

Joint hypermobility is a liability for the performing artist

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Joint hypermobility is defined as a range of joint movement that is considered excessive, taking into consideration the age, gender, and ethnic background of the individual, being greater in women and in those of Asian origin compared with other ethnic groups. All newborn babies can be considered to be hypermobile, but the range of movement diminishes progressively during childhood and then more gradually during adult life. Elderly hypermobile people have retained many facets of their hypermobility throughout life. Originally perceived to be a feature of rare inherited diseases such as Marfan and Ehlers-Danlos syndromes, it was only in the 1960s that hypermobility syndrome was seen to exist apart from these diseases and as an entity in its own right. In the early 1970s it was first linked to ballet dancers. There is now evidence that it represents a risk factor for injury in performing artists in general.

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Joint mobility, though susceptible to training, is largely determined by genetic influences. Joint hypermobility is defined as an excessive range of joint movement taking into consideration age, gender, and ethnic background. It underpins and facilitates the performance of a range of activities including dance, music, gymnastics, acrobatics, contortionism, and yoga. There is evidence that hypermobility acts as a positive selection factor for entry into ballet school in both boys and girls (Grahame and Jenkins 1972, McCormack *et al.* 2004) and proves an asset for instrumentalists over their non-hypermobility peers (Grahame 1993).

The biological cost to be paid for this enhanced performance is the occurrence of the Joint Hypermobility Syndrome (JHS). JHS is now seen as a non-life threatening genetic disorder, which renders connective tissues—

ligaments, muscles, tendons, bones, skin—fragile, more susceptible to injury, and more vulnerable to its effects. Healing may be delayed and protracted. This poses a distinct threat that may jeopardise a performer's career. The JHS phenotype (JHSP) has been characterized and classified according to validated criteria, termed the 1998 Brighton criteria, which provides a useful tool for identifying those at risk (Grahame *et al.* 2000). The aim of this study was to establish the prevalence of the JHSP among performing artists, who present with musculoskeletal ailments.

METHOD

Participants

As part of their routine assessment, all patients seeking advice at a British Association for Performing Arts Medicine (BAPAM) musculoskeletal clinic between 2000 and 2003 were tested for compliance with the Brighton Criteria for the JHSP.

Materials

Joint hypermobility is determined by the application of the 9-point Beighton scoring system (Beighton *et al.* 1973), which requires the observer to establish whether actively or passively the subject is able to perform the movements as listed in Table 1.

Procedure

The Brighton Criteria for JHS incorporates the Beighton 9-point scoring system for hypermobility but takes into account a variety of frequently-encountered symptoms as well as phenotypic features. They comprise two major and eight minor criteria:

Major criteria

1. A Beighton score of 4/9 or greater (either currently or historically).
2. Arthralgia for longer than 3 months in 4 or more joints.

Minor criteria

1. A Beighton score of 1,2, or 3/9 (0, 1, 2, or 3 if aged 50+).
2. Arthralgia (≥ 3 months) in one to three joints or back pain (≥ 3 months), spondylosis or spondylolysis/spondylolisthesis.

Table 1. Movements used to determine joint hypermobility. One point may be gained for each side for the first four manoeuvres so that the hypermobility score will have a maximum of nine points if all are positive. In individual subjects the score diminishes with aging.

	<i>Right</i>	<i>Left</i>
Passively dorsiflex the fifth metacarpophalangeal joint to $\geq 90^\circ$	1	1
Oppose the thumb to the volar aspect of the ipsilateral forearm	1	1
Hyperextend the elbow to $\geq 10^\circ$	1	1
Hyperextend the knee to $\geq 10^\circ$	1	1
Place hands flat on the floor without bending the knees	1	
<i>Maximum Total</i>	9	

3. Dislocation/subluxation in more than one joint, or in one joint on more than one occasion.
4. Soft tissue rheumatism ≥ 3 lesions (e.g. epicondylitis, tenosynovitis, bursitis).
5. Marfanoid habitus (tall, slim, span/height ratio >1.03 , upper:lower segment ratio less than 0.89, arachnodactily [+ve Steinberg/wrist signs]).
6. Abnormal skin: striae, hyperextensibility, thin skin, papyraceous scarring.
7. Eye signs: drooping eyelids or myopia or antimongoloid slant.
8. Varicose veins or hernia or uterine/rectal prolapse.

The JHS is diagnosed in the presence of two major criteria, one major and two minor criteria, or four minor criteria. Where there is an unequivocally affected first-degree relative, two minor criteria will suffice. JHS is excluded by the presence of Marfan or Ehlers-Danlos syndromes (other than the EDS Hypermobility type; formerly EDS III) as defined by the Ghent (De Paepe *et al.* 1996) and the Villefranche (Beighton *et al.* 1998) criteria respectively. Criteria major 1 and minor 1 are mutually exclusive as are major 2 and minor 2. The Brighton Criteria have yet to be validated for use in children under 16 years of age.

RESULTS

The results highlighted an expectedly high prevalence of JHS among performers, particularly among dancers and musicians. The JHSP was identified in 56 (70%) out of 80 dancers and in 54 (40%) of 134 musicians. Among the musicians the prevalence was highest in pianists (45%), string players (40%), and woodwind players (35%) and lowest in the brass (25%)

and percussion players (20%). Among the string players, the phenotype was seen to the greatest extent in violin and cello players (50% each) and least in guitarists (25%) and double-base players (18%), with viola players and harpists falling in the middle range (35% each). Analyzing the musicians' presenting diagnosis according to whether or not they showed the JHSP, the occurrence of JHSP was highest in those presenting with overuse injury and joint/spinal pain (both 55%), and lowest in those who had soft tissue lesions (35%) and osteoarthritis (25%).

DISCUSSION

A strong case can be made for identifying those artists who manifest the JHSP. They are the ones who are at greater risk of injury, both of the acute and overuse varieties. They need appropriate advice and guidance on how best to protect themselves from potentially disastrous consequences. There is a parallel need to bring the occurrence and significance of hypermobility to the attention of teachers, dance companies, and orchestras.

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