Risk factors for lower extremity injuries among contemporary dance students

Rogier M van Rijn, Christine van Seters, Marienke van Middelkoop, Janine H Stubbe

Codarts University of the Arts, Rotterdam, The Netherlands
Disclosures

• Rogier van Rijn has **no** financial disclosures that would be a potential conflict of interest with this presentation
High frequency of injuries - high absenteeism

- Yearly overall risk of injuries: > 60%

- Knee: 16.0%-21.4%
- Lower back: 13.4%-17.0%
- Ankle/foot: 20.5%-28.0%

- Returning to full dancing: 57 ± 91 days (m) and 41 ± 55 days (f)
Poor lower extremity kinematics

- Dynamic position of knee → athletes
- Lower leg alignment → dancers
- Lower strength → injured dancers

To test if lower extremity kinematics and strength are risk factors for lower extremity injuries in pre-professional contemporary dancers
Prospective Cohort Study

- 45 first year students (62% female, mean age 18.6 yrs)
  - Bachelor degree Dance (n=28)
  - Bachelor degree Dance Teacher (n=17)
Assessment of risk factors

• Intake questionnaire
  – Age (years)
  – Gender
  – Injury history
  – Educational program

• Physical tests
  – Single-leg squat
  – Countermovement jump
  – Height & weight → BMI
Main outcome measure

• Monthly questionnaire
  • Substantial lower extremity injury
    – any problems leading to moderate or severe reductions in training volume or in performance
    – complete inability to participate in dance at least once during follow-up

Oslo Sports Trauma Research Center (OSTRC) Questionnaire on Health Problems
OSTRC Questionnaire on Health Problems

Question 1
Have you had any difficulties participating in normal training and competition due to injury, illness or other health problems during the past week?

☐ Full participation without health problems
☐ Full participation, but with injury/illness
☐ Reduced participation due to injury/illness
☐ Cannot participate due to injury/illness

Question 2
To what extent have you reduced your training volume due to injury, illness or other health problems during the past week?

☐ No reduction
☐ To a minor extent
☐ To a moderate extent
☐ To a major extent
☐ Cannot participate at all

Question 3
To what extent has injury, illness or other health problems affected your performance during the past week?

☐ No effect
☐ To a minor extent
☐ To a moderate extent
☐ To a major extent
☐ Cannot participate at all

Question 4
To what extent have you experienced symptoms/health complaints during the past week?

☐ No symptoms/health complaints
☐ To a mild extent
☐ To a moderate extent
☐ To a severe extent
Examination of risk factors

• Univariate and multivariate regression models
• On leg level
• Generalized Estimating Equations (GEE)
High incidence of LE injuries

During academic year

- At least 1 injury: 82.2% (n=37)
- Substantial injury: 51.4% (n=19)
## Limited dorsiflexion ankle

<table>
<thead>
<tr>
<th></th>
<th>Multivariate analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OR (95% CI)</strong></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>0.78 (0.44 – 1.41)</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>0.56 (0.03 – 10.88)</td>
</tr>
<tr>
<td>Educational program (BA dance teacher)</td>
<td>4.96 (0.82 – 29.98)</td>
</tr>
<tr>
<td>Injury history</td>
<td>1.98 (0.36 – 11.02)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>1.02 (0.68 – 1.53)</td>
</tr>
<tr>
<td><strong>Single Leg Squat</strong></td>
<td></td>
</tr>
<tr>
<td>knee flexion (*)</td>
<td>1.02 (0.91 – 1.14)</td>
</tr>
<tr>
<td>pelvic tilt (*)</td>
<td>0.99 (0.86 – 1.15)</td>
</tr>
<tr>
<td>lateral trunk motion (*)</td>
<td>1.07 (0.93 – 1.23)</td>
</tr>
<tr>
<td>knee valgus (*)</td>
<td>0.97 (0.88 – 1.06)</td>
</tr>
<tr>
<td>dorsiflexion ankle (*)</td>
<td>1.25 (1.03 – 1.52)</td>
</tr>
<tr>
<td>hip flexion (*)</td>
<td>0.99 (0.91 – 1.06)</td>
</tr>
<tr>
<td><strong>Countermovement jump</strong></td>
<td></td>
</tr>
<tr>
<td>double leg (cm)</td>
<td>1.29 (0.99 – 1.68)</td>
</tr>
<tr>
<td>single leg (cm)</td>
<td>0.72 (0.44 – 1.16)</td>
</tr>
</tbody>
</table>
To conclude....

- High incidence of lower extremity injuries
- Limited ankle dorsiflexion $\rightarrow$ higher risk of LE injury

- Larger sample sizes
- Subgroup analysis
- Specific injuries
Thanks!

Rogier van Rijn

✉️: rmvanrijn@codarts.nl
🌐: www.codarts.nl/performing-arts-medicine