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## The influence of exclusion criteria on the relationship between suicide rates and age in cross-national studies

Traditionally, suicide rates increase with aging in many countries (Shah and De, 1998). However, exceptions to this observation are emerging. Data from the World Health Organization (WHO) in 1995 revealed that female suicide rates did not increase with age in Mauritius, Colombia, Albania and Finland (Shah and De, 1998). Suicide rates increased with age in Switzerland (Ajdacic-Gross *et al.*, 2006), Brazil (Mello-Santos *et al.*, 2005) and China (Yip *et al.*, 2000), but there were smaller peaks in the younger age-bands. Suicide rates among Australian, New Zealand and white American males increased with age, but suicide rates for females initially increased with age, peaking at menopause, and declining thereafter (Skegg and Cox, 1991; Woodbury *et al.*, 1988; Snowdon and Snowdon, 1995). Suicide rates among non-white Americans (Seiden, 1981; Woodbury *et al.*, 1988), Indians (Adityanjee, 1986; Bhatia *et al.*, 1987), Jordanians (Daradekh, 1989), Indian immigrants to the U.K. (Raleigh *et al.*, 1990; Needleman *et al.*, 1997) and some east European countries (Sartorius, 1995) declined with increasing age.

With the emergence of studies from several countries **without** an increase in the suicide rate with aging, a recent cross-national study examined the relationship between suicide rates and age by obtaining data on suicide rates for males and females in seven age-bands – 16–24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years and 75+ years – from the WHO website ([www.3.who.int/whosis/mort/table1.cfm](http://www.3.who.int/whosis/mort/table1.cfm)) for 62 countries (Shah, 2007). The main findings were: (i) a significant increase in suicide rates with increasing age in males and females in 25 and 27 countries respectively, and in both sexes in 17 countries; (ii) **no** significant increase in suicide rates with increasing age in males and females in 31 and 29 countries respectively, and in both sexes in 21 countries; (iii) suicide rates for all the age-bands were low in both sexes or females in countries **without** a significant increase in the suicide rate with increasing age in both sexes or in females only respectively; (iv) suicide rates were the highest in the younger age-bands in countries **without** a significant increase in male suicides rates with increasing age; (v) regional clustering was observed for countries **without** a significant increase in suicide rates with increasing age

in both sexes (central and south American countries, and eastern European countries and countries emerging from the former Soviet Union), females only (south America) and males only (eastern European countries); and (vi) in a small number of countries, suicide rates declined with increasing age. The reviewers had advised the following exclusions: (i) age-bands of less than 1 year, 1–4 years and 4–15 years because suicide rates in these age-bands were very low (often zero); and (ii) those countries with small population sizes and with suicide rates of zero across all age-bands because data for an individual year may have missed cases of suicide.

With the passage of time and upon reflection, I wish to share what the results may have been if the data were analysed without these exclusions for reasons discussed below. The original unpublished analysis included suicide rates for males and females in the ten age-bands of less than 1 year, 1–4 years, 4–15 years, 16–24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, 65–74 years and 75+ years and included countries where the suicide rates in all the age-bands was zero. The methodology for ascertaining the relationship between suicide rates and age was similar to that used in the published study (Shah, 2007), and included 81 countries. The main findings were: (i) a significant increase in the suicide rate with increasing age in males and females in 59 and 52 countries respectively, and in both sexes in 46 countries; (ii) **no** significant increase in the suicide rate with increasing age in males and females in 22 and 29 countries respectively, and in both sexes in 16 countries; (iii) suicide rates for all the age-bands were low in both sexes or females in countries **without** a significant increase in the suicide rate with increasing age in both sexes or in females only respectively; (iv) in countries **without** a significant increase in the suicides rate with increasing age in males only, there were peaks with the highest suicide rate in the younger age-bands; and (v) regional clustering was observed for countries **without** a significant increase in the suicide rate with increasing age in both sexes (Caribbean and Arabic countries), females only (South America and Central America) and males only (Eastern European countries and countries of the former Soviet Union). These unpublished findings were significantly different from the findings of the published study (Shah, 2007) where the stated exclusions were utilized.

This comparison illustrates how changes in the methodology in research on suicide rates can radically influence the findings. This is particularly important in cross-national research on suicide rates because of methodological issues. These include: data were not available for all the countries (Moscicki, 1995; Wasserman *et al.*, 2005); the validity of these data was unclear (Diekstra, 1989; Wasserman *et al.*, 2005); the legal criteria for the proof of suicide varies between countries and different regions within a country (Shah and Ganesvaran, 1994; Wasserman *et al.*, 2005); some countries have poor death registration facilities (Shah and Ganesvaran, 1994); and cultural and religious factors and the stigma attached to suicide may lead to under-reporting of suicides (Abraham *et al.*, 2005; Wasserman *et al.*, 2005). It is important for researchers and readers carefully to consider the inclusion and exclusion groups in cross-national research on suicide rates before interpreting the findings because very different conclusions

can be reached. Theoretically, there can only be certainty of any age-related trends in suicide rates if all the age-bands are utilized, even if the suicide rate is zero in some of the age-bands, because only this approach truly reflects all age groups.

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