

Risk and Relative Risk Exercises #2

These exercises are originally from the University of Auckland Statistics Department (provided at the AMA Saturday workshop, 18 August 2012).

In 2006 the results of a study carried out among 132 271 Jewish children born in Israel during 6 consecutive years in the 1980s were published in the Archives of General Psychiatry. The objective of the study was to examine the relationship between the father's age at the birth of child and their risk of autism.



The children were assessed for autism at age 17 years. The results are shown in the table below.

Father's Age Group	Autism	No autism	Total
15 – 29	34	60 654	60 688
30 – 39	62	67 211	67 273
≥ 40	14	4 296	4 310
Total	110	132 161	132 271

- (a) For children from fathers aged 15 to 29 at the birth of their child:
- What proportion had autism?
 - What was the probability that a randomly selected child had autism?
 - What was the risk of having autism?
 - Write this risk as a rate per 10 000 children.
- (b) For children from fathers aged 30 to 39 at the birth of their child, what was the risk of having autism?
- (c) For children from fathers aged 40 or more at the birth of their child, what was the risk of having autism?
- (d) Using the risk for fathers in the 15 – 29 year age group as the baseline:
- Calculate the relative risk for fathers in the 30 – 39 year age group of having an autistic child.
 - Interpret this relative risk.
 - Calculate the relative risk for fathers in the 40+ age group of having an autistic child.
 - Interpret this relative risk.
- (e) (i) Do fathers aged 30 to 39 have an increased or decreased risk of having an autistic child compared to those aged 15 to 29?
- Calculate the percentage change in risk relative to the baseline risk.
 - Interpret this percentage change in risk.
- (f) (i) Do fathers aged 40 or more have an increased or decreased risk of having an autistic child compared to those aged 15 to 29?
- Calculate the percentage change in risk relative to the baseline risk.
 - Interpret this percentage change in risk.



Answers to Risk and Relative Risk Exercises #2

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15 – 29	34	60 654	60 688
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- (a) For children from fathers aged 15 to 29 at the birth of their child:
- What proportion had autism? $34/60688 = 0.00056$
 - What was the probability that a randomly selected child had autism? 0.00056
 - What was the risk of having autism? 0.00056
 - Write this risk as a rate per 10 000 children. $5.6 \text{ per } 10\,000$
- (b) For children from fathers aged 30 to 39 at the birth of their child, what was the risk of having autism? $62/67273 = 0.00092$
- (c) For children from fathers aged 40 or more at the birth of their child, what was the risk of having autism? $14/4310 = 0.00325$
- (d) Using the risk for fathers in the 15 – 29 year age group as the baseline:
- Calculate the relative risk for fathers in the 30 – 39 year age group of having an autistic child. $0.00092/0.00056 = 1.643$
 - Interpret this relative risk. **Men aged 30 to 39 are about 1.6 times more likely to father an autistic child than those aged 15 to 29.**
 - Calculate the relative risk for fathers in the 40+ age group of having an autistic child. $0.00325/0.00056 = 5.80$
 - Interpret this relative risk. **Men aged 40 or over are about 6 times more likely to father an autistic child than those aged 15 to 29.**
- (e) (i) Do fathers aged 30 to 39 have an increased or decreased risk of having an autistic child compared to those aged 15 to 29? **Increased**
- (ii) Calculate the percentage change in risk relative to the baseline risk. $(0.00092 - 0.00056) \div 0.00056 = 0.643 = 64.3\%$
- (iii) Interpret this percentage change in risk. **There is a 64% increase in the chances of fathering an autistic child for men aged 30 to 39 compared to those for men aged 15 to 29.**
- (f) (i) Do fathers aged 40 or more have an increased or decreased risk of having an autistic child compared to those aged 15 to 29? **Increased**
- (ii) Calculate the percentage change in risk relative to the baseline risk. $(0.00325 - 0.00056) \div 0.00056 = 4.80 = 480\%$
- (iii) Interpret this percentage change in risk. **There is a 480% increase in the chances of fathering an autistic child for men aged 40 + compared to men aged 15 to 29.**