (-.32) reported that this goal was less important to them compared to the US (.26) and the Mexican (.21) dancers ( $p < .001$ ).

The desire to be the most highly skilled professional dancer also revealed country differences [ $F(2,194)= 6.43, p=.002$ ] but no main effect of gender or interaction between gender and country. Among the three countries, the Mexicans identified this as the more important goal followed by the Russians, and the Americans reported that this was the least important. Post hoc analyses indicated that the US dancers (-.47) were significantly different than Mexicans (.47) and different than the Russians (.33) (all  $p < .01$ ). There was no significant difference between the Russians and Mexicans.

In sum, the professional dancers appear to differ in regard to goals according to country of origin. The Russians had the greatest desire and the US dancers had the least desire to be well-known professional dancers. The Russian dancers had the greatest desire to be well liked while the Mexican dancers had the least. The US dancers were most interested in being admired for having beautiful bodies and the Russian dancers were least interested. Finally, the Mexicans reported having the most desire to be the most highly skilled professional dancers while the US dancers had the least.

*Expertise and Goals: Comparison of university dance majors and professionals.*

To examine if expertise was related to dance goals, the university dance majors were compared with the professional dancers from the US. Again, the data were transformed into Z-scores from the sample as a whole (i.e., all dancers including the Russian, Mexican, and American professionals and university dance majors).

Although there were no differences in the desire to be well liked and admired for having a beautiful body, there were differences in the desire to be well-known and highly skilled professional dancers. The professionals identified these latter two goals as more important than the university dance majors. Not surprisingly, the desire to be the most well-known professional dancer was significantly different [ $F(1,99)= 24.76, p=<.001$ ] with the professional dancers' (-.06) desire to be well-

known overwhelmingly higher than the university dance majors (-1.4). Similarly, there were differences [F(1,99)= 53.28,  $p < .001$ ] in the groups' desire to be the most highly skilled dancers with the professionals reporting more desire to be highly skilled (.07) than the university dance majors (-1.7).

*Concentration, importance, and enjoyment of dance activities.*

I was extremely interest in exploring the cross-cultural and skill level differences in the participant's ratings on qualities of different dance activities. To this end, dancers were asked to rate each dance related activity (i.e., taking ballet class, making technical corrections, body conditioning exercises, rehearsing for performances, performing on stage in front of an audience, using artistic expression to communicate while on stage, and interacting socially with other dancers) on three dimensions; concentration, importance, and enjoyment.

For each of the three categories, seven measures were collected to provide a level of understanding using a point estimate on a linear range from “low concentration” to “high concentration”, “not important” to “very important”, and “not enjoyable” to “highly enjoyable.” Please see Appendix 1 sections 18, 19, and 20 for the items. Again the participants were asked to indicate their response by placing a mark on a line. The line was measured in millimeters (0 to 100). For ease of interpretation, the actual means for each item is listed in Table 10.

*Cultural differences and dance activities.*

To investigate the difference in respondents' ratings on the concentration, importance, and enjoyment of dance activities, three repeated-measures ANOVAs were performed with activities as the between-groups factors. The ratings on each of the seven items for each dimension—namely, concentration, importance, and enjoyment of each activity—were the within-subjects variables. To control for expertise, the analysis included only the professional dancers who were performing with national and international ballet companies. Therefore this included a sub-sample of the professionals  $n=176$ .

For *concentration*, the analysis of within-subjects effects showed a reliable effect of the seven item dance activities [F(1,173)= 3097.509,  $p < .001$ ] and a main effect of country [F(1, 173)=

125673.20,  $p < .001$ ] and a significant interaction between country and rated activity, [ $F(2, 173) = 53.243, p < .001$ ]. For *importance*, the analysis of within-subjects effects showed a reliable effect of the seven item dance activities [ $F(1,173) = 1373.62, p < .001$ ] and a main effect of country [ $F(1, 173) = 4286.24, p < .001$ ]. There was also a significant interaction between country and activity [ $F(2, 173) = 1928.80, p < .001$ ]. Similarly, for *enjoyment of activities*, the analysis of within-subjects effects showed a reliable effect of the seven item dance activities [ $F(1,173) = 17311.284, p < .001$ ], a main effect of the country [ $F(1, 173) = 209773.92, p < .001$ ], and an interaction between country and activity [ $F(2, 173) = 2096.477, p < .001$ ].

In order to better understand these findings, Bonferroni pair-wise comparisons were conducted for this sub-sample of professional dancers at the highest level in their respective countries. Each possible permutation of activities within every dimension, concentration, importance, and enjoyment was compared.

Please see Tables 10 for a complete listing of the activity means by country and rating dimension, concentration, importance, and enjoyment. It is important to note, however, that the Russian dancers reported very limited variability in responses for all ratings. For example, for concentration the means for performing, making technical corrections, taking ballet class, and using artistic expression was 88.19. When the means were rank-ordered to produce Table 10, ten decimal points were used for each value.

**Concentration:** Inspection of the data shows that there was some agreement across countries in regard to the rank-ordering of concentration requirements for each of the seven dance activities. Specifically, making technical corrections was ranked among the top two activities that required the most concentration for all three countries. In contrast, across all countries, interacting socially with other dancers and performing body conditioning exercises was rated as the bottom two activities which required the least amount of concentration.

**Importance:** When examining the mean scores across cultures in regard to importance, one can see the Russians rated all activities as important. Specifically, across all 7 items the importance ratings ranged from 92.56 to 99.38. It is clear that the Russian dancers perceived all activities as



being important with only social interaction being listed as slightly less important compared to the other activities. However, the mean (92.56) of importance for social interaction is still significantly higher than the means for this activity among the US and Mexican dancers. Both the US and Mexican dancers agreed that performing and taking ballet class were the two most important activities for improving their dance performance. Most interestingly, the Russians indicated taking ballet class as the least important comparatively.

Enjoyment: The US and Mexican dancers appear to have similar patterns listing the following activities in the same order of most enjoyable: performing, interacting socially with other dancers, using artistic expression, taking ballet class, body conditioning, rehearsing, and making technical corrections. The Russians, rated all activities as highly enjoyable, with the exception of taking ballet class which they rated as 2.77 which was 50.13 points less enjoyable than rehearsing which was listed as the second least-enjoyable activity.

#### *Expertise differences and dance activities.*

I examined the ratings of the 7 dance activities on the three dimensions among US dancers according to high and low skill level. High skilled dancers were defined as individuals who were performing at national and international level companies and low skilled dancers included all of the pre-professional US dancers and those who were performing with regional companies.

To examine the differences according to skill level, repeated-measures ANOVAs were performed for the US dancers alone with skill level (low/high) as the between-groups factor and ratings on the concentration, importance, and enjoyment of each activity as the within-subjects variables.

For concentration, there was a main effect for concentration,  $[F(1,98)= 137.273, p=.001]$  a main effect of skill  $[F(1,98)= 4.097, p=.046]$  and an interaction between concentration and skill  $[F(1,98)=4.037, p=.047]$ . However, whereas the mean ratings were systematically different for the high and low skill groups, in actuality their rank ordering of the concentration required for each activity was identical. Both groups thought the concentration requirement for activities was as follows from

most concentration to least: performing, making technical corrections, rehearsing, taking ballet class, body conditioning, using artistic expression, and interaction socially with other dancers.

For importance, the analysis revealed a main effect of activities [ $F(1,100)= 426.949, p=.001$ ], a main effect of skill, [ $F(1,100)= 8466.222, p=.001$ ] and an interaction between importance of activities skill [ $F(1,100)=59.586, p=.001$ ]. Further inspection of the data revealed that performing and taking ballet classes were listed as the two most important activities by the highly skilled dancers whereas the lower skilled dancers listed taking ballet class and making technical corrections as most important. The highly skilled dancers then rated rehearsing and making technical corrections as next most important, whereas the lower skilled dancers indicated performing and rehearsing.

For enjoyment, the analysis of within-subjects showed a reliable effect of activities [ $F(1,99)= 152.604, p=.001$ ]. The test of between-subjects effects was reliable [ $F(1,99)= 5812.860, p=.001$ ] and there was an interaction between enjoyment of activities and skill [ $F(1,99)=27.958, p=.001$ ]. When comparing the high and low skilled dancers, some interesting patterns can be seen. Performing was rated the most enjoyable activity by both groups. The highly skilled dancers then ranked social interaction, using artistic expression, and taking ballet class as next most enjoyable, whereas the less skilled dancers rated the activities as follows: artistic expression, taking ballet class, and interacting socially with other dancers as most to least enjoyable.

Please see Table 10 for more details including the results of pair-wise comparisons within each rating dimension and Table 11 for a listing of each activity with the means and significant statistics.

## CHAPTER 4

### *Discussion*

This study, a cross-sectional survey of dancers from three separate cultures, was conducted to investigate the skill acquisition process of ballet dancers from an expert-performance perspective. Specifically, I was interested in understanding the skill acquisition process of dancers by identifying the mechanisms by which exceptional skill is acquired and then maintained in classical ballet dancers. In contrast to the belief that expert performance results from talent and other innate characteristics, the findings of this study (consistent with the large body of evidence in other domains) show that expert performance is primarily acquired and maintained through years of consistent engagement in deliberate practice activities.

Research in many domains (Ericsson, 1996; Ericsson & Smith, 1991; Hoffman, 1992; Starkes & Ericsson, 2003) has shown that the highest levels of performance are only displayed after a minimum of 10 years of intense practice. The results of the current study are in line with previous expertise research which reveals that the differences in skill can be accounted for by divergence in training rather than by other variables such as innate talent or genetic predispositions. Expert performance is achieved through consistent engagement in the demanding training sessions targeted at improving or acquiring a skill. Studying the development of dancers has provided a unique opportunity for the investigation of the critical effect of training on the ultimate level of expertise. Specifically, the cross-cultural and gender differences identified in the current study among classical ballet performers provide valuable information on the developmental milestones and training effects in dance.

The influence of environmental factors on the development of expert performance can be advantageously studied in domains where activities are guided by the same, or at least similar, goals and values. When mastery of activities are pursued with the same goals, such as attaining a high level of dance performance, then the observation of cultural and gender differences in developmental factors might be viewed as imperfect field experiments. Domains of expertise, such as classical ballet, in which

internationally renowned dance companies across the world often perform choreographic renditions of standardized ballets, offer an opportunity in which the development of skill acquisition can be profitably compared across countries. In dance, the ultimate goal for male and female professional dance performers is unquestionably international rather than culture specific, providing unique advantages for studying the acquisition of expert performance from a cross-cultural perspective taking into account gender differences. Specifically, the cross-cultural and gender differences among professional ballet dancers allows for comparisons of diverse training systems and distinctive career trajectories.

In the following section I will discuss the cross-cultural and gender differences in the developmental of professional dancers identified in the current study. I will then argue that the observed pattern of results is consistent with the expert-performance framework and its account of ballet performance resulting from accumulated deliberate practice. Next, I will discuss the development of individual differences in the level of attained ballet performance by ballet dancers (university dance majors and professionals) and its relation to the amount of accumulated practice and the access to superior training resources. Then, I will summarize the major findings and their relationship to the expert-performance framework. Finally, I will conclude with a brief explanation of the study's limitations and ideas for future directions.

#### *Cross-Cultural Differences among Professional Ballet Dancers*

Some domains provide more interesting and better opportunity for the investigation of the development of expertise. In dance, one or more teachers directly supervise the majority of the practice and training. Thus, the duration of practice and its objectives are better controlled than in other domains of expertise, such as chess and music, where the aspiring expert practices alone. In this study, several cross-cultural training differences were identified and are discussed below.

##### *Development of ballet practice and the amount of accumulated practice.*

One of the important components of the expertise model is in identifying the amount and quality of deliberate practice. In this regard supervised dance training is quite structured and as such is

available for analyses across cultures. Specifically, the analyses of the weekly duration of consistent dance training at specific intervals (e.g., 1, 3, 5, 10, 15, 20, and 30 hours per week) indicated an interaction between practice duration and country of origin. Most interestingly, the Russian dancers had a very distinct pattern of practice intensity wherein they were the oldest to start 1 hour of training per week yet the youngest to increase the intensity of practice to 10, 15, 20, and 30 hours per week. Because of the importance of practice on the ultimate level of expertise, the accumulated hours of practice by the age of 17 were calculated for each dancer. Overall, the Russian dancers had accumulated substantially more practice hours (8005) by the age of 17 than dancers from the US (4891) and from Mexico (4874). Quite importantly, consistent with the expert-performance framework, regardless of country there was a significant positive relationship between the accumulated hours of practice at age 17 and level of expertise at 18, suggesting that the more hours of practice dancers engage in, the higher the level of expertise.

*Ballet milestones and talent identification.*

Despite the later onset of dance training, the Russian dancers appear to progress through the developmental milestone much more rapidly and with less variability than the US and Mexican dancers. Specifically, the Russian dancers were significantly younger than US and Mexican dancers when they decided to become professional dancers, made dance their major priority, began devoting nearly all free time to dance, and first began to monitor their weight for dance. Furthermore, the milestones correspond with accumulated hours of deliberate practice across cultures.

Perhaps the most substantial cross-cultural difference between dancers was the age at which they relocated to attend a yearly ballet training school. The Russians were 9.6 years old, while the dancers from the US were 16.5, and the Mexican dancers were 17.7 years old. This difference may account for the Russians reaching all of the developmental milestones at the same age (on average 9.6 years old) where as the dancers from the other countries appear to achieve the milestone sequentially. The cross-cultural difference in relocation to attend a yearly dance training institute before the age of 10, explains why there are such significant training differences.

Consistent with the age of relocation, the Russian dancers are identified as talented and as having the capacity to become professional dancers before the age of 10. They then make life-altering decisions (with support from their families) to pursue dance as a career and relocate to attend a yearly ballet conservatory where they have access to the best dance training resources. If access to superior training resources is necessary to reach the highest level of skill (Bloom, 1985), it is not surprising that historically Russian dancers enjoyed world-renown status in dance. It appears that the consistent, highly specific training that Russian dancers receive sets them apart from the dancers in other countries showing the lasting effects of early training.

Early dance training has been shown to result in physiological adaptations (Miller, Callander, Lawhon, & Sammarco, 1984) such as the fundamental ability to turnout the hip (Kushner et. al., 1990), flexibility (Kushner et al, 1990), and forward flexion (Klemp & Chalton, 1989). In order to achieve the physical requirements necessary to execute classical ballet techniques properly, dancers must engage in an arduous course of training (Dunning, J., 1985 as cited in Hamilton, Hamilton, Meltzer, Marshall, & Molnar, 1989). In fact, consistent with work by Ericsson and Lehmann (1996), physiological differences can be accounted for by the intense training that exposes certain body parts to specific stimulation well outside the normal range. Given all of the strong evidence for the importance of training on the development of expertise, the engagement in deliberate practice activities at an early age largely accounted for the Russian dancers' advantage in the ability to properly execute classical ballet movements and is therefore related to their ultimate level of dance expertise.

*Daily lives and extracurricular activities of professional dancers across cultures.*

Consistent with the idea that the goals of professional dancers are international rather than culture-specific, it is not surprising that the results of this investigation revealed that the daily lives of professional dancers are remarkably similar. Specifically, the number of hours professional dancers spent engaged in daily activities, such as ballet class, rehearsals for dance performances, actual performances, physical/body conditioning, and sleeping including napping, was comparable across countries. The only statistically significant cross-cultural differences were in the amount of time spent taking ballet class and socially interacting with other dancers.

The US dancers spent slightly less time taking ballet class on a daily basis (1.85 hours) than the Mexican dancers (2.00 hours) and Russian dancers (2.00 hours). This minor difference in the weekly time spent in ballet classes does not appear to be indicative of any meaningful cross-cultural difference. At most, this finding may simply reflect the duration of ballet classes in the US. Although ballet classes in Russia and Mexico are normally two hours long, ballet classes in the US typically range from 45 minutes to 2 hours. With regard to time spent socializing, the Russians indicated that they spent 12 hours per day socializing with other dancers, whereas the US and Mexican spent 2.6 and 1.3 respectively. However, it appears that the Russians experience social interaction as part of the process of all dance related activities.

The investigation of time allocation during development dealt with the dancer's engagement in extracurricular activities. The results of these analyses provide evidence of unique cultural differences that exist in the early stages of life and in some cases extend to adulthood. Similar to other findings, the Russian dancers had *no* variability in their responses. All male and female Russian dancers consistently engaged in dance and music training as children and adolescents, but as adults only reported participating in dance. The Mexican dancers differed significantly between genders in their engagement in extracurricular activities as children with the females reporting participation in dance, music, and visual arts and the males participating in dance, music, and team sports. The US dancers, however, reported engagement in all activities (e.g., dance, music, visual arts, theater, team-sports, and individual-sports) throughout life. Even though the percentage of dancers that reported involvement in extracurricular activities decreased as age increased, US dancers continued involvement in activities other than dance as adults. Thus there are cultural differences in the variability of extracurricular activities, with Russians engaging in the fewest extra-curricular activities and the US dancers the most.

### *Gender Differences*

#### *Gender difference in starting ages and amount of training.*

Consistent with the findings of others (Hamilton et. al., 1989, Kushner et. al., 1990, Gruen, 1955; Skrinar and Zelonka, 1978), the results of this study showed that men across countries began dance training (nearly two years) later than women. As expected however, there were cultural patterns

in the presence of gender differences. Specifically, the gender differences in starting age of dance training in the US was nearly 3 years later than the females and in Mexico nearly 5 years later than the females. However, in Russia there is almost no difference with women starting training only .17 years earlier than men.

The intriguing finding of the late start of practice by male ballet dancers in the US and Mexico leads one to wonder how male ballet dancers are able to attain a professional level with less practice than female ballet dancers. One possible answer is that there are different standards for judging skill according to gender in ballet. Because of the scarcity of males in the dance world, men might not be held to the same high standards as women. In fact Hellerman and Skrinar, (1984) suggest that male dancers might be perceived as being at the same level as women when in reality they are not. It is possible that men can begin ballet training at an older age because requirements for turnout and point of the foot and ankle are not as rigid for males as they are for females (Hamilton et. al., 1992).

Additionally, it is possible that a late entry into dance is less restrictive for men because of the scarcity of male dancers. Despite a late entry into dance, males are strongly encouraged to continue their training because of the limited number of young males in the domain (Schnitt & Schnitt, 1987). Most interestingly, the Russian dancers had no significant gender differences in the age at which they began ballet training and in the accumulation of practice hours. Thus the Russian male dancers appeared to have started training at the same time as their female counterparts and had accumulated the same amount of practice hours as female Russian dancers. Not surprisingly, the accumulated practice was much greater among Russian male dancers than the male and female US and Russian dancers. However, historically, there has been considerable attention directed at male Russian ballet stars (Mikhail Baryshnikov was hailed as “the greatest male dancer of his generation” (Victor, 1976) and Rudolf Nureyev is often credited with changing the world of ballet). The increased practice times of Russian male dancers’ may account for their increased skill.

A second explanation for the gender difference in ballet is that men simply progress faster than their female counterparts. It is possible that young males have access to more movement experiences than young females do and consequently develop a more varied movement vocabulary during



childhood which may facilitate the acquisition of ballet. Analyses of engagement in extracurricular activities during childhood did not provide evidence to support this idea. Among the US and Russia dancers there were no significant gender differences in the engagement in team or individual sports. However, Mexican dancers had the greatest gender difference in the age at which males and females began dancing (4.68 years), and all of the males and none of the females reported engaging in team sports during childhood.

A third potential explanation for the gender differences in age of initiating dance training could be that men start dancing later than women but accumulate more practice hours and thus are able to reach professional levels. However, this explanation was not consistent with the findings of the current study. Analyses revealed that across countries, males accumulated fewer practice hours than their female counterparts.

#### *Gender differences in ballet milestones.*

While no known studies can be identified as to career aspirations of young children in regard to classical ballet, because of gender norms it would not be surprising if there are a greater number of little girls who dream of becoming classical ballet dancers than boys. Because of the gender-specific stereotypes of classical ballet (Hamilton, Hamilton, Meltzer, Marshall, & Molnar, 1989) one would expect that little girls are exposed to dance at an earlier age than little boys. In fact, gender differences were identified in most ballet milestones.

Consistent with this speculation, women were found to be younger than men when they first began supervised ballet training, decided to become professional dancers, made dance a major priority, and began devoting nearly all free time to dance. It is possible that these differences can be accounted for by societal beliefs about the sex-typed nature of ballet. Unfortunately, in western cultures such as the US and Mexico, dance is considered a feminine profession. In classical ballet, the ballerina is the main focal point, while the male dancer is often restricted to moments of technical display (Gruen, 1975). However in Russia, where male and female ballet dancer are both seen as cultural idols (Fetisova, Y. V, 1991), the gender differences were only slight.

*Gender difference in perceived talent.*

There were also gender differences in regard to perceived talent. Specifically, the women were told that they were talented and had the capacity to dance professionally at a significantly younger age than the men. This is not surprising when one considers that women began dancing at an earlier age than men. What is not clear, however, is what effect—if any—the act of being perceived as talented has on the subsequent development of expertise. The potential relationship between perceived talent and expertise will be discussed in more detail in a subsequent section.

*Gender similarities in the daily lives, social support, goals, and motives of professional dancers.*

To examine the degree to which the daily lives of professional dancers are similar, analyses were performed on typical daily activities (i.e., ballet class, rehearsals for dance performances, actual performances, physical/body conditioning, and hours per week engaged in sleeping including napping). As expected there was no gender difference in the amount of time dancers spent taking ballet class, rehearsing, performing, engaging in body conditioning classes, or sleeping. The only statistically significant gender difference found was in the amount of time dancers attended live performances. Specifically, the US men reported spending an average of 2 hours per week attending live dance performances while the US women only spent 1.2.

Perhaps the most telling information is the remarkable similarities between genders in the daily lives of ballet dancers once they have reached professional status. The similarities across genders extend to all other aspects of life including social and family support, dance related goals, and motives for engaging in dance activities (perceived importance, enjoyment, and required concentration). While there appears to be some early gender differences in the lives of professional dancers, once the commitment was made to a professional career, there appears to be much more similarity than difference between professional male and female dancers.

*The Development of Ballet Performance among American Ballet Dancers*

*Expertise, practice, and ballet milestones.*

The comparison of dancers with different skill levels within a single country allows for the investigation of different developmental career trajectories. I was interested in exploring the existence of specific developmental tracks for ballet dancers of differing levels of skill. Contrary to expectations, there were no differences between professional and university dance majors in the ages when they first began dance training, decided to dance professionally, began to monitor their weight, moved to attend a yearly ballet school, first attended men's class (for men), and began training on pointe (for women). However, differences were identified in the age when dance became a major priority and when nearly all free time was devoted to dance. Somewhat surprisingly, the professionals were 2.4 years older than then university dance majors when dance became a major priority and 2.5 years older when nearly all free time was devoted to dance.

Despite the fact that the university dance majors had initiated dance at the same times as the professionals and had reached many other milestones before the professional dancers, when the development and accumulation of practice for the professional and university dance majors were compared and some very interesting information emerged. The professional dancers had accumulated significantly more hours of practice by age 17 and age 18 than the university dance majors. Moreover, while the professional and university dance majors had similar patterns of practice (including all activities designed to improve performance but *not* including rehearsal and performance time) intensities from 1 hour to 20 hours, there was an important difference in reaching 30 hours of weekly practice. The majority of professional dancers reported training for 30 hours per week while only one quarter of university dance majors reached this level of training. These findings provide clear support for the expert-performance account of the skill acquisition process.

While one might expect that early decisions to make dance a major priority, and the earlier devotion of all free time to dance, would result in higher levels of dance expertise, the cross-cultural analysis suggested no clear advantage for an early introduction to dance training. If anything, the introduction of the highest ranked dancers from Russia suggested the benefit of a late introduction

with an early increase in practice hours. This finding brings to bear the question “Is there is an opportune time to begin dance training?” Perhaps those who begin too young, develop less effective practice habits and those less competent practice patterns remain with the dancers throughout their training careers. Dancers who start at a more mature age, however, may develop more functional practice patterns, patterns that include more deliberate practice, or more effective deliberate practice techniques. While dancers who begin dance later could be considered to be somewhat behind because of the limited training, once training begins, they may be able to progress more rapidly because their practice habits are more effective. Yet another possibility is that in the US, a late introduction into classical ballet is preferable to an early initiation in dance because of lack of organized standards training dancers. The foundational training of aspiring dancers is critical because dancers can easily develop many bad habits if not properly guided by a qualified instructor. Incorporating bad habits in the early stages of dance skill acquisition will inevitably cause problems later in life when the technical demands required for performing more complex steps increase.

The expertise model (Ericsson et al., 1993; Ericsson & Lehmann, 1996) suggests that the critical variable in the skill acquisition of ballet dancers is the time spent engaged in high quality ballet training. The critical difference in reaching a professional career appears to be the quality and quantity of training. The finding that professional dancers accumulated significantly more practice hours than the university dance majors supports the importance of deliberate practice on the ultimate level of expertise. Furthermore, a review of the dance training programs participants attended revealed that the professionals overwhelmingly attended higher caliber training programs than did the university dance majors. While the nature of the data collected on the dance training history clearly cannot be taken to imply the direction of causation for the association between the caliber of training program frequented and the ultimate level of expertise achieved, it is likely that there is a relationship such that the superior training increased skill level. In sum, the need for deliberate practice activities is always critical (Ericsson, 2002), and it is likely that the ultimate level of dance expertise results from the accumulated hours of training and the caliber of those summer and yearlong training programs.

*Talent identification among professional dancers and university dance majors.*

While the importance of training for the development of expertise has been well documented, the role of instructors has not been extensively researched. However, the study of the skill acquisition process in dance allows for better controlled research than in many other domains. Whereas many young boys and girls spontaneously start playing tennis, soccer and basketball and may engage in running and jumping, it is very unlikely that children would spontaneously invent the highly constrained movements of classical ballet. Therefore, dance instructors are critical; facilitating the learning process of creating dancers by breaking down new skills into manageable chunks, directing deliberate practice activities, and most importantly, providing the necessary corrective feedback and motivation. However, it is likely that experience of different dancers taking the same classes with the same teachers can be vastly different. While this study was not intended to explore these issues, it is noteworthy that similar hours in dance classes should not automatically be equated to similar amounts of (effective) deliberate practice, even for dancers.

The idea of perceived talent may be related to the development of expertise in dance in several ways. If an aspiring dancer is identified as being talented, he or she will most likely be given training and performance opportunities that will set him/her apart from other dancers. The belief that a dancer is talented may be directly related to the development of expertise because individuals in decision making roles (including parents, dance instructors and casting directors) who have a shared perception of a dancer's talent provide the student opportunities to engage in deliberate practice activities which consequently lead to critical physiological adaptations.

Consistent with the argument above, the results of this study revealed that there were clear differences in perceived talent among professional and university dance majors. Specifically, 100% of the professional dancers compared to 91% of the university dance majors were identified as talented. Not surprisingly, the professionals were told they were talented at a significantly younger age (nearly 3 years earlier) than the university dance majors. Furthermore, 99% of the professional dancers reported being told they had the capacity to become professional dancers on average before the age of 10 as compared to 81% of the university dance majors who were told nearly 6 years later than the

professionals. Perhaps most revealing is that while nearly all of the professional dancers believed they had the capacity to dance professionally, only 72% of the university dance majors who were told they could dance professionally believed that this was indeed true.

In sum, professional dancers were identified as talented and as having the capacity to dance professionally overwhelmingly more often and at younger ages than university dance majors. Professionals also believed that they were talented and had the capacity to dance more than university dance majors. While it is not clear if these differences are caused by or result in the expertise differences, they do support the link between perceived talent and expertise. It is likely perceived talent is related to the ultimate level of acquired dance expertise because of the differences in training opportunities. Selection into elite dance training is critical for the development of skill. If a young dancer is identified as being talented at an early age, s/he is more likely to be able to attend better training programs which result in more proficient technical mastery, better performance opportunities, and higher self-efficacy. The self-fulfilling prophecy of perceived talent is undoubtedly related to the motivation for engagement in deliberate practice activities.

#### *Social and family support.*

In order to pursue a career in classical ballet it is necessary to engage in extensive deliberate practice. The willingness or motivation to consistently in strenuous training is vital to successful performance improvement. It was expected that the ability to maintain such dedication and consistency would be associated with measures of positive psychological functioning (e.g. social support and family support). Thus the current study explored whether or not there is a relationship between expertise in dance and certain indices of psychosocial functioning. Based on previous research (Patterson, Smith, Everett, & Ptacek, 1998) linking psychosocial factors and training, and social support to well-being measures (Cohen & Syme, 1985; Isaacson & Janzon, 1986; Sarson et al., 1990), it was expected that social support would be associated with achievement in dance.

Examining the size of social networks, the results revealed that there were no differences between professionals and university dance majors in the number of people who were cared about the dancer's well being. However, a higher percentage of the professional dancers compared to the

university dance majors reported their social support network (e.g. those who cared about them and would help of comfort them if needed) was predominately comprised of individuals involved in dance related activities. Furthermore, while there were no significant differences among the groups in respect to reported family support, there was a difference among groups in regard to family conflict about the participant's involvement in dance activities. Family support for the developing child has been identified as a crucial ingredient in the development of expertise. It is often the family (e.g. parents) who assists the child in attaining high quality training. Family members must often spend considerable time and resources taking the child to practice on a nearly daily basis throughout the child's entire development. Interestingly, only 7% of the professional dancers compared to 34% of the university dance majors reported conflict in their family regarding their decision to dance.

While the nature of the relationship between social support and expertise in dance is not completely clear, it is unquestionable that at least some degree of family support is necessary for a pre-pubescent youth to actively pursue dance. Access to training opportunities is necessary for the acquisition of skill in dance and because engagement in ballet typically begins at such a young age, the caregivers including parents are indispensable during the onset of classical ballet training. When a young child first begins to dance, caregivers must provide financial and emotional support, as well as transportation to and from dance activities. Thus family support may have played a role in the dancer's subsequent access to training opportunities that impacted the level of attained expertise. Conversely, it is also possible that those dancers whose parents perceived them as having "less talent" may have received less support from their family for their dance related activities.

In sum, professional and university dance majors do not appear to differ in their level of family or social support, only in the characteristics of the support system. Professional dancers seem to have a support network that consists of more dancers than do the university dance majors. This is not surprising when one considers that professional dancers spend more time socializing with dancers than university dance majors. However, the greater conflict within the family of university dance majors about dance related activities may have had an impact on the development of expertise.

*Extra-curricular activities and daily lives of professional and university dance majors.*

In dance, as in other domains of expertise, it is likely that motivation is critical to reaching professional status. In dance, performers are faced with intense competition; thus few dancers ever achieve professional status. According to the US Census, fewer than 30% of performers in music and dance are employed full-time in their domains of expertise (Hamilton, Kella, & Hamilton, 1995). The decision to pursue a career in classical ballet in and of itself can be seen as a sacrifice. The intense training, initiated at an early age, limits the amount of time available for extra-curricular activities.

To investigate the relationship between expertise and engagement in activities, university dance majors were compared with professional dancers. Although the groups were similar in respect to engagement in dance, team sports, and individual sports, the percentage of dancers involved in these activities during their adult years differed between professional and pre-professional groups. Specifically, as teenagers, a greater percentage of the university dance majors were involved in music, visual arts, and theater; and as adults, in music and visual arts. These findings are noteworthy because it appears that while professional dancers were involved in activities other than dance during the life stages, the percentages of reported involvement significantly dropped as age increased. Among the university dance majors, the percentage of reported involvement in activities other than dance remained significantly greater than the professionals. Taking into account the finding that professionals accumulated more hours of dance practice hours by the age of 17 and 18 than the university dance majors, it is plausible that the professional dancers made a conscious decision to devote their time to engaging in dance activities rather than to extra-curricular activities.

When the daily lives of professional dancers were compared with university dance majors, findings indicated that that the groups were remarkably similar. The only differences in daily activities were that professional dancers spend more time socializing with other dancers and slightly more time sleeping than the university dance majors, while the university dance majors spent more time socializing with non-dancers than did the professionals. In sum, it appears that there are expertise differences in regard to the engagement in extra-curricular activities such that during development



those individuals will become professionals spending significantly more time in dance related activities. However, as adults, the time devoted to dance activities are remarkably similar in the two groups.

### *Goals.*

Today, researchers (Ericsson, 1996, 1997, 1998; Ericsson & Charness, 1994, Ericsson, Krampe & Tesch Romer, 1993; Ericsson & Lehmann, 1996, Ericsson and Smith, 1991) contend that expertise is not limited to a select group of talented individuals, but rather is only limited by individual's access to the necessary training resources and their motivation. Therefore, it would be useful to examine if there are expertise differences in dancers' motives for perusing dance as a career. More specifically, the dance goals of professional and university dance majors were compared. The results revealed that although there were no differences in the desire to be well liked and admired for having a beautiful body, there were differences in the desire to be well-known and highly-skilled professional dancers. Specifically, the professional dancers' desire to be well-known and the most highly skilled dancers were overwhelmingly higher than the university dance majors' desire for these attributes. If these differences are considered to be indicators of motivation, then these findings support the critical role of motivation in the ultimate level of dance expertise. However, it is also possible that the dancers "adjusted" their goals in light of the probability of their future success.

### *Concentration, importance, and enjoyment of dance activities*

Examining the concentration requirements, perceived importance, and enjoyment of dance activities can reveal the motives underlying engagement in dance behaviors. The professional dancers indicated that it took more concentration to make technical corrections, rehearse, and to perform than did the university dance majors. The professionals compared to the university dance majors also indicated that taking ballet class, rehearsing, and performing were significantly more important. Furthermore, the professionals reported enjoying performing, using artistic expression, and social interaction more than the university dance majors. In contrast, the university dance majors rated body condition exercises and social interaction as relatively more important than the professional and they also reported enjoying making technical corrections, performing body condition exercises, and rehearsing.

The ratings dancers gave each activity vary according to groups, however, both professional and university dance majors engage in effortful activities (such as taking ballet class) that require concentration and are not rated as being enjoyable but are perceived to be important for improving the level of dance skill. Why do individuals spend time in activities that are not enjoyable? Fundamental to the expertise model, engagement in effortful activities to increase skill is necessary to gain further mastery. Thus it would appear that the dancers' strong motivation to increase their skill level would underlie their motive for spending time in unpleasant dance activities. According to Ericsson and colleagues (2002) motivation is an important factor in order to attend to task and to exert effort. Engaging in deliberate practice requires a great deal of effort and is not inherently enjoyable. The central claim of the deliberate practice framework is that exceptional performance reflects extended periods of intense training and preparation and does not lead to immediate rewards.

The results of this investigation reveal that professional dancers are likely to be more motivated than university dance majors in their desire to be well-known and highly skilled professional dancers. Additionally, the perceived importance of dance activities is quite different among the groups. Specifically, the professionals rate taking ballet class, rehearsing, and performing to be more important while the university dance majors indicate body conditioning and social interaction are more important than the professionals.

While there is little doubt that motivation is necessary for dancers to engage in effortful training activities, the relationship between motivation and expertise is complex and multi-dimensional. Even as the main focus of this investigation was to study the skill acquisition of ballet dancers by exploring the relationship between deliberate practice and expertise, the role of motivation was also considered. If one believed that motivational factors are critical to the development of expertise in dance, then the professional dancer's higher motivation and belief that engaging in effortful dance activities (ballet class, rehearsals, and performances) is critical to improve his/her current level of skill, it is no surprise that they have been able to achieve professional status while the university dance majors have not. In sum, the results of the study are consistent with the idea that perceived talent may be related to self-efficacy and the ultimate level of expertise in dance. Specifically, if dancers believe

that they are talented, they will work harder and engage in more deliberate practice activities which in turn may result in higher levels of expertise.

### *Conclusion*

I was interested in studying the skill acquisition process in ballet dancers in order to answer several questions related to expertise in dance. I wished to explore the questions: “Is what we know about dance consistent with expertise research from other domains?” and “What is the relationship between dance training and the ultimate level of dance expertise?” The results of this study are consistent with speculation by dance researchers (Schnitt & Schnitt, 1987, and Dunning, 1985 as cited in Hamilton, Hamilton, Meltzer, Marshall, & Molnar, 1989) and expertise research in other domains, indicating that at least 10 years of training are required to reach expert levels (Ericsson & Lehmann, 1996). When looking at the whole sample of dancers (university dance majors and professionals), the average age of initiating dance training was approximately 9 years old and the average age of reaching professional status was 19. The hours of accumulated dance training are also in line with expertise theory. I found that even the least accomplished university dance majors had accumulated an average of 5,557 hours of practice by age 18 while the professionals on average had accumulated 8,239 hours, a 48% differential.

The results of this investigation support the idea that there is an unquestionable relationship between ballet training and the ultimate level of dance expertise. Self-report data on the training history of dancers reveals some interesting trends. Dancers who reached the highest levels (performing as principles in international companies) tended to begin their performance careers at entry level positions (apprentice or corps de ballet member) in international companies, then make their first soloist debuts in the same companies before reaching principle status. Of particular interest, the highest level dancers also attended training programs associated with the professional companies they later joined. Furthermore, US professionals attended prestigious summer and year-long training programs that in general, the university dance majors did not. These findings are most relevant because they support the notion that training is directly related to ultimate level of expertise.

The significant relationship between accumulated hours of practice by age 17 and acquired level of expertise by age 18 among the male and female professional dancers across all three countries is important because it provides evidence to support the fundamental assumptions of expertise theory, namely that consistent engagement in deliberate practice is necessary for the development of expertise. Furthermore, the unique cross-cultural differences provide additional support for the relationship between training and expertise.

The Russians, from the most prestigious ballet company in the world, started dancing later than the dancers from the other countries. At first, this may appear to be inconsistent with the expertise model; however, the finding that Russians accumulate more total practice hours under the supervision of world-renowned dance teachers and completed other milestones before the other dancers sheds light on this apparent discrepancy. In actuality, this finding may illustrate the importance of deliberate practice over mindless repetition.

One likely explanation for the Russians' early career trajectory is that the Russians have a more highly structured educational system than the other countries. Specifically, in Russia's Kiroff School, each year the few children accepted into the prestigious school are placed in a class with all of the other entering children. Once a group is formed, all of the students in the class follow the same formalized training routine. Unlike the North American dance students, the Russian dancers are expected to complete their dance training. Ballet is an extracurricular activity in the US and Mexico; in Russia, students relocate at an early age to attend a conservatory where dance is the primary focus of their academic studies. Therefore, I suspect that there are clear cultural differences in expectations across cultures, at least up to the recent past.

While the results of the present study suggest that culture is an important factor in the development of expertise in ballet dancers, it is my belief that the apparent cultural differences stem from the distinctions in training regimens and consequent engagement in deliberate practice. The skill-level differences between the pre-professional and professional dancers within a single country are also consistent with a large body of literature on the acquisition of skill and expertise in many domains. Therefore, I believe that the differences in dance skill are accounted for by divergence in training

rather than by other variables such as innate talent or genetic predispositions. Specifically, long hours of deliberate practice under the direction of qualified instructors, accumulated over an extended period of time is associated with the expert level of performance in dance.

*Limitations.*

The limitations of this study pertain to sampling issues and self-report data. Specifically, the sample was restricted to those dancers who were performing with companies that I was able to contact via telephone or email. Fortunately, I was able to communicate with the most prestigious companies in the three countries. Furthermore, the comparison of pre-professional and professional dancers was limited to dancers in the US because of the sample of convenience. Despite these sampling concerns, I believe there is a good basis for generalization of the results, namely, the extremely high response rate among participants and the distribution of skill levels within the professional dancers.

As with all self-report data, the results can only be as accurate as the dancer's recall and willingness to report honestly. Fortunately, procedures (developed by Ericsson and colleagues and discussed in Chapter 1) to minimize the limitations of such data generation procedures were employed in this study.

Finally, the data in this study were retrospective. Longitudinal data that tracks the young students from initiating dance training to adulthood could provide formidable insight into the development of expertise in dance, identify psychological factors related to the motivation necessary to sustain such high level of practice, and provide further understanding of those children who decide to terminate training.

*Future directions.*

The results of this study indicate that ballet dancers are not fundamentally different from other experts in their basic pattern of skill acquisition. Specifically, expertise is gradually acquired through extended hours of deliberate practice. This study does not, however, uncover the detailed process of skill acquisition; rather it describes the developmental process and training trajectories of dancers according to their acquired level of expertise. If more detailed information about skill acquisition in

dance is to be revealed, it will be necessary to study the basic process of learning dance steps and making necessary corrections in order to improve performance. Instructors' abilities to assist dancers in mastering novel dance skills are restricted by the limited understanding of how the ability to perform dance steps is acquired.

Furthermore, the results of this investigation support the importance of motivational variables (including the notion of perceived talent) in the development of expertise in dance. Because classical ballet is not self-taught, aspiring dancers are forced to rely on their instructors. Given the importance of ballet instructors, it would be worthwhile for researchers to define more precisely what characterizes a good ballet teacher, and what teaching methods or instructional strategies are most effective.

Table 1: Number of Professional Participants included in the Analysis

	US	Mexico	Russia	Totals
Male	28	14	50	92
Female	42	17	49	108
Totals	70	31	99	200

Note: there were 32 pre-professional students, 1 Male and 31 Female.

Table 2: Questionnaire Response Rate

Company	Location	Sent	Return	Rate
US Comp. 1	New York City	24	24	100%
US Comp. 2	Milwaukee	18	18	100%
US Comp. 3	Boston	30	28	93%
US Comp. 3	New York City	30	30	100%
US University 1	Tallahassee	40	32	80%
Mexican Comp. 1	Mexico City	33	31	93%
Russian Comp. 1	Moscow	50	50	100%
Russian Comp. 2	St. Petersburg	50	49	98%
Total		275	262	95.5%

Table 3: System for Evaluating Level of Expertise

Company Standing:	Expertise:
Principal in an international professional company	12
Soloist in an international professional company	11
Corps in an international professional company	10
Principal in a national professional company	9
Soloist in a national professional company	8
Corps in a national professional company	7
Principal in a regional professional company	6
Soloist in a regional professional company	5
Corps in a regional professional company	4
Principal in a non-professional company	3
Soloist in a non-professional company	2
Corps in a non-professional company	1

Table 4: Mean ballet milestones by country and gender

Milestones	U.S		Mexico		Russian		Significant Stats
	Men	Women	Men	Women	Men	Women	
Began supervised ballet training	9.07	6.29	11.50	6.82	9.72	9.55	C F(2,193) = 12.527, p = .001 G F(1,193) = 41.081, p = .001 * F(2, 193) = 11.859, p = .001
Decided to dance professionally	15.89	14.34	16.93	14.88	9.72	9.55	C F(2,192) = 204.119, p = .001 G F(1,192) = 15.435, p = .001 * F(2, 192) = 3.809, p = .024
Made dance a major priority	15.68	15.07	17.36	14.71	9.72	9.55	C F(2,194) = 291.585, p = .001 G F(1,194) = 17.016, p = .001 *F (2, 194) = 6.060, p = .003.
Devoted nearly all free time to dance	15.71	15.56	17.67	14.62	9.72	9.55	C F(2,190) = 196.872, p = .001 G F(1,190) = 9.891, p = .002 * F(2, 190) = 5.249, p = .006.
Began monitoring weight for dance	8.00	15.05	20.60	16.08	9.75	9.57	C F(2,91) = 80.597, p = .001 *F(2,91) = 16.054 p = .001
Moved to attend a yearly ballet school	15.83	17.00	19.25	17.00	9.72	9.55	C F(2,118) = 609.661, p = .001 * F(2,118) = 9.378 p = .001
Attended a men's class (men only)	16.00		17.73		11.69		C F(2,89) = 31.505, p = .001
Began training on pointe		12.66		12.20		11.61	

C- main effect of country, G-main effect of gender, \*- interaction of country and gender



Table 5: Mean hours of weekly activities for professional dancers by country

<b>Activity</b>	<b>US</b>	<b>Mexico</b>	<b>Russia</b>
taking ballet class	1.81	2.00	2.00
Rehearsing for dance performances	3.06	3.26	3.34
performing (excluding traveling time)	2.09	2.00	2.00
Body conditioning (yoga, Pilates, swimming, etc.)	1.03	0	1.56
personal training (working with an individual coach)	2.25	0	1.00
Sleeping (including napping)	7.60	7.77	7.35
Reading magazines or journals about dance	.91	1.00	1.00
Watching videos about dance or dance performances	1.04	1.00	1.00
Attending (in the audience) dance performances	1.43	1.00	1.00
Interacting socially with other dancers	2.61	1.33	12.00
Interacting socially with non-dancers or family members	2.18	2.09	1.00

Table 6: Mean hours of daily activities of female US professional and university dance majors

<b>Activity</b>	<b>Overall Mean</b>	<b>Pro.</b>	<b>Pre-pro.</b>	<b>Significant Statistics</b>
Taking ballet class	1.95	1.95	1.93	
Rehearsing for dance performances	3.18	3.26	2.84	
performing (excluding traveling time)	2.04	2.02	2.67	F(1,105)=4.539, p=.035
Body conditioning (yoga, Pilates, swimming, etc.)	1.45	1.41	1.56	
personal training (working with an individual coach)	1.40	1.83	1.11	
Sleeping (including napping)	7.52	7.67	7.01	F(1,137)=6.030, p=.015
Reading magazines or journals about dance	.84	.96	.79	
Watching videos about dance or dance performances	1.03	1.00	1.06	
Attending (in the audience) dance performances	1.16	1.07	1.25	
Interacting socially with other dancers	7.75	8.60	5.47	F(1,101)=8.251, p=.005
Interacting socially with non-dancers or family members	2.92	2.00	4.46	F(1,70)=16.646, p=.001

Table 7: Extracurricular involvement of professional dancers by country and gender

Activity	U.S		Mexico		Russian		Significant Stats
	Men	Women	Men	Women	Men	Women	
Dance as a child	82%	100%	64%	100%	100%	100%	C F(2,194)= 11.198, P=.001 G F(1,194)= 33.03, P=.001 * F(2,194)=11.198, P=.001
Music as a child	21%	45%	7%	18%	100%	100%	C F(2,194)= 132.25, P=.001 G F(1,194)= 4.21, P=.041
Visual arts as a child	10%	24%	0%	6%	0%	0%	C F(2,194)= 8.15, P=.001
Theater as a child	7%	24%	0%	0%	0%	0%	C F(2,194)= 10.852, P=.001 G F(1,194)= 33.03, P=.118 * F(2,194)=2.471, P=.045
Team sports as a child	23%	26%	100%	0%	0%	0%	C F(2,194)= 48.592, P=.001 G F(1,194)= 61.54, P=.001 * F(2,194)= 47.480, P=.001
Individual sports as a child	10%	17%	0%	0%	0%	0%	C F(2,194)= 9.455, P=.001
Dance as an adolescent	92%	100%	71%	100%	100%	100%	C F(2,194)= 19.007, P=.001 G F(1,194)= 11.91, P=.001 * F(2,194)= 4.803, P=.009
Music as an adolescent	21%	21%	0%	0%	100%	100%	C F(2,194)=302.68, P=.001
Visual arts as an adolescent	14%	17%	0%	0%	0%	0%	C F(2,194)=11.10, P=.001
Theater as an adolescent	21%	17%	0%	0%	0%	0%	C F(2,194)=14.76, P=.001
Team sports as an adolescent	10%	12%	100%	100%	0%	0%	C F(2,194)= 80.259, P=.001 G F(1,194)= 116.168, P=.001 * F(2,194)= 89.614, P=.001
Individual sports as an adolescent	10%	10%	0%	0%	0%	0%	C F(2,194)=6.981, P=.001
Dance as an adult	100%	100%	100%	100%	100%	100%	
Music as an adult	12%	10%	0%	0%	0%	0%	C F(2,194)=8.634, P=.001
Visual arts as an adult	10%	12%	0%	0%	0%	0%	C F(2,194)=7.753, P=.001
Theater as an adult	21%	14%	0%	0%	0%	0%	C F(2,194)=13.890, P=.001
Team sports as an adult	10%	2%	0%	0%	0%	0%	C F(2,194)=5.037, P=.001
Individual sports as adult	10%	2%	0%	0%	0%	0%	C F(2,194)=5.037, P=.001

G-Indicates a main effect of gender, C- Indicated a main effect of country, and \*- Indicated an interaction between gender and country

Table 8: Perceived talent of professional dancers by country and gender

Item	U.S		Mexico		Russian		Significant Stats
	Men	Women	Men	Women	Men	Women	
Identified as talented?	100% Yes	100% Yes	100% Yes	100% Yes	100% Yes	100% Yes	
Age when first told talented	9.39	7.82	16.93	14.88	9.72	9.55	C F(2,192)= 115.21, p=.001 G F(1,192)= 11.907, p=.001 Post Hoc p= .001 M* U&R Post Hoc p= .004 R* U
Identified by whom	50% DI 50% Mu	3% Fam 60% DI 38% Mu	100% Mu	100% Mu	60%DI 40% Mu	53% DI 47% Mu	C F(2,194)=27.4788, P=.001 Post Hoc p= .001 M* U&R
Dancer believed identification	93% Yes	100% Yes	100% Yes	100% Yes	80% Yes	65% Yes	C F(2,194)=16.6837, P=.001 Post Hoc p=.001 R* M & U
Attribution	4% E 11% I 86% EI	10% E 7% I 83% EI	7% I 93% EI	100% EI	12% E 72% I 16 EI	6% E 69% I 25% EI	C F(2,194)=51.2646, P=.001 Post Hoc p=.001 R* M & U
Belief stability	4% + 40% - 54% ~	5%+ 5%- 33/ 52~	100%~	100% /	88%/	94% / 6%~	C F(2,194)= 17.83, P=.001 Post Hoc p= .001 U* M&R
Identified as capable of dancing professionally?	100% Yes	98% Yes	100% Yes	100% Yes	100% Yes	100% Yes	
Age when told capable of dancing professionally	10.18	9.38	16.93	14.88	9.72	9.55	C F(2,194)= 63.660, P=.001 Post Hoc p= .001 M* U&R
Identified by whom	57% DI 42% Mu	2% Fam 64% DI 33% Mu	100% Mu	100% Mu	60% DI 40% Mu	53% DI 47% Mu	C F(2,194)= 21.670, P=.001 Post Hoc p= .001 M* U&R
Dancer believed identification	100% Yes	98% Yes	100% Yes	100% Yes	80% Yes	65% Yes	C F(2,194)= 17.914, P=.001 Post Hoc p= .001 R* U& M
Attribution	4% E 11% I 86% EI	10% E 2% I 88% EI	100% EI	100% EI	12% E 72% I 16 EI	6% E 69% I 25% EI	C F(2,194)= 57.562, P=.001 Post Hoc p= .001 R* U& M
Belief stability	11% + 50% / 39% ~	10% + 38% - 50% / 2% ~	100%/	100%/	88%/	88%/	

Fam- family, DI- dance instructor, Multi-multiple (e.g., friend, family, dancer, dance instructor), I- internal feelings, E-others opinions, +- increased over time, --decreased over time, /-constant, ~fluctuated, C-country, G-gender

Table 9: Perceived talent of professional and university dance majors within a single county

Item	Professional	Pre-professional	Significant Stats
Identified as talented?	100% Yes	91% Yes	F(1,100)=7.009, p=.009
Age when first told talented	8.47	11.41	F(1,95)=14.911, p=.0012
Identified by whom	1% Family 56% Dance Inst. 42% Multiple	31.3 % Dance Inst. 59.4 Multiple	F(1,97)=4.856, p=.030
Dancer believed identification	97% Yes	84% Yes	
Attribution	7% External 9% Internal 84% Ext & Int	15.6% External 25.0% Internal 50% Ext & Int	F(1,97)=7.807, p=.006
Belief stability	3% Increased 4% Decreased 36% Constant 57% Fluctuated	10 % Increased 10% Decreased 3% Constant 76% Fluctuated	
Identified as capable of dancing professionally?	99% Yes	81% Yes	F(1,100)=11.243, p=.001
Age when told capable of dancing professionally	9.71	15.36	F(1,91)=36.577, p=.001
Identified by whom	1% Family 61% dance instructor 67% Multiple	3% dancer 31% dance instructor 47% Multiple	
Dancer believed identification	99% Yes	72% Yes	F(1,94)=5.005, p=.028
Attribution	7% External 6% Internal 87 Ext & Int	23% External 31% Internal 46% Ext & Int	F(1,94)=15.270, p=.001
Belief stability	10% Increased 43% Decreased 46% Constant 1% Fluctuated	31% Increased 12% Decreased 8% Constant 51% Fluctuated	

Table 10: Rank-ordering on Concentration, Importance, and Enjoyment of Dance Activity

Item	Low skilled US		High skilled US		Mexico		Russia	
	Item	Mean	Item	Mean	Item	Mean	Item	Mean
Concentration	1	71.25	1	84.46	2	89.16	4	88.19
	2	71.13	2	79.83	4	87.74	2	88.19
	3	69.53	3	76.13 c	3	86.48	1	88.19
	4	66.66	4	71.48 c	1	84.52	6	88.19
	6	65.81	6	70.98	6	84.48	3	69.11
	5	61.68	5	57.37 a	5	64.77	7	30.55 b
	7	36.70 a	7	26.35 b	7	25.42	5	29.15 a
Importance	Item	Mean	Item	Mean	Item	Mean	Item	Mean
	4	92.94	1	99.11 c	1	99.58	5	99.38
	2	92.32	4	98.15 c	4	92.35	3	99.38
	1	90.51	5	87.80	2	92.10	1	99.38
	3	90.00	2	84.57	3	88.03	6	99.38
	6	89.85	6	81.89	7	88.03	7	99.38
	5	80.51 b	5	69.72 b	6	76.94 b	2	99.25
7	58.60 a	7	13.39 a	5	63.00 a	4	92.56 a	
Enjoyment	Item	Mean	Item	Mean	Item	Mean	Item	Mean
	1	91.70 b	1	98.15	1	99.03	1	99.38
	6	86.51a	7	97.33	7	98.65	6	99.38
	4	73.98	6	92.17	6	98.61	7	99.38
	7	71.21	4	83.87	4	58.65	2	52.90 b
	3	69.87	5	62.30	5	57.16 b	5	52.90 b
	2	68.04	3	59.11 a	3	55.16 b	3	52.90 b
5	62.06	2	56.11 a	2	55.16 b	4	2.77 a	

Item Key

1. Performing
2. Making technical corrections
3. Rehearsing
4. Taking Ballet class
5. Body conditioning
6. Using Artistic Expression
7. Interacting socially w/dancers

Table 11: US dancers ratings for activities by expertise

Item	Regional & Pre-professional	National & International	Significant Stats
<b>Required Concentration for:</b>			
1. Taking ballet class	66.13	71.48	F(56, 46)= 5.681, p=.019
2. Making technical corrections	70.77	79.83	F(56, 46)= 4.634 p=.034
3. Body conditioning	60.49	57.37	F(55, 46)= 35.343, p=.001
4. Rehearsing	69.80	76.13	F(55, 46)= 18.060, p=.001
5. Performing	71.68	84.46	F(56, 46)= 62.998, p=.001
6. Using Artistic Expression	66.05	70.98	F(56, 46)= 26.731, p=.001
7. Interacting socially with dancers	26.35	35.48	F(56, 46)= 58.394, p=.000
<b>Importance for dance improvement</b>			
1. Taking ballet class	92.61	98.15	F(56, 46)=35.293, p=.001
2. Making technical corrections	92.04	84.57	F(56, 46)=22.901, p=.001
3. Body conditioning	80.18	69.72	F(56, 46)=15.590, p=.001
4. Rehearsing	89.86	87.80	F(56, 46)=64.211, p=.001
5. Performing	90.23	99.11	F(56, 46)=51.450, p=.001
6. Using Artistic Expression	89.07	81.89	F(56, 46)=14.272, p=.001
7. Interacting socially with dancers	56.23	13.39	F(56, 46)=73.345, p=.001
<b>Enjoyment of Activities</b>			
1. Taking ballet class	74.54	83.87	F(56, 46)=24.537, p=.001
2. Making technical corrections	67.20	56.11	F(56, 46)=83.886 , p=.001
3. Body conditioning	61.20	62.30	F(56, 46)= 39.790, p=.001
4. Rehearsing	70.35	59.11	F(56, 46)=27.875 , p=.001
5. Performing	91.25	98.15	F(56, 46)=21.828 , p=.001
6. Using Artistic Expression	86.25	92.17	F(56, 46)=18.939 , p=.001
7. Interacting socially with dancers	72.20	97.33	F(56, 46)=66.007 , p=.001

## APPENDIX A

Cover Letter & Questionnaire

Dear Dancer:

My name is Carla Ureña. I am a former ballet dancer and currently a doctoral candidate at Florida State University (FSU) in Tallahassee, Florida. I am presently working with several professors at FSU who are studying the development of expertise in ballet. To conduct this study I need your help. I am asking you to take a few minutes to complete the following anonymous questionnaire that will ask about your development as a dancer. Your participation in this study will help us better understand how individuals progress as dancers. Your responses will be kept confidential, and the final report will only include a summary of all of the participants' responses. The results will not be presented in a way that would make it possible to identify any individual participants.

To thank you for your time and for completing this questionnaire, you will be eligible for a drawing for one of three prepaid Bank of America Visa gift cards in the amounts of \$300.00, \$150.00, and \$75.00. You will find an envelope attached so you can return the enclosed questionnaire to me. Once complete, you will be able to access the final report of this study online at <http://carlaurena.com>. This questionnaire was designed for ease and speed of response. While there are several pages, each page will only take a few minutes to complete.

Please complete and return the questionnaire along with the enclosed "raffle ticket" within two weeks of receiving it. Upon receipt of the questionnaire, we will separate out the raffle tickets to maintain your anonymity. The raffle tickets will be entered into the drawing and winners will be notified within three months of completing and returning the questionnaire.

If you complete the questionnaire, I will assume you agree to participate and you are giving us permission to summarize your responses in a final report. If you have any questions, concerns, or comments please feel free to contact me at any time by calling (850) 645-5073 or via e-mail at [mail@carlaurena.com](mailto:mail@carlaurena.com) or you may contact one of the faculty members involved in this project: K. Anders Ericsson at [ericsson@psy.fsu.edu](mailto:ericsson@psy.fsu.edu) or Thomas Welsh at [twelsh@dance.fsu.edu](mailto:twelsh@dance.fsu.edu).

Thank you for taking the time to read this letter and for considering my request!  
Sincerely,

Carla Ureña



**1.- 6. Demographics**

1. What is your age? \_\_\_\_\_ years

2. Are you male or female?

Male  Female

3. What is your highest educational level?

- less than 12<sup>th</sup> grade
- high school graduate or GED
- More than 12<sup>th</sup> grade (some college)
- Bachelor's degree
- Master's degree or higher

4. What is your primary dance focus?

- classical ballet performance
- contemporary dance performance
- choreography
- teaching dance
- other: \_\_\_\_\_

5. Are you currently employed either part-time or full-time as a professional dancer?

yes  no

If Yes:

Name: \_\_\_\_\_

Location: \_\_\_\_\_

What type of company is this?

- classical
- contemporary
- other: \_\_\_\_\_

What is your status in the company?

- apprentice
- soloist
- corps
- principal

6. Are you currently attending a dance training program?

yes  no

If Yes:

Name: \_\_\_\_\_

Location: \_\_\_\_\_

What type of program is this?

- year-long
- summer-only
- university
- Other: \_\_\_\_\_

What level are you in?

How many levels are there? (list most advanced first)

**7. Development of Ballet Practice**

Please answer the following questions about your dance practice history. Please include activities focused on improving your dance performance skills. However, **DO NOT** include rehearsals, performances, and special summer programs.

**How old were you when you first began consistently training for...**      **Age in years**      **NA**

- 1 hour per week
- 3 hour per week
- 5 hour per week
- 10 hour per week
- 15 hour per week
- 20 hour per week
- 30 hour per week

**8. Ballet Milestones**

**How old were you when you first...**      **Age in years**      **NA**

- participated in supervised technical ballet training
- decided to become a professional dancer
- made dance your major priority
- devoted nearly all free time to dance training
- began to monitor weight for dance
- moved (relocated) to attend a yearly ballet school
- (males only) attended a men's class
- (females only) began training on pointe

### 9. Year-Long Ballet Training History

Have you ever attended a **YEAR-LONG**, pre-professional dance school, training program, or conservatory (such as the Pittsburgh Ballet Theatre, North Carolina School of the Arts, or Bolshoi Academy)?

yes no (please skip to section 10)

---

**If Yes:**

What was the **FIRST Year-Long** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

less than 1 year  1-2 years  more than 2 years  other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes no

**If Yes:** What type of scholarship?  full  partial

What (if any) was the **NEXT Year-Long** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

less than 1 year  1-2 years  more than 2 years  other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes no

**If Yes:** What type of scholarship?  full  partial

What (if any) was the **NEXT Year-Long** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

less than 1 year  1-2 years  more than 2 years  other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes no

**If Yes:** What type of scholarship?  full  partial

---

Have you attended any other year-long programs?

yes no

**If Yes, please list:**

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---

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## 10. Summer Training History

Have you ever attended a **SUMMER**, pre-professional dance school, training program, or conservatory (such as the Boston Ballet Summer Program or School of American Ballet Summer program)?

yes  no (please skip to section 11)

---

**If Yes:**

What was the **FIRST SUMMER** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

What type of training program was this? (*Mark one box*)

- local dance studio/ non-professional ballet program  
 training program affiliated with a professional dance company  
 university dance program  
 other: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

1-2 weeks  3-6 weeks  more than 6 weeks  other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes  no

**If Yes:** What type of scholarship?  full  partial

What (if any) was the **NEXT SUMMER** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

What type of training program was this? (*Mark one box*)

- local dance studio/ non-professional ballet program  
 training program affiliated with a professional dance company  
 university dance program  
 other: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

1-2 weeks  3-6 weeks  more than 6 weeks  other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes  no

**If Yes:** What type of scholarship?  full  partial

What (if any) was the **NEXT SUMMER** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

What type of training program was this? (*Mark one box*)

- local dance studio/ non-professional ballet program  
 training program affiliated with a professional dance company  
 university dance program  
 other: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

---

1-2 weeks     3-6 weeks     more than 6 weeks     other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes     no \_\_\_\_\_

**If Yes:** What type of scholarship?  full     partial

What (if any) was the **NEXT SUMMER** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

What type of training program was this? (*Mark one box*)

- local dance studio/ non-professional ballet program  
 training program affiliated with a professional dance company  
 university dance program  
 other: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

1-2 weeks     3-6 weeks     more than 6 weeks     other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes     no \_\_\_\_\_

**If Yes:** What type of scholarship?  full     partial

What (if any) was the **NEXT SUMMER** training program you attended?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

What type of training program was this? (*Mark one box*)

- local dance studio/ non-professional ballet program  
 training program affiliated with a professional dance company  
 university dance program  
 other: \_\_\_\_\_

How old were you? \_\_\_\_\_ Years old

How long did you attend?

1-2 weeks     3-6 weeks     more than 6 weeks     other: \_\_\_\_\_

Did you receive a merit-based scholarship?

yes     no \_\_\_\_\_

**If Yes:** What type of scholarship?  full     partial

---

Have you attended any other summer programs?

yes     no \_\_\_\_\_

**If Yes, please list:**

---

---

---

---

---

### 11. Performance Career

Please answer the following questions about your performance career.

What was the **FIRST** ballet company you ever performed with in front of an audience?

Name: _____	Location: _____
-------------	-----------------

What type of ballet company was this? *(Mark one box)*

pre-professional     professional     regional     national     international

**1<sup>st</sup> appeared:**    **Age**    **NA**    **How did this opportunity arise?** *(Mark all that apply)*

in the corps                           substitute dancer     audition     invitation     guest artist     other

as a soloist                           substitute dancer     audition     invitation     guest artist     other

as a principal                           substitute dancer     audition     invitation     guest artist     other

Comments: \_\_\_\_\_

What (if any) was the **NEXT** ballet company you ever performed with in front of an audience?

Name: _____	Location: _____
-------------	-----------------

What type of ballet company was this? *(Mark one box)*

pre-professional     professional     regional     national     international

**1<sup>st</sup> appeared:**    **Age**    **NA**    **How did this opportunity arise?** *(Mark all that apply)*

in the corps                           substitute dancer     audition     invitation     guest artist     other

as a soloist                           substitute dancer     audition     invitation     guest artist     other

as a principal                           substitute dancer     audition     invitation     guest artist     other

Comments: \_\_\_\_\_

What (if any) was the **NEXT** ballet company you ever performed with in front of an audience?

Name: _____	Location: _____
-------------	-----------------

What type of ballet company was this? *(Mark one box)*

pre-professional     professional     regional     national     international

**1<sup>st</sup> appeared:**    **Age**    **NA**    **How did this opportunity arise?** *(Mark all that apply)*

in the corps                           substitute dancer     audition     invitation     guest artist     other

as a soloist                           substitute dancer     audition     invitation     guest artist     other

as a principal                           substitute dancer     audition     invitation     guest artist     other

Comments: \_\_\_\_\_

What (if any) was the **NEXT** ballet company you ever performed with in front of an audience?

Name: _____	Location: _____
-------------	-----------------

What type of ballet company was this? *(Mark one box)*

pre-professional     professional     regional     national     international

**1<sup>st</sup> appeared:**    **Age**    **NA**    **How did this opportunity arise?** *(Mark all that apply)*

in the corps                           substitute dancer     audition     invitation     guest artist     other

as a soloist                           substitute dancer     audition     invitation     guest artist     other

as a principal                           substitute dancer     audition     invitation     guest artist     other

What (if any) was the **NEXT** ballet company you ever performed with in front of an audience?

Name: _____	Location: _____
-------------	-----------------

What type of ballet company was this? *(Mark one box)*  
 pre-professional     professional     regional     national     international

**1<sup>st</sup> appeared:**    **Age**    **NA**    **How did this opportunity arise?** *(Mark all that apply)*  
 in the corps                           substitute dancer     audition     invitation     guest artist     other  
 as a soloist                           substitute dancer     audition     invitation     guest artist     other  
 as a principal                         substitute dancer     audition     invitation     guest artist     other  
 Comments: \_\_\_\_\_

What (if any) was the **NEXT** ballet company you ever performed with in front of an audience?

Name: _____	Location: _____
-------------	-----------------

What type of ballet company was this? *(Mark one box)*  
 pre-professional     professional     regional     national     international

**1<sup>st</sup> appeared:**    **Age**    **NA**    **How did this opportunity arise?** *(Mark all that apply)*  
 in the corps                           substitute dancer     audition     invitation     guest artist     other  
 as a soloist                           substitute dancer     audition     invitation     guest artist     other  
 as a principal                         substitute dancer     audition     invitation     guest artist     other  
 Comments: \_\_\_\_\_

Are you currently performing with a ballet company?

yes     no

**If Yes:**

What ballet company are you **CURRENTLY** performing with?

Name: \_\_\_\_\_ Location: \_\_\_\_\_

What type of ballet company is this? *(Mark one box)*

pre-professional     professional     regional     national     international

**1<sup>st</sup> appeared:**    **Age**    **NA**    **How did this opportunity arise?** *(Mark all that apply)*  
 in the corps                           substitute dancer     audition     invitation     other \_\_\_\_\_  
 as a soloist                           substitute dancer     audition     invitation     other \_\_\_\_\_  
 as a principal                         substitute dancer     audition     invitation     other \_\_\_\_\_  
 Comments: \_\_\_\_\_

Have you performed with any other ballet companies?

yes     no

**If Yes, please list:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### 12. Typical Activities

Please try to think of a specific week during which you are NOT on tour.

**During a typical work week how much time do you spend ... Hours per day**

- taking ballet class
- rehearsing for dance performances
- performing ballet (excluding traveling time)
- body conditioning (yoga, Pilates, swimming, etc.)
- personal training (working with an individual coach)
- sleeping (including napping)
- reading magazines or journals about dance
- watching videos about dance or dance performances
- attending (in the audience) dance performances
- interacting socially with other dancers
- interacting socially with non-dancers or family members

### 13. Extra Curricular Activities

Which activities did you engage in (on a regular basis) during the following periods of your life?

(Mark all that apply)

Age:	Dance	Music	Visual-arts	Theater	Team sports	Individual sports	Other (please specify)
Child (6-12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adolescent (13-16)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adult (17+)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Did you pursue any of these activities as intensively as you did dance? (Mark one box)

yes no

If Yes: (Please list) \_\_\_\_\_

### 14. Social Support

1a. How many people do you know who care a lot about your well-being, including people you might only be able to reach by telephone, letter, or email?

- None
- One
- Two
- Three
- Four
- Five or more

1b. ...of these how many are NOT involved in dance?

- None
- One
- Two
- Three
- Four
- Five or more

2a. If you were in trouble or needed comfort how many people do you know who would help you?

- None
- One
- Two
- Three
- Four
- Five or more

2b. ...of these how many are NOT involved in dance?

- None
- One
- Two
- Three
- Four
- Five or more

Was there conflict in your family regarding your decision to dance?  Yes  No

Did your dancing put you in conflict with your peers?  Yes  No

**15. Perceived Talent**

Were you ever told that you were talented or gifted in dance?

yes no

**If Yes:** at what age were **FIRST** told this? \_\_\_ Years old

By Whom: *(Mark all that apply)* friend family dancer dance instructor other \_\_\_\_\_

Were there times when you believed this was true? *(Mark one box)*  Yes  No

To what do you attribute this belief? *(Mark all that apply)* others opinions  internal feeling

Over time has this belief: *(Mark all that apply)* increased decreased remained constant fluctuated

Comments: \_\_\_\_\_

Were you ever told that you had the capacity to become a professional dancer?

yes no

**If Yes:** at what age were first told this? \_\_\_ Years old

By Whom: *(Mark all that apply)* friend family dancer dance instructor other \_\_\_\_\_

Were there times when you believed this was true? *(Mark one box)*  Yes  No

To what do you attribute this belief? *(Mark all that apply)* others opinions  internal feeling

Over time has this belief: *(Mark all that apply)* increased decreased remained constant fluctuated

Comments: \_\_\_\_\_

*For the following sections please place an "X" on the corresponding dotted line. For example if asked to indicate height a fairly tall person might place an X as follows:*

(extremely short) |-----X-----| (extremely tall)

**16. Family Support**

How supportive was your family of your efforts to dance by doing each of the following?

Providing financial support  
(not at all) |-----| (greatly)

Providing emotional support  
(not at all) |-----| (greatly)

Providing transportation (to dance activities when necessary)  
(not at all) |-----| (greatly)

Attending your dance performance  
(not at all) |-----| (greatly)

**17. Goals**

On average, how important is each of the following for you to be?

A well known professional dancer  
(low priority) |-----| (high priority)  NA

A well liked dancer in your studio or company  
(low priority) |-----| (high priority)  NA

Admired for having a beautiful body  
(low priority) |-----| (high priority)  NA

The most highly skilled professional dancer  
(low priority) |-----| (high priority)  NA



### 18. Required Concentration

How much concentration is required for you to engage in each of the following activities?

(low concentration)	-----	Taking ballet class	-----	(high concentration)
(low concentration)	-----	Making technical corrections	-----	(high concentration)
(low concentration)	-----	Body conditioning exercises	-----	(high concentration)
(low concentration)	-----	Rehearsing	-----	(high concentration)
(low concentration)	-----	Performing on stage in front of an audience	-----	(high concentration)
(low concentration)	-----	Using artistic expression to communicate while on stage	-----	(high concentration)
(low concentration)	-----	Interacting socially with other dancers	-----	(high concentration)

### 19. Importance for Improving your Dance Performance

How important are each of the following for improving your dance performance?

(not important)	-----	Taking ballet class	-----	(very important)
(not important)	-----	Making technical corrections	-----	(very important)
(not important)	-----	Body conditioning exercises	-----	(very important)
(not important)	-----	Rehearsing	-----	(very important)
(not important)	-----	Performing on stage in front of an audience	-----	(very important)
(not important)	-----	Using artistic expression to communicate while on stage	-----	(very important)
(not important)	-----	Interacting socially with other dancers	-----	(very important)

---

### 20. Enjoyment of Activities

Even if these had no effect on your dancing, how much would you still enjoy each of the following activities?

(not enjoyable)	-----	Taking ballet class	-----	(highly enjoyable)
(not enjoyable)	-----	Making technical corrections	-----	(highly enjoyable)
(not enjoyable)	-----	Body conditioning exercises	-----	(highly enjoyable)
(not enjoyable)	-----	Rehearsing	-----	(highly enjoyable)
(not enjoyable)	-----	Performing on stage in front of an audience	-----	(highly enjoyable)
(not enjoyable)	-----	Using artistic expression to communicate while on stage	-----	(highly enjoyable)
(not enjoyable)	-----	Interacting socially with other dancers	-----	(highly enjoyable)

Do you have any questions or ideas you would like to share?

---

---

**Thank you for taking the time to complete and return this questionnaire!**

**Please fill out the “raffle ticket” below if you wish to be entered into the drawing for one of three prepaid Bank of America Visa gift cards in the amounts of \$300.00, \$150.00, and \$75.00. The raffle tickets will be detached from the questionnaire to maintain your anonymity!**

-----

**“Raffle Ticket”**

Name (optional): \_\_\_\_\_

If you are selected, please indicate how you would like to be contacted.

Telephone: (\_\_\_\_) \_\_\_\_\_ Email: \_\_\_\_\_

Letter (mailing address): \_\_\_\_\_

\_\_\_\_\_

## APPENDIX B

Human Subjects Approval



Office of the Vice President For Research  
Human Subjects Committee  
Tallahassee, Florida 32306-2763  
(850) 644-8673 · FAX (850) 644-4392

## APPROVAL MEMORANDUM

Date: 7/9/2004

To:  
**Carla Urena**  
MC: 1270

Dept: **Psychology**

From: **John Tomkowiak, Chair**

A handwritten signature in black ink that reads "John Tomkowiak M.D.".

Re: **Use of Human Subjects in Research**  
**Skill Acquisition and Expertise Development in Ballet Dancers**

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Exempt per 45 CFR § 46.(b) 2 and has been approved by an accelerated review process.

**The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.**

If the project has not been completed by **5/12/2004** you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

Cc: K. Anders Ericsson  
HSC No. 2003.379-R

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## BIOGRAPHICAL SKETCH

Carla A. Ureña was born in St. Petersburg, Florida, where she began her dance training. She attended various pre-professional training programs including the Winnipeg Ballet, Bolshoi Academy at Vail, Boston Ballet Center for Dance Education, and the Compañía Nacional de Danza. During her high school years she attended the North Carolina School of the Arts and began her professional career when she joined the Bay Ballet Theater under the direction of Christopher Fleming. Carla's dance career ended abruptly when she sustained a back injury, and she subsequently shifted her focus to academic pursuits.

While earning her B.S. in Psychology at Florida State University, Carla first became interested in expertise research and began to explore her particular research interest in the study of expert performance in dance under the watchful eye of K. Anders Ericsson. Carla then continued to work closely with Ericsson while she completed her M.S. in Instructional Systems in 2001 and her Ph.D work in 2004.

Currently, Carla is an Associate in Research at the Learning Systems Institute where she serves as a project manager for Navy contracts. Her long term goal is to pursue a research agenda in the area of expertise development in the performing arts.