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Evaluating whether sight is the most valued sense

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TITLE: Evaluating Whether Sight is the Most Valued Sense

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Key Points

Question: Which sense is most valued by the general public?

Findings: This cross-sectional online survey found that sight is the most valued sense, followed by hearing. Participants would, on average, choose 4.6 years of life in perfect health over 10 years of life with complete sight loss. Members of the public valued balance above traditionally recognised senses such as touch, taste, and smell.

Meaning: This study provides empirical support for frequent assertions made by practitioners, researchers and funding agencies, that sight is the most valued sense among the general population.

Abstract

Importance: Sight is often considered to be the sense most valued by the general public, but there is limited empirical data to support this. This study provides empirical evidence for frequent assertions made by practitioners, researchers and funding agencies, that sight is the most valued sense.

Objective: To determine which senses are rated most valuable by the general public, and to quantify attitudes towards sight and hearing loss in particular.

Design: A cross-sectional web-based survey, conducted through a market research platform (FlexMR), capturing a heterogeneous sample of UK adults.

Setting: Online.

Participants: 250 UK adults (aged 22-80 years, 56.4% female) were recruited in March 2016.

Main Outcome(s) and Measure(s): Participants were first asked to rank the five classical senses (sight, hearing, touch, smell, taste) plus three other senses (balance, temperature, pain), in order of most valuable (8) to least valuable (1). Next, the fear of losing sight and hearing was investigated using a Time Trade-Off exercise. Participants chose between 10 years without sight/hearing, versus varying amounts of perfect health (from 10 to 0 years).

Results: 88% of participants ranked sight as their most valuable sense (mean rating = 7.8; 95% CI 7.6-7.9). Hearing was ranked second (mean rating = 6.2; 95% CI 6.1-6.4), and balance third (mean rating = 4.9; 95% CI 4.7-5.1). All three were ranked above the classical senses of touch, taste and smell (Wilcoxon signed-rank tests; all P s < 0.05).

The Time Trade-Off exercise indicated that, on average, participants preferred 4.6 years (95% CI 4.2-5.0) of perfect health over 10 years without sight, and 6.8 years (95% CI 6.5-7.2) of perfect health over 10 years without hearing (mean difference between sight and hearing = 2.2 years; P < 0.001).

Conclusions and Relevance: Among a cross-sectional survey of UK adults from the general public, sight was the most valued sense, followed by hearing. These results suggest people would, on average, choose 4.6 years of perfect health over 10 years of life with complete sight loss, although how this generalizes to other parts of the world is unknown.

1 **Introduction**

2 Research in the US has shown that members of the public rate sight loss as a greater
3 concern than loss of memory, loss of speech/hearing, or chronic health conditions such as
4 HIV/AIDS and heart disease.¹ Similarly, a longitudinal clinical study with patients
5 experiencing sensory loss has shown that loss of sight and touch cause the greatest
6 decreases in quality of life, before loss of hearing, taste and smell.² However, the
7 importance of sight relative to other senses has not been systematically investigated in the
8 general population in a non-clinical setting. We therefore conducted a survey to determine
9 which senses are rated most valuable by a cross-section of the public, and quantified
10 attitudes towards sight and hearing loss in particular using a Time Trade-Off (TTO) exercise.

11

12 **Methods**

13 This study was approved by the City, University of London School of Health Sciences'
14 Research Ethics Committee. Informed written consent was obtained from all participants
15 before enrolment. An online survey was delivered by an independent market research
16 company, FlexMR (FlexMR Ltd, Milnthorpe, UK), who were contracted by the research team
17 specifically to disseminate the survey and collate responses. FlexMR sampled 250 UK-based
18 adults in March 2016 (median (range) age: 50 (22-80) years; 56.4% female). The participants
19 were selected from a pool of UK-based individuals who had previously registered to receive
20 survey invitations from FlexMR, and were entered into a prize draw as compensation.
21 Participants' socio-demographic characteristics were collected (eTable1). The survey was
22 open to individuals who may have had a sensory impairment themselves, or within their
23 family. Ninety participants (36%) reported chronic conditions of some kind, with three
24 participants reporting long-term eye conditions, and one participant reporting deafness.

25 This study adopted a broader definition of senses than the five "classical" senses defined by
26 Aristotle, including also balance (equilibrioception), pain (nociception), and temperature
27 (thermoception). Participants were first asked to rank eight senses (*sight, hearing, touch,*
28 *smell, taste, balance, temperature* and *pain*), in order of most valuable ('8') to least valuable
29 ('1'). Next, fear of losing sight and hearing was investigated using a TTO exercise.³
30 Participants chose between 10 years without sight/hearing ('Life A') versus varying amounts
31 of perfect health, in one-year decrements from 10 to 0 years ('Life B'). This allowed for
32 calculation of the number of years without sight or hearing that a participant would trade
33 for perfect health over a 10-year period. Differences in years traded between groups were
34 then analysed using Wilcoxon rank-sum and Kruskal-Wallis tests.

35

36 Results

37 As shown in Figure 1, 88% (95% CI 82-94%) of participants ranked sight as their most
38 valuable sense (mean rank = 7.8; 95% CI 7.6-7.9). Hearing was ranked as the second-most
39 valuable sense (mean rank = 6.2; 95% CI 6.1-6.4), but was rated as significantly less valuable
40 than vision ($P < 0.001$). Balance was ranked as the third-most valuable sense (mean rank =
41 4.9; 95% CI 4.7-5.1), above the three classical senses of touch, taste and smell (all $P < 0.05$).

42 In the TTO exercise, participants, on average, chose 4.6 years (95% CI 4.2-5.0) of life in
43 perfect health over 10 years of life with complete sight loss, and 6.8 years (95% CI 6.5-7.2) of
44 life in perfect health as an alternative to 10 years of life with complete hearing loss. This
45 means that over a 10-year period, participants were prepared to sacrifice 5.4 years without
46 sight (95% CI 5.0-5.8) and 3.2 years without hearing (95% CI 2.8-3.5) in order to remain in
47 perfect health (mean difference between sight and hearing = 2.2 years; $P < 0.001$). 15% of
48 participants chose death (0 years of Life B) over 10 years with complete sight loss, and 6% of
49 participants chose death over 10 years with complete hearing loss (Figure 2).

50 Men were willing to sacrifice almost one year more without sight than women in exchange
51 for perfect health (mean difference = 0.94 years; $P = 0.032$) (Figure 2B/2C). There were no
52 statistically significant differences in the number of years without sight that participants
53 would give up based on age-group ($P = 0.610$); family history of sensory impairment ($P =$
54 0.172); or having a chronic health condition ($P = 0.481$). For hearing, people with a family
55 history of sensory impairment would give up significantly *fewer* years without hearing than
56 those with no family history of sensory impairment (mean difference = -1.46 years; $P =$
57 0.002). Participants with chronic conditions would give up fewer years without hearing than
58 those with no chronic conditions (mean difference = -0.56 years; $P = 0.041$). There were no
59 statistically significant differences in the number of years without hearing that participants
60 would give up based on age ($P = 0.463$) or sex ($P = 0.436$).

61

62 Discussion

63 The results suggest that sight is the most valued sense, followed by hearing. This is
64 consistent with convergent evidence from linguistics, showing that vision-related words
65 dominate the English lexicon.⁴ Balance was also ranked highly: as the third most important
66 sense, ahead of the classical senses of touch, taste and smell. This is consistent with
67 empirical evidence showing that balance impairments, and their impact on mobility and
68 daily activities, can be a key factor in reduced quality-of-life.⁵ This shows that the five
69 classical Aristotelian senses do not comprise the most valued senses.

70 The TTO exercise showed that people would choose an average of 4.6 years of perfect
71 health over 10 years without sight, and 6.8 years of perfect health over 10 years without
72 hearing. Male participants opted to sacrifice almost one year more without sight than
73 female participants. Interestingly, men's higher valuation of sight in this study does not
74 reflect real-world healthcare-seeking behavior, with evidence that men are more likely than

75 women to risk neglecting their eye health. For example, individuals presenting with late-
76 stage glaucoma are 16% more likely to be male.⁶

77 Regarding hearing loss, those with chronic conditions would give up fewer years without
78 hearing than those with no chronic condition. This accords with theory on ‘focusing effects’,
79 whereby healthy individuals, when asked to focus on the perceived impact of a disease or
80 disability, frequently overestimate its negative impact on their quality of life and disregard
81 the many other contextual factors which could mitigate its impact, such as the possibilities
82 of adaptation.⁷ However, a similar pattern was not found for sight loss; those with chronic
83 conditions sacrificed only marginally fewer years without sight, demonstrating that sight is
84 valued similarly highly by those with and without existing chronic health conditions.

85

86 **Limitations and Future Work**

87 These results may be specific to the UK population, rather than universally applicable. The
88 survey was novel but not formally validated. Moreover, despite efforts to recruit a broadly
89 representative sample of the UK population, we cannot rule out potential bias introduced
90 by drawing on a market research company’s participant pool. Additionally, we did not
91 collect data on ethnicity of our participants.

92 Furthermore, following longstanding tradition, this study considered the senses as discrete
93 systems. However, sensory impairments are often comorbid; for example, many forms of
94 eye-disease are also associated with hearing loss⁸ or vestibular dysfunction.⁹ Future work
95 should consider the public’s concerns around multi-sensory impairments, for example by
96 using the sorts of Time-Trade-Offs described in the present work (e.g. years of sight and
97 hearing loss together, traded off against sight and balance loss together). Such research
98 would be valuable given the growing prevalence of multi-sensory loss in globally aging
99 populations.¹⁰

100

Online-Only Supplement - eTable1. Characteristics of study participants (N = 250), including years without sight and without hearing sacrificed by group

| | | Years (95% CI) | | Years (95% CI) | |
|--------------------------------------|--------------|--|------------------------|--|--------------------------|
| Variable | N (%) | Years without sight traded for perfect health | P value (sight) | Years without hearing traded for perfect health | P value (hearing) |
| All participants | 250 (100) | 5.4 (5.0 - 5.8) | N/A | 3.2 (2.8 - 3.5) | N/A |
| Age, y | | | 0.61 | | 0.46 |
| 22-40 | 79 (32) | 5.6 (4.6 - 6.0) | | 3.3 (2.7 - 4.0) | |
| 41-60 | 101 (40) | 5.3 (4.7 - 5.9) | | 2.9 (2.4 - 3.5) | |
| 61-80 | 70 (28) | 5.6 (4.9 - 6.4) | | 3.3 (2.6 - 3.9) | |
| Sex | | | *0.03 | | 0.44 |
| Female | 141 (56) | 5.0 (4.5 - 5.5) | | 3.1 (2.6 - 3.6) | |
| Male | 109 (44) | 5.9 (5.3 - 6.5) | | 3.3 (2.7 - 3.8) | |
| Marital status | | | 0.10 | | 0.16 |
| Single | 42 (17) | 6.1 (5.2 - 7.0) | | 4.1 (3.0 - 5.2) | |
| Married | 134 (54) | 5.3 (4.7 - 5.8) | | 3.0 (2.5 - 3.5) | |
| Living with partner | 40 (16) | 4.8 (3.9 - 5.7) | | 3.0 (2.3 - 3.7) | |
| Divorced | 27 (11) | 5.2 (3.8 - 6.5) | | 2.4 (1.3 - 3.6) | |
| Widowed | 7 (3) | 7.9 (5.1 - 10.7) | | 4.6 (1.1 - 8.0) | |
| UK Education level | | | 0.36 | | 0.45 |
| No formal qualifications | 7 (3) | 5.0 (2.3 - 7.7) | | 1.1 (-0.2 - 2.5) | |
| GCSE or equivalent | 65 (26) | 4.8 (4.0 - 5.5) | | 3.2 (2.5 - 4.0) | |
| A Level or equivalent | 49 (20) | 5.3 (4.4 - 6.2) | | 3.3 (2.4 - 4.2) | |
| Undergraduate degree | 88 (35) | 6.0 (5.3 - 6.7) | | 3.3 (2.7 - 4.0) | |
| Postgraduate degree | 34 (14) | 5.3 (4.1 - 6.4) | | 3.0 (2.0 - 4.0) | |
| Other | 7 (3) | 5.3 (2.3 - 8.2) | | 2.4 (0.7 - 4.2) | |
| Religion | | | 0.74 | | 0.40 |
| No religion | 117 (47) | 5.6 (5.0 - 6.1) | | 3.0 (2.4 - 3.5) | |
| Religion | 128 (51) | 5.3 (4.7 - 5.8) | | 3.3 (2.8 - 3.8) | |
| Prefer not to say | 5 (2) | 5.0 (1.0 - 9.0) | | 4.2 (-0.3 - 8.7) | |
| Chronic conditions | | | 0.48 | | *0.04 |
| Yes | 90 (36) | 5.2 (4.6 - 5.9) | | 2.8 (2.1 - 3.4) | |
| No | 160 (64) | 5.5 (5.0 - 6.0) | | 3.4 (2.9 - 3.8) | |
| Family history of sensory impairment | | | 0.17 | | **0.002 |
| Yes | 37 (15) | 4.8 (3.7 - 5.9) | | 1.9 (1.2 - 2.7) | |
| No | 213 (85) | 5.5 (5.1 - 5.9) | | 3.4 (3.0 - 3.8) | |

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DPC and JE had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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