Anabolic androgenic steroid use in the Nordic countries: A reply to Bilgrei and Sandøy

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Introduction
In commenting on our systematic review and meta-analysis of the prevalence of use of non-medical anabolic androgenic steroid(s) (AAS) in the Nordic countries (Sagoe, Torsheim, Molde, Andreassen, & Pallesen, 2015a), Bilgrei and Sandøy (2015) argue that AAS use in these countries should not be considered a major public health problem. Instead, they argue that AAS use in the Nordic countries should be regarded as a problem among smaller subgroups of users.

Although Bilgrei and Sandøy provide a useful contribution to the discussion on the use of AAS in the Nordic countries, it is our view that their comments have little impact on our conclusion: “…though subject to some limitations…non-medical AAS use should be regarded as a serious public health problem in the Nordic countries” (p. 7).

In this piece, we respond to the comments of Bilgrei and Sandøy based on the premises they provide for their conclusion: prevalence, evolvement and severity.

Prevalence of AAS use
Bilgrei and Sandøy note, and rightly so, that the preponderance of lifetime prevalence rates reported in our included studies ranges from 1 to 2%, with a few exceptions in studies of subpopulations such as bodybuilders, prisoners and drug users. Additionally, they infer rightly, as we assert (p. 25), that lifetime prevalence is usually higher than other types of prevalence (e.g. last year, last month or current prevalence). This is down to differences in the period of coverage and likelihood of permanent or temporary abstinence. They further support their argument with recent data from Norwegian general population surveys where lifetime prevalences range between 1 and 2% (Sandøy, 2013), with past year prevalence ranging between 0.1 and 0.2% (p. 25).

Essentially, Bilgrei and Sandøy’s latter premise corroborates our lifetime Norway-specific prevalence estimate of 2.4%. We also agree with the position that non-medical AAS use is “…a problem among smaller subgroups” (p. 26) such as bodybuilders, drug users and offenders. We also agree that “prevalence rates of AAS use in the general population in the Nordic countries are relatively low” (p. 26) as, for instance, non-athletes report quite a low prevalence rate in our study (1.2%). However, considering our overall lifetime prevalence figure of 2.1% together with the high lifetime prevalences reported by subpopulations such as bodybuilders, drug users and offenders – translating, potentially, into several hundreds of thousands of former or current users across the Nordic countries, with about 30% of these users experiencing AAS depend-
ence or addiction (Kanayama, Hudson, & Pope, 2009) – our position that, subject to some limitations, non-medical use of AAS should be considered a serious public health problem in the Nordic countries is tenable.

“Evolvement” of AAS use

Based on the stable lifetime prevalence figures reported in the European School Survey Project on Alcohol and Other Drugs (ESPAD) project between 1995 and 2011, Bilgrei and Sandøy argue that they “find no scientific documentation confirming the increase of AAS use in Norway that could lead to the conclusion of a (growing) public health problem” (p. 26).

The ESPAD data provides very useful epidemiological data on AAS use. Nonetheless, reliance, per se, on the stable prevalence estimates from the ESPAD project as evidence that AAS use is not a growing phenomenon in the Nordic countries is, in our opinion, faulty. Bilgrei and Sandøy rightly note that the ESPAD data included in our analysis targets 15 to 16-year-olds. It is important to note that evidence from systematic analyses of the AAS use literature indicate that the majority of AAS users initiate use in their twenties with only about 2% starting use before age 16 (Pope et al., 2014; Sagoe et al., 2014). The young age of the ESPAD sample is therefore a plausible explanation for the low prevalence rate consistently reported. In support of the above explanation, a recent study of Norwegian males aged 16 to 21 found that lifetime prevalence of AAS use is as high as 4.0% with 5.1% contemplating use (Jenssen & Johannessen, 2015).

A similar premise of Bilgrei and Sandøy is that our data “show(s) no increase over time”. This inference is not supported by our data. Although a cursory look at the breakdown of our prevalence estimates in terms of publication year shows a decreasing trend, we make no such statistical inference or conclusion taking into account heterogeneity in samples in the included studies across publication year. Thus, in no part of our work do we conclude that AAS use is a “growing public health problem” as alleged by Bilgrei and Sandøy (p. 26). We therefore find Bilgrei and Sandøy’s “evolution” argument on our conclusion untenable.

“Severity” of AAS use

There is extant literature on the negative consequences of AAS use on physical and mental health [see Pope and Kanayama (2012) for a review] with adolescent users in particular at risk of experiencing permanent cognitive alteration and emotional reactivity (Hildebrandt, Langenburcher, Flores, Harty, & Berlin, 2014). We have also recently shown that perceived use of AAS has negative consequences on people’s perception of the social image or personality of the perceived user (Sagoe et al., 2015b).

Apart from the individual-specific harmful effects, AAS use also has negative social consequences. In a recent Swedish population-based study, Lundholm, Fri sell, Lichtenstein, and Långström (2014) found that lifetime AAS use has a strong association with criminal conviction, although this association diminished after controlling for polypharmacy. Previous forensic studies in Sweden have also shown that AAS use is associated with aggressive and criminal behaviour (Klötz et al., 2006, 2007), although other studies have found...
no such association (e.g., Pope, Kouri, & Hudson, 2000).

In their commentary, Bilgrei and Sandøy argue that lifetime prevalence has no association with duration of use or the negative consequences of AAS use on users or society. They assert “It is therefore difficult to assess the severity of AAS use based on lifetime prevalence rates.” (p. 26). It is in our view, however, difficult to associate any kind of AAS use prevalence estimate per se (e.g. lifetime, past year, past month, current) with the experience of AAS-related negative consequences, such as previously discussed, in individual users or society at large. This is because such negative consequences are a function of the age and gender of the user as well as the dosage, duration of use and type of AAS used (Cunningham, Lumia, & McGinnis, 2013; Kicman & Gower, 2003; Landry & Primos, 1990; Pagonis et al., 2006). Therefore, in respect of our study, we find the “severity” argument of Bilgrei and Sandøy peripheral.

Conclusion
Based on our line of argument provided above, we find the points raised by Bilgrei and Sandøy of little impact on our conclusion. We discuss in our work the challenges associated with epidemiological data on AAS use. Additionally, contrary to the statement by Bilgrei and Sandøy, we are not oblivious of the potential social stigma AAS users may encounter as we have recently examined (Sagoe et al., 2015b). However, despite these challenges, it remains important to develop working prevalence estimates [of AAS use] (Pope et al., 2014, p. 371).

Accordingly, it is our view that epidemiological data on AAS use, as we provide in our work, is an indispensable part of the effort to deal with AAS use and its potential negative consequences in former and current users as well as on the health of families and society at large. Importantly, as we note in our work, …efforts need to be made in all the Nordic countries not only to deal with this problem, but also to monitor trends in the incidence and prevalence of AAS use. This research provides a strong foundation that can be built upon with the emergence of more evidence on AAS use in the Nordic countries (p. 15).

Declaration of Interest None.

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