

Title: Challenges in reporting systematic reviews on epidemiological sport injury data.

Letter to the editor re: “Upholding standards of reporting in the synthesis of dance epidemiology literature” re: “Prevalence and profile of musculoskeletal injuries in ballet dancers: A systematic review and meta-analysis”

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We thank Swain and Ekegren (2016) for their letter regarding our recent systematic review and meta-analysis on the prevalence and profile of musculoskeletal injuries in ballet dancers, published in *Physical Therapy in Sport* (Smith, Davies, de Medici, Hakim, Haddad, & Macgregor, 2016). Systematic reviews of epidemiological data are complex. There are many challenges when designing and conducting such research synthesis projects, namely in relation to a developing methodology and associated analysis approaches, in the face of potential selection bias and confounding, and

heterogeneity (Dickersin, 2002). From this stand-point, Swain and Ekegren (2016) raised a number of important methodological points pertaining to systematic reviewing in general, with our recent paper being appropriately used to illustrate some wider themes of relevance.

Swain and Ekegren (2016) firstly raised the issue of using pooled period prevalence data which assessed the number of injuries reported, over the number of participants, within a specific follow-up period of time, for each individual paper. Whilst incidence data may have provided a more robust and time-specific set of data to investigate this topic (Rothman, Greenland & Lash, 2008), it was not possible to analyse this type of data in our systematic review, due to the paucity of data available. Furthermore, Swain and Ekegren (2016) highlighted potential issues with the estimation of prevalence data from our paper. The methods adopted were appropriate to answer our research question i.e. estimating the injury profile of this cohort. We however agree that further exploration on the potential sources of heterogeneity in respect to type of injury, definitions of injury and level of professional dancing, would have been particularly enlightening. However, as acknowledged, there is currently insufficient literature to provide this level of analysis. It is hoped that as the evidence-base evolves, stimulated through our systematic review recommendations, we will be able to perform such analyses in the future.

The conclusions drawn from our systematic review were accurately based on the evidence available. The statement “no studies have reported the prevalence of chronic musculoskeletal disorders in ballet dancers once they have retired from active dancing” accurately reflects our systematic review’s findings (Smith et al., 2016). Disappointingly, our systematic review, failed to identify two papers (Rönkkö, Heliövaara, Malmivaara, Roine, Seitsalo, Sainio, & Kettunen, 2007; van Dijk, Lim, Poortman, Strubbe, & Marti, 1995) highlighted by Swain and Ekegren (2016). This has been attributed to cataloguing search strategy errors from the electronic databases reviewed. Whilst the authors placed several safety-checks to identify *all* the evidence, reporting the totality of the literature, these papers were disappointingly missed in this instance. Such errors have been reported

previously within systematic reviewing (Sampson & McGowan, 2006), and systematic review methodologists need to continue to develop approaches to reduce the risks of this occurring in the future (Hausner, Waffenschmidt, Kaiser, & Simon, 2012; Sampson, McGowan, Cogo, Grimshaw, Moher, & Lefebvre, 2009).

Finally, we thank Swain and Ekegren (2016) for highlighting the omission regarding Allen, Nevill, Brooks, Koutedakis, and Wyon's (2012) reported incidence data in professional ballet dancers. Whilst this was an important point to make, there remains an overall paucity of literature on incidence injury data for professional ballet dancers as they transition into retirement. This is an important avenue for future research. This raises a final point regarding the importance of systematic reviews in general. Whilst it is important that available data are rigorously analysed to inform clinical decision-making, identifying the 'gaps' in knowledge and understanding, in order to develop research priorities, is of equal importance (Averis & Pearson, 2003). In our paper, as reiterated by Swain and Ekegren (2016), we identified a paucity of literature on specific training and performance regimes and their effects on musculoskeletal injury profiles in retired ballet dancers.

To conclude, both Swain and Ekegren (2016) and this letter have highlighted the importance of rigor and transparency when reporting systematic review of epidemiological data. These considerations are valuable for future researchers when posed with these challenging, yet significant research questions, based on observation study data.

Competing interests

None declared.

Funding

None declared.

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