Social Science & Medicine 106 (2014) 75–82

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Does incentivising pill-taking 'crowd out' risk-information processing? Evidence from a web-based experiment☆

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ARTICLE INFO

Article history:
Available online 31 January 2014

Keywords:
Financial incentives
Risk-information
Side-effects
Risks
Pill-taking
Health incentives
Medication adherence

ABSTRACT

The use of financial incentives for changing health-related behaviours raises concerns regarding their potential to undermine the processing of risks associated with incentivised behaviours. Uncertainty remains about the validity of such concerns. This web-based experiment assessed the impact of financial incentives on i) willingness to take a pill with side-effects; ii) the time spent viewing risk-information and iii) risk-information processing, assessed by perceived-risk of taking the pill and knowledge of its side-effects. It further assesses whether effects are moderated by limiting cognitive capacity. Two-hundred and seventy-five UK-based university staff and students were recruited online under the pre-text of being screened for a fictitious drug-trial. Participants were randomised to the offer of different compensation levels for taking a fictitious pill (£0; £25; £1000) and the presence or absence of a cognitive load task (presentation of five digits for later recall). Willingness to take the pill increased with the offer of £1000 (84% vs. 67%; OR 3.66, CI 95% 1.27–10.6), but not with the offer of £25 (79% vs. 67%; OR 1.68, CI 95% 0.71–4.01). Risk-information processing was unaffected by the offer of incentives. The time spent viewing the risk-information was affected by the offer of incentives, an effect moderated by cognitive load: Without load, time increased with the value of incentives (£1000: $M = 304.4$sec vs. £0: $M = 37.8$sec, $p < 0.001$; £25: $M = 66.6$sec vs. £0: $M = 37.8$sec, $p < 0.001$). Under load, time decreased with the offer of incentives (£1000: $M = 48.9$sec vs. £0: $M = 132.7$sec, $p < 0.001$; £25: $M = 60.9$sec vs. £0: $M = 132.7$sec, $p < 0.001$), but did not differ between the two incentivised groups ($p = 1.00$). This study finds no evidence to suggest incentives "crowd out" risk-information processing. On the contrary, incentives appear to signal risk, an effect, however, which disappears under cognitive load. Although these findings require replication, they highlight the need to maximise cognitive capacity when presenting information about incentivised health-related behaviours.

Introduction

Financial incentives are increasingly being considered and used in health policies in the UK and elsewhere, in an attempt to improve health-related behaviours (Le Grand, 2008; Marteau, Ashcroft, & Oliver, 2009). They have been used most often in low and middle income countries as part of programmes which aim to reduce poverty and health inequalities. These programmes use conditional cash transfers that are delivered to families, if certain health and educational behaviours have been performed (Lagarde, Haines, & Palmer, 2007). They have also been used in high-income countries to target some health behaviours, including tobacco use, unhealthy eating and lack of physical activity (e.g. APM Health Europe, 2007; North East Essex NHS Trust, 2009), as well as poor management of chronic conditions (e.g. Claassen, Fakhoury, Ford, & Priebe, 2007; World Bank, 2008). Most financial incentive schemes involve the offer of a reward, such as a cash payment, a voucher or a prize, which is delivered if a pre-specified behaviour or outcome has been achieved. Other schemes involve the use of a 'deposit-contract' whereby individuals pledge their own money, which they lose if they fail to meet their goals.

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http://dx.doi.org/10.1016/j.socscimed.2014.01.020

Unlike most interventions designed to change health behaviours, the use of financial incentives raises particular concerns regarding their potentially adverse effects on the quality of people's decisions to engage in incentivised behaviours. This is particularly relevant to behaviours associated with adverse side-effects, such as taking certain medicines, receiving immunisation, and attending screening appointments. The specific concern is that the prospect of receiving a financial reward could result in the risks associated with an incentivised health behaviour being overlooked (Marteau et al., 2009). There are two possible ways this could occur: first, financial incentives might lead people to ignore or not process risk-information; second, people offered financial incentives might process risk- information but might not feel that it applies to them, and therefore continue to perceive the risks to themselves as low compared to those not offered incentives. Results from a recent randomised controlled trial, in which teenage girls were offered shopping vouchers worth £45 (€56; $73) for undergoing three doses of the HPV vaccination, did not find the offer of financial incentives to undermine the quality of people's decisions to engage in an incentivised health-related behaviour (Mantzari, Vogt, & Marteau, in press). These conclusions were based on an assessment of girls' ability to make informed choices, as measured by their attitudes towards the HPV vaccination and their knowledge of the HPV vaccination's consequences on health. Knowledge of the vaccination's adverse side-effects was not assessed. Consequently, findings do not allow inferences to be made about whether or not the offer of a financial reward results in the risks associated with the incentivised behaviour being overlooked (Marteau et al., 2009).

We are unaware of any studies that have assessed the impact of financial incentives on the processing of risk-information associated with an incentivised health-related behaviour. Research within two conceptually analogous domains could help elucidate the uncertainty. The first involves the use of payments for live organ donations, which have been criticised for undermining donors' ability to calculate the related risks (e.g. Becker & Elias, 2007; Olbrisch, Benedict, Haller, & Levenson, 2001). Partial support for this claim derives from studies investigating the economic and health consequences of selling kidneys in India (Goyal, Mehta, Schneiderman, & Sehgal, 2002) and Pakistan (Naqvi, Ali, Mazhar, Zafar, & Rizvi, 2007). Findings show that the majority of vendors were very poor and sold their organs to pay off debts, but would not recommend others to do the same. This could be taken as an indication of regret and interpreted as sellers having been unaware of the negative consequences associated with organ donation. It is not clear, however, whether that was because they were inadequately informed of the likely outcomes or because the prospect of money led them to ignore the risks or perceive them as not being applicable to them. Recent research shows that as the risk of renal failure increases, individuals become less willing to donate kidneys, regardless of the level of payment offered, therefore suggesting that financial incentives do not blind people to the risks of living kidney donation (Halpern et al., 2010).

The second related research area involves the use of financial incentives for participation in research, including clinical trials. Payments increase individuals' willingness to participate in research (Bentley & Thacker, 2004; Singer, Groves, & Corning, 1999; Slomka, McCurdy, Ratliff, Timpson, & Williams, 2007). They have, however, been criticised for being undue inducements (Dickert & Grady, 1999) that alter decision-making processes, such that the side-effects of participating are not fully considered (Dickert, Emanuel, & Grady, 2002), and risks are overlooked (Grant & Sugarman, 2004; London, 2005), thus leading individuals to expose themselves unwittingly to the possibility of harm (McNeill, 1997). These concerns are largely hypothetical with the evidence about how participation payments influence perceived risk and decision-making processes being scarce. The few studies that have been conducted in the area suggest that compensation does not lead people to neglect research risks (Bentley & Thacker, 2004; Dunn, Kim, Fellows, & Palmer, 2009; Halpern, Karlawish, Casarett, Berlin, & Asch, 2004; Singer & Couper, 2008). Specifically, it has been found that people make rational trade-offs between risk and benefit. Although they are willing to accept more risk in return for more money, this does not blind them to risk or distort their judgments (Bentley & Thacker, 2004; Dunn et al., 2009; Halpern et al., 2004; Singer & Couper, 2008). On the contrary, participation payments could signal risk and increase vigilance and information seeking when the amount offered is high. In one study, participants were allocated to view information regarding either a trial that involved drawing blood or a trial that involved Transcranial Magnetic Stimulation and were offered either $25, $100 or $1000 for participation. Findings showed that compared to the low-payment scenarios, the offer of a high payment (i.e. $1000) increased participants' willingness to participate, but also increased perceived risk and the time they spent viewing the risk-information (Cryder, London, Volpp, & Loewenstein, 2010).

Although the above findings highlight some of the potential effects of financial incentives on the processing of risk-information, certain limitations associated with the design of the studies do not allow firm conclusions to be drawn. These include first, a failure to incorporate conditions of no payment, which prevents an assessment of the absolute effect of financial incentives on risk-information processing; second a lack of measures of individuals' knowledge of risks. It has been suggested that when motivated by cash payments, individuals may have less interest in assessing or comprehending study details, reading consent forms or attempting to understand the research aims and related risks (Grady, 2005). Accordingly, an assessment of the impact of financial incentives on individuals' knowledge of risks is essential. A third limitation of existing studies stems from the reliance on hypothetical scenarios, of which participants were aware. Only one study (Cryder et al., 2010) led individuals to believe that they were responding to information of an actual trial, in which they could participate.

In addition to the above, to our knowledge no studies have assessed the potential role of limited cognitive capacity on the impact of financial incentives on risk-information processing. In real-life situations, the cognitive resources of some people invited to decide about engaging in incentivised behaviours are often overloaded with matters of daily living. Cognitive capacity can also be affected by the way in which information (e.g. the design and format) about the potential adverse consequences of incentivised health-related behaviours is given, which could overload working memory, thus inducing cognitive load and reducing the amount of cognitive resources available for processing the informational content (Chandler & Sweller, 1991; Sweller, 1994; Sweller, Van Merrienboer, & Paas, 1998). Consistent with the assumptions of "dual-processing" models of decision-making (e.g. Strack & Deutsch, 2004), findings demonstrate that cognitive load inhibits activation of the reflective system that generates behavioural decisions based on reasoning, judgment and knowledge about facts and values and increases activation of the impulsive system that elicits behaviour through associative links (Hinson, Jameson, & Whitney, 2002; Shiv & Fedorikhin, 1999). Consequently, under cognitive load, people have less ability to process risks and rely on heuristics to make satisfactory decisions with minimal effort (Friese, Hofmann, & Wänke, 2009; Hofmann, Gschwendner, Friese, Wiers, & Schmitt, 2008; Whitney, Rinehart, & Hinson, 2008). From this it seems possible that the potential adverse effects of financial incentives on risk-information processing are amplified under conditions of cognitive load.