20121007 - Judgements of likelihood under hypoxic conditions (descriptive statistics) - 2010

Mild hypoxia and optimistic judgement

Gilbey et al (2010[1]) carried out a pilot study for ascertaining whether mild hypoxia[2] led to more optimistic (or pessimistic) judgements about the likelihood of certain life events[3] than otherwise. This article provides detailed descriptive information about the results of that research.

Results showed that a small group of participants only slightly changed their judgements about life events between normal and hypoxic conditions (see illustration 1). Many of these changes can be considered negligible, although some small changes were also observed. Statistically speaking, the latter changes showed standardised effect sizes ranging between small (delta=0.22[6]) and medium (delta=0.40) for five judgments. However, such effect sizes may not reflect a similarly important difference in scores between conditions. After all, the participants estimated their judgements of likelihood on a Likert scale. If we take each anchor as the centroid for a particular estimate of likelihood (eg, '5, Lightly above average'), it is reasonable to assume that such estimate actually ranges midway between the immediately lower and upper anchors (eg, any score between 4.5 and 5.4 would be considered 'Lightly above average'). Thus, a change of 0.5 points on this scale (ie, a change that moves an estimate from a centroid to the next range) may be a reasonably minimum degree of change expected before considering such change as something noteworthy[4]. Following this logic, then, most of the differences between conditions among these participants were below such threshold and, thus, rather unimportant.

Illustration 1: Results obtained under normal and hypoxic conditions				
	Normoxia	**Hypoxia**	**Difference** [5]	**Delta** [6]
Overall judgement of likelihood	5.46	5.43	-0.03	-0.05
Items included in group analysis				
	Normoxia	**Hypoxia**	**Difference** [5]	**Delta** [6]
Maintaining good relationships with relatives	5.40	5.80	0.40	0.44
Staying healthy and fit to an old age	5.27	5.67	0.40	0.33
Not being fired from a job	4.87	5.27	0.40	0.35

Falling or staying in love	5.73	5.40	-0.33	-0.34
Not becoming sterile	5.00	4.67	-0.33	-0.25
Not developing a drinking problem	5.80	5.53	-0.27	-0.22
Not attempting suicide	6.47	6.40	-0.07	-0.09
Having a successful career	5.33	5.40	0.07	0.06
Not having a heart attack before 40	5.27	5.20	-0.07	-0.05
Traveling extensively	5.20	5.27	0.07	0.06
Liking my job	5.20	5.13	-0.07	-0.06
Not getting infected with Aids	5.67	5.73	0.06	0.05
Items excluded from group analysis[Z]				
Living beyond 80	---	---	---	---
Getting a wonderful surprise next birthday	---	---	---	---
Not contracting cancer	---	---	---	---
Not being a victim of theft	---	---	---	---
(Mean values on a 1-7 Likert scale; values above 4 represent "optimism")				

Regarding grouped values, there are some considerations to take into account in order to interpret them correctly. On the one hand, the authors separated items which showed a statistically significant difference from '4, Average' from those which did not show such statistical difference. They then added up the former as if they represented a measure of 'unrealistic optimism' while excluding the others. This is a questionable practice if all items ever contributed to such measure of 'unrealistic optimism', as there should not be any provision for "cherry-picking" those items which provide good results from those which do not. Thus, the grouped results are meaningless under the assumption that the selected items (but not the others) measured either 'risk judgement' or 'unrealistic optimism'.

On the other hand, the grouped results may be valuable if we consider them simply as judgements of likelihood about selected life-events. In this case, "cherry-picking" is a plausible strategy as a way of describing a change in judgements which were already biased in this particular group of participants (ie, it may not be adequate to generalise to other judgements, life-events or groups). Under this assumption, it is appropriate to interpret changes between conditions, which, for this particular group, were negligible (delta=-0.05), most probably due to the adding up of items which diverged from average in either direction, thus balancing their differences out.

Methods

Research approach

Pilot study for comparing judgements of likelihood made under hypoxic and normal conditions.

Sample

15 undergraduate and postgraduate university male students, with no health problems.

Design

Longitudinal design using a paired-sample, so that all participants did both conditions. The order in

which each participant did each condition was selected randomly.

Variables

- The independent variable was the level of blood oxygen, which varied between normal and that typical at an altitude of 2,400 meters (8,000 feet).
- The dependent variable was the assessment of 16 life-events in terms of likelihood of them occurring to "people like the participant". This assessment was carried out at the end of each condition.

Materials

- An hypoxicator was used to simulate oxygen levels at sea level (under the normal condition) and at 4,200 meters (8,000 feet) above sea level (under the hypoxic condition).
- A questionnaire provided 16 life-events items for the participants to assess, of which 8 were positive (eg, living beyond 80 years of age) and 8 were negative (eg, developing cancer). The participants wrote their confidence about experiencing those events by selecting one of 7-anchors on a scale running from '1, Much below average' to '7, Much above average' (or vice versa, if the item was a negative one). Although the questionnaire is presented as a tool assessing unrealistic optimism, it is not a validated tool but it was constructed ad-hoc for the study. Therefore, in this article it is presented as a tool for assessing the likelihood of selected life events, rather than as a tool for assessing unrealistic optimism.

Procedure

All participants went through both conditions, normal and hypoxic, although the order in which they did them was randomly selected for each participant. During each session they performed other cognitive tasks, and at the end of each session they completed the questionnaire (one per session).

Data analysis

- The authors screened out four items which showed no bias towards optimism or pessimism (thus, being merely average). The reason argued was to focus on those items already biased (towards optimism) only. This post-hoc reasoning seems plausible insofar the questionnaire was also an ad-hoc tool compiled for this study rather than a validated tool for measuring unrealistic optimism. However, it is also possible that the authors were simply "cherry picking" the most promising results.
- The values for the negative items were reversed in order to align them with the positive values as well as for calculating overall results (negative values are re-written as "Not experiencing such event" in this article).
- The main data analyses of concern here were descriptive statistics, namely mean values, unstandardised effect sizes (means differences) and standardised effect sizes (Gauss's delta).

References

1. **GILBEY Andrew, Toby MUNDEL, Stephen LEGG, Stephen HILL, Zac SCHLADER & Aaron RAMON (2010).** *A pilot test of the effect of mild-hypoxia on unrealistically optimistic risk judgements.* Aviation Education and Research Proceedings (ISSN 1176-0729), 2010, pages 7-12.
+++ **Notes** +++
2. Such as that experienced at 4,200 meters (8,000 feet) of altitude.
3. The authors attempted to research 'risk judgement' and 'unrealistic optimism'. However, the research methods and tools used do not seem to have worked in support of such objectives. This article will, instead, refer to them as 'judgements of likelihood' and 'selected life events', instead.
4. Put in perspective, just 0.6 points represents a 10% change in value on a 7-anchor Likert scale. Thus, the minimum 0.5 points contemplated here is a rather very small change in value (of about 8% change on the scale).
5. Unstandardised effect size (means difference).
6. Standardised effect size (Gauss's delta).
7. The authors did not provide statistics for these four items, and they rejected them from further analysis for not showing a statistical significant difference from the average value, 4.

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