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A review of terrorism and its reduction of the gender ratio at birth after seasonal adjustment

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ABSTRACT

Background: Males are born in excess of females, a ratio expressed as M/T (males:total births). The ratio exhibits seasonal variation. Furthermore, acute stressful events may result in a transient dip in male births due to excess foetal losses, reducing M/T.
Aims: This study was carried out in order to identify significant M/T dips after adjusting for seasonality.
Study design: Live births by gender and month were sought for acute stressful events. After seasonal correction (where appropriate), M/T dips were sought.
Subjects: Live births.
Outcome measures: M/T dips.
Results and conclusions: This paper studied 112,226,306 live births. The following events showed dips ≤ 5th percentile 3–5 months after these acute episodes: the Brooklyn Bridge protests, Katrina Hurricane for all 4 states and for each individual state (Alabama, Florida, Louisiana, Mississippi), the Battle in Seattle, the London bombings, The Madrid bombings (for Madrid and for Spain), the Breivik shooting, the Oklahoma City bombing and the Sandy Hook Elementary School shooting. The Virginia Polytechnic Institute and State University shooting the Fukushima Daiichi nuclear disaster also showed dips albeit slightly later.

Seasonal adjustments should be taken into consideration in order to avoid Type 1 or 2 error pitfalls.

1. Introduction

Males are almost invariably born in excess of females [1], and the ratio of male-to-female live births may be expressed as M/T (male divided by total births). A wide variety of factors have been shown to influence M/T, including stress, which lowers the ratio. This may be an acute or chronic effect, and both may be natural or man-made. Chronic effects include cold winters [2] and contracting economies [3]. Acute effects include terrorist attacks [4]. Dips in M/T due to acute events have been shown to be caused by male foetal losses in already pregnant women [5], leading to a drop in M/T three to five months later [4].

This ratio has also been shown to be exhibit seasonal variation [6]. Both the analysis of acute M/T dips after stressful events, and seasonal variation evaluation are plagued by the paucity of data detailing male and female live births by month, limiting the possibility of such analysis. This study was carried out in order to ascertain whether M/T was significantly affected by acute stressful events, after correcting for seasonal variation in this very ratio, in loci where such data was available leading up to and following acute events.

This methodology has been used in two other studies, one of which analysed the seasonality M/T in Iceland and the effects of the 2010 Eyjafjallajökull volcanic eruption [7]. A second paper also utilised this methodology for France and the effects of the 1968 student riots and Japan and the effects of the Aum Shinrikyo religious cult's attack on the Tokyo subway using sarin nerve gas in 1995 [8].

For the purposes of this analysis, acute events included protests, riots and terrorist attacks.

2. Methods

United States data was available from the website of the Centers for Disease Control and Prevention. Data for London, Spain and Japan was

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Table 1
Events studied.

	Event	Location	Event	Births included
1	Springfest riots	Harrisonburg, Virginia	10/04/2010	1,355,605
2	Santa Cruz and Oakland	Santa Cruz, California	01/05/2010, 07/01/2009, 08/07/2010, 05/11/2010	4,158,870
3	G-20 Pittsburgh summit protests	Pennsylvania	24–25/09/2009	1,158,622
4	Brooklyn Bridge protests	New York	September 2011	1,954,300
5	Katrina Hurricane	Alabama, Florida, Louisiana and Mississippi	August 2005	4,661,715
6	Katrina Hurricane	Alabama	August 2005	730,013
7	Katrina Hurricane	Florida	August 2005	2,661,899
8	Katrina Hurricane	Louisiana	August 2005	765,871
9	Katrina Hurricane	Mississippi	August 2005	503,932
10	The Battle in Seattle	Seattle, Washington	November 1999	964,061
11	London bombings	London	07/07/2005	7,028,320
12	Madrid bombings	Madrid	11/03/2004	720,510
13	Madrid bombings	Spain	11/03/2004	4,750,159
14	Fukushima Daiichi nuclear disaster	Japan	12/03/2011	6,262,731
15	Breivik shooting	Norway	22/07/2011	650,385
16	Twin Towers	USA	11/09/2001	61,233,045
17	Twin Towers	New York	11/09/2001	3,718,594
18	Sandy Hook Elementary School shooting	Connecticut	14/12/2012	430,486
19	Rodney King riots	Los Angeles	April 29–May 4, 1992	6,166,135
20	The Columbine High School shooting	Columbine, Colorado	20/04/1999	681,192
21	Virginia Polytechnic Institute and State University shooting	Blacksburg, Virginia	16/04/2007	1,146,527
22	The Oklahoma City bombing	Oklahoma	19/04/1995	523,334

Table 2
JDemetra seasonality tests for male and female births.

	Event	Time series	Evolutive seasonality test	Combined seasonality test
1	Springfest riots, Virginia	Males	0.5156	SP
		Females	0.6311	SP
2	Santa Cruz and Oakland California	Males	0.6735	SP
		Females	0.6311	SP
3	G-20 Pittsburgh summit protests, Pennsylvania	Males	0.0946	SP
		Females	0.7084	SP
4	Brooklyn Bridge protests, New York	Males	0.5047	SP
		Females	0.1345	SP
5	Katrina Hurricane, Alabama, Florida, Louisiana and Mississippi	Males	0.7827	SP
		Females	0.4228	SP
6	Katrina Hurricane, Alabama	Males	0.9669	SP
		Females	0.34	SP
7	Katrina Hurricane, Florida	Males	0.6188	SP
		Females	0.8848	SP
8	Katrina Hurricane, Louisiana	Males	0.0301[a]	SP
		Females	0.8886	SP
9	Katrina Hurricane, Mississippi	Males	0.934	SP
		Females	0.5313	SP
10	The Battle in Seattle, Washington	Males	0.1414	SP
		Females	0.1833	SP
11	London bombings, July 2005	Males	0.6012	SP
		Females	0.7026	SP
12	Madrid bombings, Madrid	Males	0.9349	SP
		Females	0.8594	SP
13	Madrid bombings, Spain	Males	0.9351	SP
		Females	0.7813	SP
14	Fukushima Daiichi nuclear disaster, Japan	Males	0.0112[a]	SP
		Females	0.0651	SP
15	Breivik shooting, Norway	Males	0.1344	SP
		Females	0.0141[a]	SP
16	Twin Towers, USA	Males	0.2048	SP
		Females	0.0084[a]	SP
17	Twin Towers, New York	Males	0.9351	SP
		Females	0.7813	SP
18	Sandy Hook Elementary School shooting, Connecticut	Males	0.9455	SP
		Females	0.3525	SP

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