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A Cross-Cultural Investigation of the Lifestyle Factors Affecting Laypeople's Allocation of a Scarce Medical Resource

Agathe Nguyen Huynh[1], Adrian Furnham[2*], Alastair McClelland[1]

[1]Department of Experimental Psychology, University College London, London, UK
[2]Norwegian Business School (BI), Olso, Norway
Email: *adrian@adrianfurnham.com

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Abstract

This study investigates how lifestyle factors affect laypeople's allocation of a scarce medical resource and explores cross-cultural differences in ethical decision-making between the UK, France and Switzerland. A total of 193 participants completed an online questionnaire in which they had to rate the profiles of 16 hypothetical patients in terms of priority for access to kidney dialysis. Each profile was a unique combination of the following lifestyle factors: smoking behaviour, alcohol consumption, weight and amount of physical activity. As predicted, it was found that non-smokers were favoured over smokers, moderate drinkers over heavy drinkers, normal weight patients over obese patients and frequent exercisers over infrequent exercisers. However, contrary to our predictions, no cross-cultural differences were evident. The potential impact of these findings with respect to the formulation of guidelines for allocating scarce medical resources is discussed.

Keywords

Allocation, Kidney Dialysis, Smoking, Alcohol, Weight, Addiction

1. Introduction

When the demand for a particular medical resource exceeds the supply, the resource is considered "scarce". A classic example of a scarce medical resource is donor organs. In the last twenty years, the number of people waiting for an organ transplant has increased by more than 30% in the UK [1] and doubled in the US [2]. When a resource is scarce, decisions have to be made as to who will and who will not have access to it. Such decisions have major implications, as allo-

cating a medical resource to a patient means it is withheld from another, which could mean the difference between life and death.

1.1. Lack of Guidelines for Allocation Decisions

Philosophers have had wide-ranging discussions as to how allocation decisions of scarce healthcare resources should be made [3]. Some have argued that such decisions should be based on the *egalitarian* principle, which states that all individuals are of equal worth and that resources should be allocated randomly (e.g., lottery, first-come-first-served) [4]. On the other hand, supporters of *utilitarianism* have argued that the allocation should provide the greatest good for the greatest number. This could mean allocating scarce medical resources to save the most lives (*i.e.*, favour the ones with the highest chance of survival) but could also be interpreted in terms of maximizing long-term benefits for society by favouring patients with the highest social usefulness (e.g., doctors, parents) [5]. Egalitarianism and utilitarianism are the two main ethical viewpoints in the literature. However other principles have been added such as the *maximin* (or *prioritarianism*) principle, according to which allocation should maximize the benefit of the worst-off (e.g., the youngest, the sickest) or the *desert* (or *reciprocity*) principle, which states that allocation should take into account how much effort the patient has made to contribute to society (e.g., by avoiding being ill) [3] [6] [7].

Countries often do not have clearly defined guidelines for allocating scarce medical resources. In the UK, the National Institute for Health and Care Excellence (NICE) is the closest to a central decision-maker for allocating resources within the NHS but it only deals with macro-allocation, which consists of distributing resources to groups (e.g., which hospital should receive which medicine or machine) [8]. There is no central guidance for micro-allocation decisions, which consist of distributing resources to specific individuals [9].

Micro-allocation decisions are mostly in the hands of doctors and nurses [10]. However, they are not qualified nor guided in their decision-making, which leads to large individual differences in the way they allocate resources. For example, when twenty-five nephrologists were asked to reject 10 out of 40 patients for a kidney transplant, no single patient was rejected by all of them [11]. However, doctors seem to be conscious that their decisions are sometimes somewhat arbitrary and report wanting help to review them according to ethical standards [12]. This suggests that they would make use of guidelines if they were available.

1.2. Laypeople's Beliefs on the Criteria Currently Used for Allocation

Psychological studies have been conducted to investigate the criteria used when laypeople allocate scarce medical resources. They found that these criteria were sometimes different from the ones advised by philosophers and health economists [9].

Health economists mainly promote the utilitarian principle of maximizing

cost-effectiveness by favouring individuals who have the highest chance of surviving after the treatment [13]. However, when laypeople were asked to allocate donor livers to hypothetical patients who either had a 70% or a 30% chance of survival after surgery, less than a fifth were willing to abandon the patients with a poor prognosis by allocating all organs to those with a better prognosis [14]. In a even more striking rejection of this principle, laypeople were asked to rate the priority for funding the heart treatment of 16 hypothetical patients, and it was found that participants did not show a preference for patients with an 80% chance of survival compared to patients with a 50% chance of survival [15].

Some philosophers have suggested including the concept of quality of life in this utilitarian principle by taking into consideration the patient's mental health and potential disability after the treatment [16]. This led to the development of a measurement tool called a Quality Adjusted Life Year (QALY), which is currently used by NICE [17]. Again, the general public does not seem to agree with this principle. When laypeople were asked to allocate funding for treatment to one of two groups, a significant proportion of participants did not choose the highest QALY group [18].

These studies indicate that the general public is not satisfied with allocating scarce medical resources solely on the basis on prognosis, even when this includes a notion of quality of life.

1.3. Beyond Prognosis: Personal Characteristics

More recent studies have investigated whether laypeople would rather base their allocation decisions on criteria other than prognosis. For example, in one study the researcher asked participants to choose between groups, which not only varied in their chance of survival after the transplant but also with respect to personal characteristics such as 1) age, 2) time spent on the waiting list, 3) previous transplants and 4) cause of liver disease; he found that participants not only allocated more livers to patients who had a better chance of survival, but also to those who were young, had been on the waiting list for longer, had never been transplanted and whose liver disease was not caused by alcohol abuse [19]. Similarly, another researcher asked laypeople to choose the percentage of a budget they would be willing to give for the treatment of groups of patients which varied in term of 1) life expectancy, 2) quality of life after treatment, 3) age, 4) socioeconomic status (SES), 5) whether they had received costly treatment before and 6) how healthy their lifestyle was; again, they found that all the variables significantly influenced participants' allocation [20]. This suggests that laypeople are willing to sacrifice some cost-effectiveness (*i.e.*, allocating resource to maximise survival) for a gain in fairness (e.g., allocating resources to the youngest who has more time to live or to the poorest who does not have the financial means to pay for private healthcare).

However, these studies are not easily comparable, as participants were sometimes asked to allocate funding, as opposed to actual resources (e.g., organs). Moreover, participants were asked to choose between groups rather than indi-

vidual patients. Yet it is this micro-allocation of resources which confronts members of the medical profession, and which needs to be investigated. Finally and importantly, these studies only investigated some characteristics (e.g., age, SES, responsibility for illness) when laypeople's conception of fairness might include many more factors.

Some of the shortcomings of these studies have been addressed by a series of experiments conducted by Furnham and his colleagues [21]-[27] (see also studies by Wiseman [28] [29]). They investigated laypeople's allocation of scarce medical resources to individual patients who differed on a number of personal characteristics. All experiments used a very similar methodology: participants read the story of a hospital, which had more patients requiring a kidney dialysis than time available on the machine, were shown a list of hypothetical patients and were asked to choose the one they thought was most deserving of the treatment. They then ranked the rest of the patients in order of priority. Each patient's profile was a unique combination of the different personal characteristics under investigation e.g., "Lorna, 24, earns 35,000 pounds a year, has two children and is a smoker" (Furnham *et al*., 2002, p. 195) [26]. There were usually four variables, each with two levels and combined in a factorial manner, leading to 16 patient profiles.

It is clear that some of the factors, which affect laypeople's allocation decisions, revolve around the patients' lifestyle. For example, laypeople prefer non-smokers to smokers, non-drinkers to drinkers and normal weight patients to overweight patients. These findings echo those in studies of public opinion discussed above. Patients whose liver disease was induced by an excessive consumption of alcohol were significantly less likely to be chosen for transplant than patients whose liver disease occurred through no fault of their own [19]. Similarly, laypeople were less likely to fund the treatment of patients who were described as having an unhealthy lifestyle, even when the role of lifestyle in causing the disease was not stated [15] [20].

The use of lifestyle as a criterion for healthcare allocation is very prevalent since the rise of so called "non-communicable diseases" [30]. For example, in the UK, a third of clinical commissioning groups (CCGs), NHS bodies in charge of allocation decisions at the local level, advise doctors to delay or deny surgery for smokers and obese patients unless they stop smoking or lose weight [31]. Moreover, private insurers are multiplying their "pay as you live" programmes in which they monitor their clients' health behaviours (e.g., daily footstep measured by smartphone) to adapt the prices of their premium [32].

However, little is known about *which specific* lifestyle factors they are willing to take into account. Furnham and colleagues mostly focused on the influence of smoking (investigated in five studies) but alcohol and weight were only investigated once and other factors such as physical activity or diet were completely omitted. Moreover, these lifestyle factors were almost never studied together. Therefore the magnitude of their combined effect on allocation decisions could not be evaluated.

Further, some methodological flaws in the studies by Furnham and colleagues could have led to biased responses from participants. For example, a failure to specify that patients all had the same chance of benefiting from the treatment [22] [23]. Hence non-drinkers and normal weight patients might have been preferred because participants believed they were more likely to recover from the treatment than drinkers or overweight patients. Moreover, patients were typically given first names. This revealed their gender but also gave an indication of their origin and social category, which have both been shown to influence laypeople's allocation decisions [33] [34].

Finally, previous research mostly interrogated British and American samples. Yet, there could be differences in the criteria used by other nationals. Indeed, the only cross-cultural study conducted in 2002, did find a cultural difference; British participants discriminated against smokers, but this was not the case for Spanish participants [33]. This was explained by a difference in smoking prevalence in the two countries; at the time there was a much higher consumption of cigarettes in Spain than in the UK. However further cross-cultural research is clearly needed to establish international guidelines for scarce medical resources allocation.

Therefore, the aim of this study was to investigate which lifestyle factors affect laypeople's allocation of a scarce medical resource (kidney dialysis) and to explore cross-cultural differences in ethical decision-making between the UK, France and Switzerland. To address the flaws of past experiments, patients were not given names but *initials* and it was made clear that they all had the *same probability of having a successful dialysis*. Participants were presented with 16 patient profiles and were asked to rate each patient's priority for access to kidney dialysis, and each profile was a unique combination of the following factors smoking, alcohol consumption, weight and physical activity. Three additional follow-up questions assessed the participants' perception of the responsibility of the patients for their behaviour and for their illness.

1.4. Hypotheses

1) Main effects

H1. Non-smokers would be favoured over smokers.

H2. Participants described as drinking half the maximum recommended amount of alcohol per week would be favoured over patients described as drinking twice the maximum recommended amount.

H3. Patients described as having a normal weight would be favoured over patients described as obese.

H4. Patients described, as exercising twice the recommended amount per week would be favoured over patients described as exercising half the recommended amount per week.

2) Interactions

H5. There would be an interaction between nationality and smoking behaviour. Non-smokers would be favoured over smokers but this effect would be

moderated by smoking prevalence, *i.e.*, the effect would be larger in the UK (smallest prevalence) than in Switzerland and larger in Switzerland than in France (largest prevalence)[1].

H6. There may be an interaction between nationality and alcohol consumption, given that France has the highest alcohol consumption[2], the UK has the highest prevalence of alcohol use disorders[3] and Switzerland has the least restrictive laws[4].

2. Method

2.1. Participants

The sample was composed of 193 participants (67 males, 124 females and two who did not wish to disclose their gender) with ages ranging from 18 to 61 years, with a mean age of 29.41 years (*SD* = 14.30 years). Fifty-one (10 males and 41 females) were British with a mean age of 29.76 years (*SD* = 4.99 years). Eleven smoked, 35 drank alcohol and 31 exercised weekly. Ninety (37 males and 53 females and one who did not wish to disclose) were French, with a mean age of 34.4 years (*SD* = 16.40 years). Thirty-five smoked, 77 drank alcohol and 66 exercised weekly. Fifty-two (20 males and 31 females and one who did not wish to disclose) were Swiss, with a mean age of 28.10 years (*SD* = 13.33 years). Eighteen smoked, 45 drank alcohol and 40 exercised weekly. This was a convenience sample with the majority of participants recruited online via social media, and through the UCL Psychology Subject Pool (SONA). A power analysis suggested that the sample size was adequate. Data cleansing meant that a number of participants were dropped either because they failed to complete the task, did so impossibly quickly or seemed to be erratic in their responses.

This study received ethical approval from the Ethics Chair in the UCL Department of Experimental Psychology (EP: 2018/007).

2.2. Questionnaire

1) Patient profiles

Sixteen unique patient profiles were generated by combining each of the two levels of the four within participant variables together in a factorial manner. The different attributes were presented on the screen separated by comas and preceded by randomly generated initials (e.g., "A.L. smokes cigarettes, drinks half the maximum recommended amount of alcohol per week, is obese, exercises twice the recommended amount per week"). In contrast to the majority of previous research using this paradigm, participants rated rather than ranked the pa-

[1]WHO age-standardized estimated prevalence of smoking among those aged 15 years or more is: 30% in France, 22.7% in Switzerland and 18.8% in the UK [35].

[2]Alcohol per capita (aged 15+) is 12.2 litres of pure alcohol a year in France, 11.6 litres in the UK, and 10.7 litres in Switzerland [36].

[3]The prevalence of alcohol use disorders and alcohol dependence is 11.1% in the UK, 8% in Switzerland and 5.5% in France [36].

[4]In Switzerland, the legal drinking age is 16 and there is no restriction on selling alcohol after a certain time or to intoxicated people [36].

tient profiles. Although adequate for testing within participants variables, rankings cannot be used when between participants variables are manipulated. Each profile was followed by a 1 to 7 Likert scale. To avoid ceiling effects, this scale was asymmetrical in terms of the number of high and low priority response options, ranging from 1 (very low) through 4 (high) to 7 (absolutely crucial).

2) Follow up questions

The follow up questionnaire was designed to assess the participants' perception of the responsibility of the patients for their behaviour and their illness. 1: "How much do you think these factors represent a risk for kidney failure?" Participants rated each lifestyle variable from "not at all a risk factor" to "a determining cause". 2: "How easy do you think it is for smokers to stop smoking? For people who drink twice the maximum recommended amount per week to lower their consumption to the recommended amount per week? For obese people to lose weight and reach a normal weight? For people who exercise half the recommended amount per week to exercise as much as the recommended amount?" Participants rated each lifestyle variable from "very easy" to "impossible". 3: "How responsible do you think smokers are for smoking? People who drink twice the maximum recommended amount are for drinking too much? Obese people are for being obese? People who exercise half the recommended amount are for not exercising enough?" Participants rated each lifestyle variable from "not at all" to "completely".

All the materials were translated in French and then back translated to check that the translation accurately captured the meaning of the original[5]. The results were analysed by a mixed ANOVA to test the hypotheses.

2.3. Procedure

Participants were informed that their task was to rate the priority of 16 hypothetical patients for access to a dialysis machine. It was made clear that the probability of the treatment succeeding was the same for all patients. Participants were then presented with the 16 patient profiles and were asked to rate each of them on the Likert scales. The profiles were presented in a random order, all on the same page, for an unlimited amount of time. Participants then completed the follow-up questionnaire and a demographic questionnaire, in which they indicated their gender, age, nationality and whether the following statements were true for them: "I never smoke", "I never drink", "I exercise weekly".

3. Results

A 3 (Nationality) × 2 (Smoking) × 2 (Alcohol consumption) × 2 (Weight) × 2 (Physical activity) mixed ANOVA was performed on the data[6]. None of the Levene's tests were significant but Box's test for homogeneity of covariance was significant. Thus the Greenhouse-Geisser correction was used for assessing

[5]The translated material is available from the first author on request.

[6]The complete data set can be obtained from the first author on request.

F-values for the within subjects variables[7].

3.1. Main Effects

With respect to main effects, all within subject variables were significant. Participants favoured; non-smokers ($M = 4.30$) over smokers ($M = 3.74$), $F(1, 190) = 51.90$, $p < 0.001$, $\eta_p^2 = 0.22$, light drinkers ($M = 4.32$) over heavy drinkers ($M = 3.72$), $F(1, 190) = 42.84$, $p < 0.001$, $\eta_p^2 = 0.18$, normal weight patients ($M = 4.14$) over obese patients ($M = 3.92$), $F(1, 190) = 6.64$, $p = 0.011$, $\eta_p^2 = 0.03$ and frequent exercisers ($M = 4.29$) over infrequent exercisers ($M = 3.79$), $F(1, 190) = 52.84$, $p < 0.001$, $\eta_p^2 = 0.22$.

There was no main effect of nationality, $F(2, 190) = 1.27$, $p = 0.282$, $\eta_p^2 = 0.01$.

3.2. Interactions

There were four significant two-way interactions. There was a significant interaction between smoking and alcohol consumption, $F(1, 190) = 26.16$, $p < 0.001$, $\eta_p^2 = 0.12$. A simple effects analysis showed that heavy drinkers were rated significantly lower when they were smokers ($M = 3.58$) than when they were non-smokers ($M = 3.97$), $t(192) = 5.37$, $p < 0.001$. The pattern of results was the same for light drinkers, *i.e.*, they were rated significantly lower when they were smokers ($M = 4.00$) than non-smokers ($M = 4.67$), $t(192) = 7.41$, $p < 0.001$. However, the effect of smoking was greater for light drinkers ($d = 0.53$) than for heavy drinkers ($d = 0.39$).

The smoking x physical activity interaction was significant, $F(1, 190) = 7.82$, $p = 0.006$, $\eta_p^2 = 0.04$. A simple effect analysis found that infrequent exercisers were rated significantly lower when they were smokers ($M = 3.59$), than non-smokers ($M = 4.05$), $t(192) = 6.07$, $p < 0.001$. The pattern of results was the same for frequent exercisers, *i.e.*, they were rated significantly lower when they were smokers ($M = 3.98$) than non-smokers ($M = 4.58$), $t(192) = 7.19$, $p < 0.001$, but the effect of smoking was greater for frequent exercisers ($d = 0.52$) than for infrequent exercisers ($d = 0.44$).

The Alcohol × Weight interaction was significant, $F(1, 190) = 11.73$, $p < 0.001$, $\eta_p^2 = 0.06$. A simple effects analysis revealed that obese patients were rated significantly lower when they were heavy drinkers ($M = 3.72$), than light drinkers ($M = 4.19$), $t(192) = 5.49$, $p < 0.001$. The pattern of result was the same for normal weight patients; they were rated significantly lower when they were heavy drinkers ($M = 3.82$) than light drinkers ($M = 4.47$), $t(192) = 6.53$, $p < 0.001$. However, the effect of alcohol consumption was greater for normal weight patients ($d = 0.47$) than for obese patients ($d = 0.39$).

The alcohol × physical activity interaction was also significant, $F(1, 190) = 13.94$, $p < 0.001$, $\eta_p^2 = 0.07$. A simple effects analysis found that infrequent exercisers were rated significantly lower when they were heavy drinkers ($M =$

[7]Eight participants gave all patients the highest priority rating. Removing them from the data had no impact on the pattern of results. Hence the findings reported here include these participants.

3.58), than light drinkers ($M = 4.06$), $t(192) = 5.13$, $p < 0.001$. The same pattern of results was found for frequent exercisers, *i.e.*, they were rated significantly lower when they were heavy drinkers ($M = 3.96$) than light drinkers ($M = 4.60$), $t(192) = 7.08$, $p < 0.001$. However the effect of alcohol was larger for frequent exercisers ($d = 0.51$) than for infrequent exercisers ($d = 0.37$).

The analysis revealed one significant three-way interaction[8]: nationality x smoking × alcohol, $F(2, 190) = 4.85$, $p = 0.009$, $\eta_p^2 = 0.05$. Simple effects analysis found that the smoking x alcohol interaction was significant in the British sample, $F(1, 50) = 7.00$, $p = 0.011$, $\eta_p^2 = 0.12$ and in the Swiss sample, $F(1, 51) = 16.84$, $p < 0.001$, $\eta_p^2 = 0.25$. Both groups gave heavy drinkers particularly low ratings when they smoked and light drinkers particularly high ratings when they did not smoke. However the Smoking x Alcohol interaction was not significant in the French sample, $F(1, 89) = 1.54$, $p = 0.22$, $\eta_p^2 = 0.02$.

3.3. Follow-Up Questions

1) "How much do you think these factors represent a risk for kidney failure?"

There was a significant main effect of lifestyle, $F(3, 570) = 95.52$, $p < 0.001$, $\eta_p^2 = 0.34$. Using Bonferroni-corrected pairwise comparisons (familywise $\alpha = 0.05$), significant differences were found between all the means. The highest rated was alcohol ($M = 5.82$), followed by weight ($M = 5.39$), smoking ($M = 4.43$) and physical activity ($M = 3.92$). There was no evidence that the mean ratings varied as a function of nationality ($F < 1$).

There was a significant interaction between lifestyle and nationality, $F(6, 570) = 2.67$, $p = 0.016$, $\eta_p^2 = 0.03$. However, inspection of Table 1 reveals that the order of importance of the lifestyle factors was the same in the three samples: alcohol > weight > smoking > physical activity.

Table 1. Mean ratings for the first follow-up question according to nationality.

Nationality	Lifestyle factor	*M*	*SD*
British	Alcohol	6.10	0.96
	Weight	5.29	1.12
	Smoking	4.57	1.47
	Physical activity	3.69	1.33
French	Alcohol	5.63	1.58
	Weight	5.59	1.20
	Smoking	4.34	1.60
	Physical Activity	4.17	1.60
Swiss	Alcohol	5.88	1.45
	Weight	5.13	1.24
	Smoking	4.44	1.63
	Physical activity	3.73	1.36

[8]Details of interactions beyond three-way are not reported here but are available from the author on request.

2) "How easy do you think it is …?"

There was a significant main effect of lifestyle, $F(3, 570) = 144.51$, $p < 0.001$, $\eta_p^2 = 0.43$. Using Bonferroni-corrected pairwise comparisons (familywise $\alpha = 0.05$), significant differences were found between all the means except between smoking and weight, which were both rated the highest (Smoking, $M = 4.87$; Weight, $M = 4.80$), followed by alcohol ($M = 3.92$), followed by physical activity ($M = 2.73$).

There was also a significant main effect of nationality, $F(2, 190) = 3.60$, $p = 0.029$, $\eta_p^2 = 0.04$. Using the REGWQ procedure, it was found that the British participants gave lower ratings on average than the French (British, $M = 3.87$; French, $M = 4.24$). The Swiss mean rating was intermediary ($M = 4.13$) and did not significantly differ from the French or the British.

There was a significant interaction between lifestyle and nationality, $F(6, 570) = 2.81$, $p = 0.011$, $\eta_p^2 = 0.03$. Inspection of Table 2 reveals that the British and the Swiss rated the life-style factors in the same order: smoking > weight > alcohol > physical activity. However, the French rated weight higher than smoking: weight > smoking > alcohol > physical activity.

3) "How responsible do you think…?"

There was a significant main effect of lifestyle, $F(3, 570) = 104.73$, $p < 0.001$, $\eta_p^2 = 0.36$. Using Bonferroni-corrected pairwise comparisons (familywise $\alpha = 0.05$), no significant difference was found between the means for smoking ($M = 5.50$), alcohol ($M = 5.40$) and physical activity ($M = 5.54$). However, weight was rated significantly lower than each of the other lifestyle factors (M = 3.86). There was no evidence that the mean ratings varied as a function of nationality, $F(2, 190) = 1.98$, $p = 0.14$, $\eta_p^2 = 0.02$.

There was a significant interaction between lifestyle and nationality, $F(6, 570) = 2.95$, $p = 0.012$, $\eta_p^2 = 0.03$. Inspection of Table 3 reveals that the French and the Swiss rated the life-style factors in the same order: physical activity > smoking > alcohol > weight. But the British rated them in a different order: smoking > alcohol > physical activity > weight.

Table 2. Mean ratings for the second follow-up question according to nationality.

Nationality	Life-style factor	*M*	*SD*
British	Smoking	4.57	0.99
	Weight	4.45	1.12
	Alcohol	3.53	1.17
	Physical activity	2.92	1.62
French	Weight	5.06	1.15
	Smoking	4.97	0.88
	Alcohol	4.23	1.45
	Physical activity	2.72	1.44
Swiss	Smoking	5.08	1.08
	Weight	4.90	1.24
	Alcohol	3.98	1.46
	Physical activity	2.54	1.29

Table 3. Mean ratings for the third follow-up question according to nationality.

Nationality	Life-style factor	*M*	*SD*
British	Smoking	5.24	1.60
	Alcohol	5.18	1.51
	Physical activity	5.02	1.39
	Weight	4.02	1.21
French	Physical activity	5.70	1.21
	Smoking	5.63	1.30
	Alcohol	5.46	1.27
	Weight	3.73	1.28
Swiss	Physical activity	5.88	1.40
	Smoking	5.62	1.39
	Alcohol	5.56	1.29
	Weight	3.83	1.31

4. Discussion

In line with our first four hypotheses, we found that laypeople preferred: 1) non-smokers over smokers, 2) light drinkers over heavy drinkers, 3) people with a normal weight over obese people, and 4) frequent exercisers over infrequent exercisers when prioritising individuals for kidney dialysis. However, the hypothesised interactions between 1) nationality and smoking and 2) nationality and alcohol were not evident in the results.

Further inspection of the results indicated that the effect of smoking was moderated by alcohol consumption and physical activity. Non-smokers were always preferred over smokers but this preference was more marked when the patient was a light drinker or a frequent exerciser. Similarly, the effect of alcohol consumption was moderated by weight and physical activity. Light drinkers were always preferred over heavy drinkers but this preference was more marked when the patient had a normal weight or was a frequent exerciser.

Participants rated lifestyle factors in terms of risk for kidney failure in the following order (from highest to lowest risk): 1) alcohol, 2) weight, 3) smoking, 4) physical activity. It is not possible to say whether this order corresponds to the actual risk these factors represent, as lifestyle variables are only indirect causes of kidney failure and, strictly speaking, cannot be ranked in order of importance [37][9].

In terms of how difficult participants thought it was to change lifestyle factors, there was no difference between stopping smoking and losing weight, which were both considered the hardest, followed by 2) lowering one's consumption of alcohol and 3) taking the recommended amount of exercise.

[9]Renal failure could be due to diabetes and hypertension, which are strongly associated with an imbalanced diet and a lack of exercise. Moreover, it almost always occurs in connection with another medical condition such as peripheral artery disease, which is associated with smoking; or liver disease, which is associated with drinking.

Concerning responsibility for lifestyle, obese patients were considered to be less responsible for their weight than smokers, heavy drinkers and infrequent exercisers for their respective behaviours. The ratings of the three latter did not significantly differ from one another.

4.1. The Effect of Lifestyle on Allocation Decisions

The finding that participants favoured patients with a healthy lifestyle for access to a kidney dialysis is consistent with the *desert* (or reciprocity) principle, according to which people are entitled to the product of their labour in that, those who consciously maintained their health should be prioritized in a situation where medical resources become scarce [3] [7].

The effect of smoking had already been well established [24] [25] [26]. However, the effects of alcohol and weight in past studies could have been based on the participants' belief that patients were more likely to recover if they did not drink and had a normal weight [22] [23]. As participants were explicitly told that the probability of success of the dialysis was equal for all patients, the present findings indicate that laypeople prefer patients who drink moderately and have a normal weight even when they know that these factors will not affect the success of dialysis.

Despite being statistically significant, weight had a very small effect on participants' ratings. This is in contrast with previous findings that weight had a very large effect [22]. This is surprising considering that the manipulation in the present study was stronger (*i.e.*, patients were described as obese as opposed to overweight). This difference in effect size could be attributed to a change in attitudes towards obesity since the study in 2010. In recent years, awareness has been raised concerning issues associated with weight stigma [38] [39] [40]. This may have changed the general public's perception of the responsibility of obese people for their weight. Indeed, it has been shown that when people are sensitized to the difficulties associated with weight stigma, they are more likely to blame exterior influences (e.g., the government, the food industry) than individuals, for obesity [41]. Accordingly, participants in the present study considered obese people to be less responsible for their weight than any other lifestyle variable. Clearly, no causal link can be inferred from the present findings. However, they could suggest that participants took weight less into account in their allocation decisions because they were more aware of weight stigma and hence might not have considered obese individuals responsible for their weight.

There seems to be a certain coherence between the participants' assessment of responsibility for lifestyle and their allocation decisions, *i.e.*, obese people were considered less responsible for their weight than smokers, heavy drinkers and infrequent exercisers and weight had the smallest influence on allocation decisions whereas smoking, alcohol and physical activity all had large effects. In contrast, there seems to be little coherence between participants' assessment of the risk lifestyle factors represent for kidney failure and the influence of these factors on their allocation decisions (e.g., despite having the smallest effect on

allocation judgements, weight was regarded as being the second biggest risk factor). Similarly, evaluations of how difficult it is to change lifestyle factors did not accord with their effect on allocation decisions (e.g., participants believed that smoking was the most difficult lifestyle variable to stop but nevertheless strongly discriminated against smokers).

4.2. Cultural Differences

Contrary to Furnham *et al.*'s earlier findings that smoking significantly affected the allocation decisions of British participants but not Spanish participants; there was no evidence of any cross-cultural differences in the present study [26]. Yet, the differences in smoking prevalence between the countries investigated were similar to the differences between the UK and Spain at the time of Furnham and colleagues' study[10]. Moreover, participants' self-reported smoking habits seem to be representative of their countries' smoking prevalence[11]. This undermines Furnham and colleagues' suggestion that a cross-cultural difference was found because of a difference in smoking prevalence.

Alternatively, it could be argued that this cross-cultural difference was found because at the time of Furnham and colleagues' study, the anti-smoking movement was much stronger in the UK than in other European countries (e.g., they had much higher taxes on cigarette packs [42]). However, due to government interventions, differences in attitudes towards smokers between Western European countries have decreased [43]. Laypeople are generally more aware of the dangers of smoking and hence discriminate against smokers when making allocation judgements. It would be interesting to replicate Furnham and colleagues study today to see if Spanish laypeople would now discriminate against smokers.

4.3. Limitations of the Study

Despite the insights that this study provides, there are some limitations. Firstly, participants in the present and most past studies on laypeople's allocation of scarce medical resources, took decisions individually when in reality, allocation decisions are taken by committees or after receiving advice from colleagues or ethics consultants [44]. Importantly, group discussions change decisions [45]. For example, allocation decisions that were made in groups were amplified, compared to decisions made individually (e.g., smoking had a larger effect on the rankings) [25]. Therefore, the present results might not capture the complexity of real-life allocation decisions. Moreover, our findings are limited to the allocation of kidney dialysis. Indeed, research has suggested that allocation decisions can vary depending on the medical resource in question [21] [24] [26].

[10]In 2002, the prevalence of tobacco smoking amongst people over 15 years was 31.3% in the UK and 45.2% in Spain, a 14 percentage point difference (WHO, 2002) [42]. In 2015, the prevalence of tobacco smoking amongst people over 15 years old was 19.9% in the UK, 29.8% in France and 26.9% in Switzerland (WHO, 2015 [35]). This corresponds to a 10 point difference between the UK and France and a 7 point difference between the UK and Switzerland.

[11]In the present study, around 40% of the French participants, 35% of the Swiss participants and 20% of the British participants reported smoking.

4.4. Suggestions for Further Research

Patient's compliance is an important variable that could be investigated in the context of scarce medical resources allocation. Indeed, patients differ in how good they are at keeping appointments, following their doctor's advice or taking their medicine and this has been shown to influence transplant coordinators' decisions to allocate an organ to a patient [46] and decisions by health insurers to cover the cost of treatment of a patient [47]. It would be of interest to investigate whether laypeople agree with the use of this compliance criterion.

Another way to manipulate patients' responsibility for their lifestyle could be to mention their personal wealth. Indeed, having a lower income can be a barrier to behaving in a healthy manner [48]. Hence, in a future study, patients could be described as either responsible for their poor lifestyle because they could afford to be healthier or as less responsible for their lifestyle because of a lack of financial resources.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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