

Are parents more willing to vaccinate their children than themselves?

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Abstract

Risk perception studies have focused on personal risks, yet many decisions are taken for others. Some studies have suggested that parents are especially sensitive to risks to their children. We compared 245 parents' willingness to vaccinate their child versus themselves in nine hypothetical scenarios relating to influenza strains. Scenarios varied according to non-vaccination risk (low, medium, high) and 'risk target' (oneself, one's child, or, as a comparator, one's elderly parent). Participants were more willing to vaccinate their child (61% acceptance) than themselves (54%) or their parent (56%). Parents may be more risk-sensitive when deciding for their child than for themselves.

Keywords:

Children; risk; health behaviour; health psychology; quantitative methods

Are parents more willing to vaccinate their children than themselves?

Risk perceptions are central to many health behaviour theories (e.g. Rogers, 1983). These theories posit that individuals are more likely to adopt health-protective behaviours (or lessen engagement in health-compromising behaviours) when they perceive themselves to be vulnerable to an aversive health threat, and a prescribed course of action to be effective in reducing the threat (e.g. Rogers, 1983). While effects tend to be small, these hypotheses have been empirically well-supported in predicting responses to personal health (Milne, Sheeran, and Orbell, 2000). Yet, many health-related decisions are taken as proxies, based on perceptions of risks posed to another. For example, parents must decide whether to vaccinate their children against communicable diseases. Little evidence is available to compare risk-based health decisions taken on behalf of others with those for oneself.

Separate literatures suggest that people may not appreciate risks to their own health (e.g. Weinstein, 1987), and that parents may be highly sensitive to risk when making health-related decisions for their children (e.g. Gardner, Davies, McAteer and Michie, 2010). Work on vaccination acceptance, in which two potential risks are present – disease risks associated with rejecting a vaccine, and possible complications arising from accepting a vaccine – has found that parents pay more attention to unlikely high-risk consequences than the likely benefits, despite acknowledgement of the low probability of aversive consequences being realized (Gardner et al., 2010). A telephone survey of UK healthcare workers during the 2009 swine influenza pandemic showed that respondents were significantly more likely to accept the vaccine for their child than for themselves (Rubin, Potts and Michie, 2011), but it is unclear whether this was due to greater risk-aversion when deciding for children, or a perception that the child was at increased risk.

The few studies that have compared self-child risk decisions, while holding risk magnitude constant, have focused on medical decisions. One study explored how treatment

acceptance varied across assigned decision-maker roles (Zikmund-Fisher, Sarr, Fagerlin, and Ubel, 2006). Participants responded to two hypothetical scenarios in which they had to respectively decide whether to accept chemotherapy and an influenza vaccine, both of which were presented as posing less risk to mortality than rejecting treatment. Those adopting the role of ‘parent’ to the patient were more likely to accept treatment than those in the ‘self’ role, but less likely than those in ‘physician’ or ‘medical director’ roles. Participants in this study were neither parents nor health professionals, and so responses may have captured expectations of role-appropriate decision-making, rather than accurately reflecting parents’ real-world decisions.

The present study was designed to investigate whether parents make more risk-averse health decisions for their children than for themselves, when controlling for risk magnitude. Parents responded to hypothetical scenarios describing deadly influenza strains and indicated whether they would accept an effective influenza vaccine, which carried a variable but small risk of death, for themselves or on behalf of their child. To explore whether effects could be attributed specifically to focusing on one’s child, we included a third ‘risk target’ (one’s own elderly parent) as a comparator. Influenza vaccination was chosen because it was deemed realistic: during pandemics, vaccinations are offered to people of all ages, and so parents, their children, or their elderly relatives may feasibly be advised to be vaccinated.

Work on personal risk perceptions shows that people are sensitive to risk magnitude (e.g. Weinstein, Kwitel, McCaul, Magnan, Gerrard, and Gibbons, 2007), and so will be less likely to vaccinate where non-vaccination risks are low. As a test of our risk magnitude manipulation, we predicted that:

Hypothesis 1: Participants will be more likely to accept the vaccine as the risks associated with non-vaccination increases.

Parents have been shown to be attentive to even small risks when making decisions for their

child (e.g. Gardner et al., 2010). Hence, we hypothesized that:

Hypothesis 2: Participants will be more likely to accept the vaccine for their child than for themselves, or for their parents.

Hypothesis 3: There will be an interaction between risk magnitude and risk target: participants will be as likely to vaccinate their child against a low non-vaccination risk as for high non-vaccination risk, but this will not be the case when deciding for oneself or for one's parent.

Method

Participants

Participants were recruited to an online study through two channels: distribution at seven London parent-and-toddler groups of leaflets advertising the study, and via advertisements circulated online on four UK parenting forums (www.thebundlejungle.com; www.homedad.org.uk; www.mumsnet.com; www.netmums.com), social networking sites (Facebook, Twitter), and via email to staff and postgraduate students at University College London, and the UK Psychology Postgraduate Affairs Group mailing list. (Due to researcher error, the number of participants recruited from each source was not recorded.) Each participant was given an entry into a £25 (\$40) cash prize draw. Leaflet and email recipients were encouraged to forward details to eligible others, and a separate cash prize of £25 (\$40) was awarded to the person who recruited most participants in this way (see Gardner, 2009).

Participants were eligible for inclusion if they were aged 18 or above, parent to at least one child, with at least one living parent. Of 303 people who started the study, 51 (16.8%) were removed for failing to respond to all scenarios, and seven participants (2.3%) were deleted due to multiple entries from the same IP addresses. The final sample comprised 245 participants (219 female), aged 21 to 61 years ($M = 38$ years, $SD = 9$ years). Most were educated to undergraduate level or above (170, 69.4%), with 56 participants (22.9%)

educated to high-school level or lower, 2 (0.8%) with no formal qualifications, and 17 (6.9%) of 'other' education status. Most participants were employed (79 full time, 32.2%; 60 part-time, 24.5%; 23 self-employed, 9.4%), 27 (11.0%) were full-time and 10 (4.1%) part-time students, 41 (16.7%) were unemployed, and five (2.0%) were retired. Most participants were of White ethnicity (219; 89.4%), 15 (6.1%) were Asian, and 11 (4.4%) were of Black, Mixed or Other ethnicity.

Given a lack of research in this area, insufficient effect size information was available for a priori power analysis. The UCL Research Ethics Committee approved the study (reference 3754/001).

Design and Procedure

A within-subjects design was used. Participants completed an online task comprising nine hypothetical scenarios, which described one of three influenza strains (which differed in mortality *risk level*: low, medium, high), relating to one of three '*risk targets*' (self, child, parent). To account for potential order effects, participants were assigned to one of three conditions, which differed according to the sequence in which risk targets were presented (child-parent-self; parent-self-child; or self-child-parent). Risk level was presented in the same order in all conditions (high-medium-low). A study URL was created which, when clicked upon, randomly directed participants to one of the three conditions: 76 (31.0%), 89 (36.3%), and 80 (32.7%) of the final 245 participants were in conditions one, two, and three, respectively. There were no differences between conditions in age, gender, or education.

Vaccination choice task

Scenarios described influenza strains which varied according to the risk of death posed by non-vaccination (low risk: 2%; medium risk: 5%; high risk: 10%), and the target of the risk ('you'; 'your three-year-old child'; or 'your parent', described as having "mild cognitive impairment which has affected their ability to make their own health decisions").

Risks were presented both as percentages (e.g. ‘2%’) and frequencies (‘2 out of 100’). Risk levels were based on previous research (Zikmund-Fisher et al, 2006), while mirroring real-world mortality rates (World Health Organisation, 2010). Only the risk of rejecting the vaccine was manipulated in the scenarios: the risk posed by vaccination acceptance was kept constant at 1% in all scenarios, to ensure vaccination was always the less risky option.

In each scenario, participants were told to “*imagine that there is a deadly flu going around*” and that “*an expert doctor has assessed [e.g. you], taking into account [your] medical history. The doctor says that [you] have a [e.g. 5%] chance of contracting and dying from the virus. A new flu vaccine has been developed which is effective in preventing an individual from contracting the virus. The doctor says that there is a 1% (1 out of 100) chance that this vaccine could cause death in [your] case*”. Two response options were given: acceptance (“*I would [take / give] the vaccine and accept the 1% (1 out of 100) chance that [e.g. I] could die from the vaccine*”) and rejection (“*I would not [take / give] the vaccine and accept the [e.g. 5%] chance that [I] could die from the flu*”).

Analysis

Generalized estimating equations (GEE) were used to model changes, as they are more robust to missing data and violations of the sphericity assumption than standard repeated-measures ANOVA (Krueger and Tian, 2004). As outcome data were binary (vaccination acceptance vs rejection), a logit link function and Akaike’s Corrected Information Criterion were used to select the most appropriate repeated covariance structure for the model to provide best fit to data. Socio-demographic covariates were included in the GEE to control for potential confounding, and a sensitivity analysis excluding these covariates confirmed the robustness of observed effects. Statistical significance was set at $\alpha=0.05$ and, where appropriate, adjusted in post-hoc analysis for multiple comparison using the sequential Sidak correction.

Results

Raw percentages indicated that 38.4% of participants vaccinated at low, 58.5% at medium, and 75.0% at high risk, and that acceptance was higher for one's child (61.1%), than one's parent (56.3%) or oneself (54.4%; see Table 1). These tendencies were confirmed by main effects for risk level (Wald $\chi^2(2) = 155.73$, $p < .001$) and risk target (Wald $\chi^2(2) = 21.36$, $p < .001$).

INSERT TABLE 1 HERE

Post-hoc pairwise comparisons (p 's $< .001$) confirmed that vaccination acceptance was greater where non-vaccination risk was high relative to low or medium, partially supporting Hypothesis 1. In support of Hypothesis 2, participants were more likely to vaccinate their child than either themselves ($p < .001$), or their parent ($p = .002$), but there were no differences in acceptance for one's parent versus oneself ($p = .32$). Contrary to Hypothesis 3, there was no interaction between risk level and risk target (Wald $\chi^2(4) = 5.76$, $p = .22$): for each risk target, vaccination acceptance was greatest for high non-vaccination risk.

Discussion

This study investigated whether parents make different risk-based decisions for their children than for themselves. Results showed that parents were more willing to vaccinate their children than themselves. Vaccine acceptance rates for a 'control' risk target – one's own parent – did not differ from those for oneself, but were significantly lower than those for children. This suggests that the observed effect was located in greater willingness to vaccinate one's child, rather than a decreased willingness to vaccinate oneself. Risk perceptions were nonetheless important when deciding for children, as participants were more willing to vaccinate themselves, parents and children as non-vaccination risks increased. These findings require validation via replication using more rigorous methods, with more

sophisticated controls for possible order effects, and more demographically diverse samples. Nonetheless, given the lack of systematic exploration of self-child differences when processing health risks, our study provides evidence for a hypothesis which, if supported by future research, would have important implications for theory and practice.

The present study does not explain why any self-child differences in health risk decision-making should occur. It may be that parents attend to different types or quantities of information when making decisions for their children than when doing so for themselves. Parents prioritise protecting their children and feel a strong sense of responsibility when making health decisions for them (Stewart, Pyke-Grimm and Kelly, 2012), and so potential negative outcomes for one's children may be more salient, or weighted more heavily in the decisional process. Risk-based decision-making is thought to involve a strong affective component (e.g. Loewenstein, Weber, Hsee, and Welch, 2001). Parents may perhaps experience heightened anticipatory emotions (e.g. fear, worry) when considering health threats to their children, or anticipate greater negative emotions arising from their children experiencing a negative health event as a result of their rejection of a vaccine. Findings may alternatively reflect self-presentation concerns, with parents wanting to appear more conservative when deciding for children because they view greater risk sensitivity as role-appropriate. One study of MMR vaccination acceptance found that, in addition to weighing the health costs and benefits arising from vaccination, parents considered social costs, such as being perceived as an irresponsible parent if they rejected the vaccine (Casiday, 2007). No measures were taken of emotional activation, role expectancies, nor social desirability, and so these possible explanations cannot be tested. Future work could use 'think aloud' interviewing procedures to explore the reasoning underlying risk-based decisions on behalf of others at the moment that they are made.

If self-child differences in risk-based decision-making were confirmed by further research, they would have important theoretical and practical implications. Parents' decisions remained sensitive to risk magnitude, such that they were more willing to vaccinate all targets as non-vaccination risks increased, and so threat perceptions remain important when making decisions for children. Nonetheless, there may be systematic differences in risk tolerance thresholds according to whether risks are faced by oneself or one's child. From a practical perspective, health communication approaches could perhaps be better targeted according to whether health risks were faced by oneself or one's children. Child vaccination promotion messages might most fruitfully focus on the non-vaccination risks posed to the child requiring vaccination, rather than to risks posed to other children through reduced herd immunity. Conversely, parents might be more persuaded to vaccinate themselves, or to engage in health behaviour more broadly, by messages emphasising the negative impacts that their own failure to engage in such health-promoting behaviour could have on their children.

Study limitations render our results tentative. First, results may be confounded by vaccination acceptability. We chose to focus scenarios on influenza vaccination because we assumed that it would minimize the risk of results being influenced by negative parental attitudes towards the vaccine, as have been documented towards the MMR vaccine (Gardner et al, 2010). Yet, parental resistance to vaccination more broadly has been documented in the UK and other European countries (Blume, 2006), and even parents that choose to vaccinate may worry about vaccine safety and side effects (Harvey, Good, Mason, and Reissland, 2013). No measures were taken of attitudes towards the influenza vaccine, or towards vaccination more generally, and so assumption could not be tested. Relatedly, influenza is likely to be more familiar to parents than other diseases requiring vaccination, and so parents may have more personal experience and knowledge to inform influenza vaccination decisions than for other vaccinations (e.g. Yaqub, Castle-Clark, Sevdalis, and Chataway, 2014). For

these reasons, it is unclear whether any self-child effect would generalize to non-influenza vaccination settings, let alone other risk-relevant health behaviour domains. **Second, we used minimal information scenarios to assess decision-making based solely on risk perceptions, and so it remains unclear how much weight self-child effects may have in determining real-world decisions. A core assumption underpinning the scenarios was that participants would view vaccination as necessary to minimise infection risk, but even where influenza is viewed as serious, individuals may choose protective measures other than vaccination (Mo and Lau, 2014). People may also discount health threats because they believe, erroneously, that engaging in health behaviours irrelevant to those health threats will mitigate the risks (Ernsting, Schwarzer, Lippke, and Schneider, 2013). Future work should examine the contribution of self-child effects to vaccination decision-making in real-world contexts.** **Third,** recruiting via parenting forums and university-based networks is likely to have biased our sample towards higher-educated parents. Findings may not generalise to less educated parents. Most participants were mothers, and it is possible that observed effects are gender-specific. **Fourth,** while the ordering of risk targets was counterbalanced, risk level order effects were not controlled. In all sequences, the first scenario described a high non-vaccination risk, which may have set an anchor point around which subsequent risk perceptions were adjusted (Tversky & Kahneman, 1974). More sophisticated controls for order effects were not employed because they would have required many more scenario sequences and a larger sample.

Notwithstanding these limitations, the present study provides evidence of a possible systematic difference in health risk decision-making, depending on whether the decision is made for oneself or one's children. These findings warrant further investigation using more methodologically rigorous designs among larger samples, accounting for self-presentation concerns, across vaccination settings and health behaviour domains. If replicated, **and shown**

to make a meaningful contribution to decision-making in real-world contexts, these findings would have important implications for understanding risk decisions in health behaviour, and the development of effective health promotion interventions among those with responsibility for children.

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Table 1. Percentage of participants willing to vaccinate in each scenario

Risk Level	Risk Target			% across risk targets
	<i>Self</i>	<i>Child</i>	<i>Parent</i>	
	N (%)	N (%)	N (%)	
Low	89 (36.3%)	105 (42.9%)	88 (35.9%)	38.4%
Medium	131 (53.5%)	154 (62.9%)	145 (59.2%)	58.5%
High	180 (73.5%)	190 (77.6%)	181 (73.9%)	75.0%
% across risk levels	54.4%	61.1%	56.3%	

N = 245. Each participant completed each of the nine scenarios (3 [risk target] x 3 [risk level]), so that percentages within each cell are proportions of all 245 participants. Hence, neither row nor column sums total 245.