

# Laboratory Study Reports That Gaynor Minden Pointe Shoes Promote Better Alignment

*80% of Professional Dancers Suffer Ankle Injuries;  
Improper Alignment May Be A Cause*

*Forces on Dancers' Ankles are 10 Times Body Weight*

Dancers are better aligned in Gaynor Minden pointe shoes according to an independent study just completed by the Exercise Science Department at the University of Massachusetts, Amherst led by Lise Worthen, B.F.A., a graduate student and Research Assistant in Biomechanics. Proper alignment is extremely important not only for ballet technique, but also for correct muscular development and for protecting the joints from injury.

In the study, ankle adduction ("sickling" in dance terminology), was reduced and, on average, subjects stood straighter in Gaynor Mindens. These results were announced at the 15th Annual Performing Artists Medicine Association Conference in Aspen, Co. on June 21, 1997.

The toe box and the shank (stiff midsole) of the patented Gaynor Minden pointe shoe are made from thermoplastic elastomeric materials. Traditional pointe shoes, on the other hand, typically have toe boxes made from paper, fabrics and/or paste - a design virtually unchanged since the nineteenth century. Both types use pink satin for the external covering.

In an earlier separate study\*, 80% of professional dancers were shown to suffer an injury to one or both ankles at some time in their careers. Worthen now points out that the high rate of injury may be a reflection of forces at work in the dancer's ankle joint - forces which reach up to 10 times a dancer's body weight in full plantar flexion (en pointe), according to an earlier study by Canadian biomechanists.\*\* Worthen, a former ballet teacher at Bates College, says, "Straight ankle alignment is stressed as a part of proper ballet technique. This is a biomechanically smart element of technique because misalignment transmits these high forces to the medial/lateral ankle structures."

Worthen's study used a kinematic analysis of dancers' ankles. The test subjects were advanced level ballet students with at least eight years of training. Two video cameras and Motion Analysis Software were used to record and analyze the dancers as they performed echappé (springing en pointe, with the weight landing on both feet), and "spring-to" passé relevé (springing en pointe landing on one foot, the non-supporting knee bent.)

  
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Another finding showed that when improvements of more than 5° were made, they were made by switching to Gaynor Mindens – improvements defined as straighter ankle angles with less adduction/abduction, i.e. less “sickling”/“winging”. One subject whose alignment was improved in Gaynor Mindens experienced 12° less sickling.

“Preventing sickling and winging is important,” says Worthen in the text of the study, “because each degree of misalignment in a dancer means force directed to the medial/lateral ankle structures (ligaments, bones, tendons and associated muscles). Balanced en pointe, a dancer weighing 115 lbs. potentially directs 2 lbs of force on the lateral ankle structures with every degree of sickling. For example, the dancer who straightened her alignment by 12° in the experimental shoe (Gaynor Minden), alleviated approximately 24 lbs of laterally placed force each time she balanced en pointe ... Seen in this light, redesigned pointe shoes may be important ergonomic tools for ballet dancers.”

Risk to the ankle can be greater during vigorous dancing because muscle activity and momentum increase the forces involved in misalignment by as much as ten times body weight\*\*.

Eliza Minden, the designer of the Gaynor Minden, believes that the difference is caused by the elastomeric material’s ability to maintain its shape and stiffness, as opposed to traditional toe-boxes which begin to deform soon after a dancer starts wearing the shoes. (Traditional pointe shoes often last only one performance; Gaynor Mindens normally last 5 to ten times longer.)

“The breakdown of the traditional materials causes a deformation of the toe-box and of the platform on which the dancer balances. As a result the ankle joint may become misaligned, tending to lean outward over the little toes. As the dancer attempts to compensate for the misalignment, her muscles work differently and may develop incorrectly and her placement may shift,” she says. Minden also suggests that the breakdown that occurs along the edges of the platforms of traditional shoes might allow the dancer to roll up en pointe with a misaligned ankle, as opposed to the platform of the Gaynor Minden which facilitates attainment of the full pointe position from the correct angle.

“We are delighted with these findings and expect they will be of great interest to dancers, their teachers and their parents,” says Minden. “I’ve always felt that dancers are not just artists, they are also elite athletes who deserve to benefit from technology just as other athletes do. “However,” she cautions, “it’s too soon to claim that our pointe shoe is safer because further, long-term studies are needed. Ballet always has an inherent risk of injury. No pointe shoe could ever make ballet easy, painless or risk-free. All we can do is try to minimize the injurious forces. This study shows that we have made good progress in that direction.”

The Gaynor Minden pointe shoe was designed in consultation with medical experts who specialize in treating dancers. The elastomeric components offer the additional advantage of being unbreakable. Not only are the toe-box and platform better able to withstand forces, but the shank (the stiff midsole that provides essential support) is similarly unbreakable. Traditional pointe shoes generally use a cardboard-like material that also is prone to wearing out after only one performance.

In addition, the Gaynor Minden has cellular urethane foam linings to improve comfort and absorb impact. High quality athletic shoes have long utilized these materials, but Gaynor Minden was the first dancing shoe to do so. It is the only pointe shoe made with Rodgers' Corporation's Poron™ 4000 which has the American Podiatric Medical Association's Seal of Acceptance.

\*McNeal, Watkins, Clarkson and Tremblay (Medical Problems of Performing Artists), 1990.

\*\*Galea and Norman (International Series on Biomechanics, V. 5A) , 1984.



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