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Who shall live and who shall die? A factorial survey experiment on prioritizing COVID-19 patients under medical triage conditions

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ABSTRACT

During the 2020 COVID-19 pandemic expert commissions developed ethical guidelines for prioritizing assistance in the event of insufficient resources (triage). However, ethical principles may deviate from laypeople's moral standards. Our study aims to investigate which factors help laypeople justify for prioritizing a COVID-19 patient and which respondent characteristics – among them for the first time also values – moderate their impact on prioritizing decisions. The results of a factorial survey experiment conducted in Spain 2022 showed that the most important factors were the vaccination status and the smoking behavior of patients, contradicting ethical guidelines and revealing the need for better communication between experts and the public. Better communication also means incorporating laypeople's moral views in the process of developing ethical guidelines. Moreover, patients' family obligations, patients' origin, age, and social class were analyzed. Our results show that some of these factors depend on respondents' personal values (Schwartz values), vaccination context, and smoking behaviors.

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1. Introduction

Life and death are under scrutiny when critical social conditions create dilemma situations and demand to make decisions about "Who lives, who dies, who decides" (Ekland-Olson 2015; Bartolome Peral et al. 2024) both from a political perspective but even more so in concrete scenarios with competing medical, social, and ethical claims. In 2020, in the

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clinical context, expert commissions checked and further developed ethical guidelines for prioritizing medical assistance in the event of insufficient resources (triage). “Triage decisions in situations of scarce resources were not extraordinary in the pre-COVID-19 era” (Herreros et al. 2020:455) but the COVID-19 pandemic created a new large scale social context of death and dying and increased social, political, and existential insecurities.

Today, we live in a globalized world that not only allows people to travel around the globe in a matter of hours but also allows newly mutated viruses to spread rapidly around the world. During the COVID-19 pandemic, for example, 4.6 to 45.9% of affected patients required treatment. According to Cardona et al. (2021:33), in the UK, the US, and Italy, 75%, 76%, and 88% of all patients requiring intensive care ultimately received invasive treatment on a ventilator. The length of stay in the ICU for COVID-19 patients on ventilation was longer than for those with other diseases (e.g., between 8 and 14 days in Italy and between 9 and 28 days in the US). In general terms, people aged around 75 years and older have experienced high mortality rates (71.3–94.9% in the US).

When there is an imbalance between the demand for treatment and the resources available, *prioritization*—deciding who should receive treatment and who should not—becomes necessary (Archard et al. 2020:1; Herreros et al. 2020). In the context of the COVID-19 pandemic, a public debate began in many countries about situations in which overcrowded hospitals would be forced to prioritize patients for treatment given scarce medical resources (Knotz et al. 2021). Professionals in many countries, including Italy, Spain, Belgium, Germany, the UK, and the US (at the city and state level), felt the need to establish decision-making and triage protocols (Archer et al. 2020:540). Ethics committees were convened to develop guidelines for decision-making in such situations. This was done not only for reasons of transparency but also for the sake of clinicians and health professionals, who must find the best possible solution during emotionally stressful circumstances. These reach beyond the experimental and psychological “five stages of death” (Kübler-Ross, 1969) and also contradict assumptions about the “denial of death” (Becker 1973) since limited resources for patients pose inevitable questions to medical professionals in specific “limit situations” (Jaspers 1925) also occurring in contemporary welfare states and peace times and not only in war times (cf. Eagan and Messelken 2023).

Triage is part of beginning- and end-of-life issues, which create ethical dilemmas among citizens and experts because they involve our moral codes and values (Ekland-Olson 2013; Fallucchi et al. 2021). Yet, triage has remained largely uncovered even in general late modern sociological discussions on “Endings” (cf. Kearl 1989) and in the “Sociology of Death and Dying” (Howarth 2007). From a social science perspective, it is especially important to understand whether triage decisions and the underlying ethical principles are accepted by the public. This paper adds to a limited body of literature on whether the general population holds the same ethical principles that are often applied in triage protocols in situations of emergency. In this regard, the works of Bouthillier et al. (2024) for Quebec and Ontario (Canada), Daugherty Biddison et al. (2019) for Maryland (US), and Fallucchi et al. (2021) for the US contributed to analyses into both the medical and social legitimacy of triage frameworks by foregrounding ethical principles and public acceptability, underlining the importance of values in pandemic crisis, and finding substantial heterogeneity in citizens' moral views, which are often not aligned with the established medical guidelines (Fallucchi et al. 2021). Works like the one of Gradwohl et al. (2024) focused on laypeople's propensity of discrimination and ingroup favoritism in hypothetical triage decisions in the US. Knotz et al. (2021) used a conjoint experiment in Switzerland to examine not only the public's attitude toward priority access to ICU for COVID-19 patients, but also toward access to vaccine. Finally, Larsen and Schaeffer (2021) conducted a factorial survey on the Danish population's attitude toward prioritizing COVID-19 patients in the allocation of hospital beds, and Reeskens et al. (2021) conducted a conjoint experiment for the Netherlands on priority access to ICU for COVID-19 patients. Both studies contribute to the analysis of public perceptions of deservingness and are at the core of the scientific discussion in this field. To contribute in filling existing research gaps, our study aims to investigate which criteria laypeople in Spain use to justify prioritizing certain patients for treatment. While, Ekland-Olson (2015) asked "who decides" on life and death, we ask what would lay people decide.

As triage is a rather complex topic involving patients with very different characteristics, we used a factorial survey experiment (Auspurg and Hinz 2015) which allowed us to handle this complexity more realistically than with traditional scales.

In this way (cf. Figure 1), we were able to analyze not only the influence of characteristics (i.e., vignette factors) that may justify prioritizing certain COVID-19 patients (Figure *1*: I) but for the first time also whether respondents who support different human values (Figure 1: II) and respondents with different degrees of individual affectedness and responsibility (Figure 1: III) react differently to, i.e., moderate, different patient characteristics. By including respondent's self-interest and ideology (self-placement on a left-right scale), the study of Reeskens et al. (2021) is to the best of our knowledge the only one which also analyzed such cross-level interaction effects between vignette and respondent characteristics. The results of our study will help to improve our understanding of how the public perceives medical triage and whether the major principles of ethical guidelines compiled by experts are reflected in laypeople's judgment behavior, better communication about triage protocols, and increased transparency and legitimacy in the eyes of the public. With the purpose of investigating the attitudes of laypeople toward decisions on medical triage, an online survey was conducted, using an opt-in panel of 876 respondents aged 18 and older and administered in Spain in July 2022.

In the following sections, we will first present a theoretical overview of the ethical principles that are assumed to shape medical triage judgments. We then derive

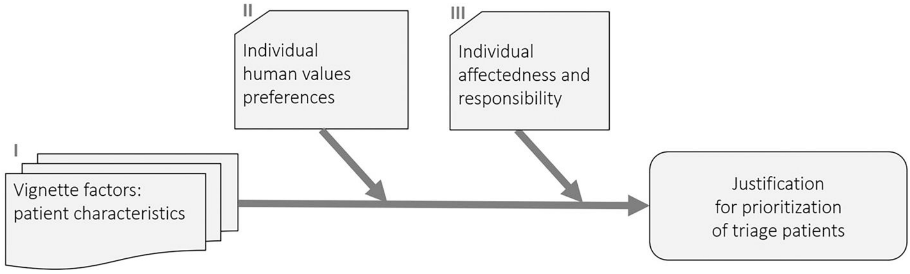


Figure 1. Structure of the explanatory model of the factorial survey experiment on triage.

hypotheses from the theory about patient characteristics that we assume contribute to justifying the prioritization of COVID-19 patients (Figure 1: I). Because we assume that our own personal characteristics (values, affectedness, potential commitment, and responsibility; Figure 1: II/III) also have an influence on the extent to which certain patient characteristics can be used to justify the prioritization of patients, we will formulate corresponding hypotheses. We then briefly introduce the method of factorial survey experiments and present the operationalizations for the descriptions of our fictitious COVID-19 patients, including information about our experimental design, and for the characteristics of the respondents. In the next section, we present our empirical results. Finally, we summarize the main findings and draw conclusions.

2. Triage and medical decisions

When considering triage and medical decision-making, there are three relevant terms used in medicine to refer to the distribution of resources to patients, namely "allocation," "rationing," and "triage." Firstly, "allocation" refers to the distribution of all medical resources, regardless of their scarcity. Secondly, "rationing" refers to the distribution of medical resources, considering the availability of these resources, to treat patients. Thirdly, "triage" focuses on the decision-making process regarding the distribution and use of medical resources (e.g., the prioritization of patients), which becomes critical when the demand for treatment exceeds the available resources, although the degree of scarcity may vary considerably (Jaziri and Alnahdi 2020:3–5). In this regard, the study of Knotz et al. (2021) addressed this same topic for the Swiss case, identifying some medical and non-medical characteristics that Swiss public would give prevalence in prioritization.

The ethical principles guiding medical triage are linked with theories of distributive justice, which address "the fairness, equity, and suitability of distribution determined by societal norms, which in turn derive their justification in the structure social cooperation which holds sway in the given community" (Jaziri and Alnahdi 2020:6). In this respect, according to Jaziri and Alnahdi (2020), the concept of social justice transcends the field of medicine and healthcare, stimulating social discussion about the role of the government, the family, and other actors in medical decision-making. Thus, several ethical and legal dilemmas can arise when demand exceeds supply. The two guiding principles in this context are *maximizing benefits and justice* (i.e., distributing scarce resources in an efficient and fair manner). However, the problem is that these two principles must be balanced against one another (Ehni et al. 2021; Savulescu et al. 2020).

Utilitarianism ("the greatest good for the greatest number") seeks to allocate scarce resources so as to maximize total population health, for example, by prioritizing patients with the best prognosis for recovery (Wilkinson et al. 2020). This goal of doing the "greatest good for the greatest number" also justifies limiting and withdrawing critical care resources in some cases (Jaziri and Alnahdi 2020). *Egalitarianism* ("allocation based upon equal and in this way fair access to resources") seeks to provide equal treatment, either vertically (priority based only on the *principle of need* that allows justifying unequal distributions, cf. Wendorf et al. 2002:23) or horizontally (first-come, first-serve or random selection). This creates dilemmas and conflict with some triage frameworks, mainly with the utilitarian principle of maximizing the overall benefit to society.

In any medical triage situation, a *protocol* must be developed that guides the decision-making of health professionals. In the process of the preparation of protocols, several core *principles* are fundamental (Hulsbergen et al. 2020:1485–1486; Daugherty Biddison et al. 2019; Satomi et al. 2020:2–3), namely the following:

Protocol Principle A: *Justice in the distribution of resources*. This involves respecting the duty of care, the obligation to manage and administer resources, and balancing equality and the use of protocols with clearly defined criteria.

Protocol Principle B: *Maximization of global benefits in the allocation and use of resources*. This involves considering the maximum benefit for all patients and the largest possible number of people, identifying and prioritizing those who can recover using the scarce resources available. Professionals must also consider i) *The evaluation of short- and long-term life expectancy* using validated instruments; ii) *Estimated life years saved*, prioritizing patients who are more likely to survive; iii) *The "right" to live a full lifecycle*; and iv) *Cases identified as "irreversible,"* which should receive adequate palliative care.

Protocol Principle C: *Promotion and reward of instrumental value*. Frontline or essential workers' care should be prioritized for the sake of their faster recovery and return-to-work capacity, as well as saving the lives of those who can save more lives. Being a breadwinner or caregiver has been also considered by some guidelines, and many citizens consider these relevant elements when establishing priority because having family with dependents increases the social usefulness of an individual (Chan et al. 2022; Persad and Largent 2022).

Protocol Principle D: *No priority for disease*. Patients suffering from other diseases must be triaged using the same criteria for priority of care.

Protocol Principle E: *Adequate Palliative Care* should be offered to all those who do not meet the criteria for admission to intensive care units.

Based on theories of distributive justice and the five protocol principles, most triage guidelines recommend allocation based on four decision-making imperatives: (1) *giving priority to the worst off*, (2) *maximizing the benefits yielded by scarce resources*, (3) *treating people equally (in the sense of applying the same criteria to all patients)*, and (4) *promoting and rewarding instrumental value* (Hulsbergen et al. 2020:1486; Emanuel et al. 2020:2051; Jöbges et al. 2020).

3. Determinants of the prioritization of COVID-19 patients

3.1. Patient characteristics as justifications for prioritization

Physicians make triage decisions based on patient characteristics, and these decisions are related to the ethical principles derived from theories of distributive justice. However, the relative importance of these patient characteristics (cf. patient hypotheses *PH1* to *PH6* and justifications in Table 1) may vary because different individual conditions among patients are weighted differently by the public. The present study quantifies the relative importance of various ethical principles by asking laypersons whether they would prioritize patients with specific characteristics in real-world scenarios, reflecting the underlying principles.

Table 1. Patient characteristics (experimental factors) as justifications for prioritization (I).

Patient characteristics (experimental factors)	Theoretical justification and/or explanation	Measurement and patient hypotheses (PH1 to PH6) on justification for prioritizing a COVID-19 patient
1. Factor: ***remaining life years of the patient (utilitarian position)***	saving the most lives and life years as well as allowing patients to experience the most life stages possible	PH1 / older patients: –
2. Factor: ***health-status responsibility***	pertains to patients' past behaviors that have affected their current health status	PH2 / smoking: –
3. Factor: ***resource shortage responsibility***	refusing vaccination can contribute to scarcity in that it represents a failure to actively work toward disease prevention	PH3 / being vaccinated: +
4. Factor: ***perceived usefulness***	includes family obligations to dependents, including being a breadwinner or caregiver	PH4 / having family responsibilities toward dependents: +
5. Factor: ***the principle of need***	patients from higher classes are seen as having more resources with which to find alternative solutions when they are not prioritized	PH5 / higher social class: –
6. Factor: ***utilitarian principle of promoting and rewarding instrumental value***	individuals who can save others (utility) or have previously saved others or contributed to the community in various ways (reciprocity) should be prioritized	PH6 / not being born and raised in Spain: –

The first factor, *remaining life years of the patient*, is highly debated in terms of prioritizing patients due to the ambiguity involved in attempts to maximize healthcare benefits. Decision-making relies on assessing the likelihood of survival post-treatment using indicators such as sequential organ failure assessment (SOFA, cf. Hulsbergen et al. 2020). Utilitarian arguments advocate for saving the most lives and life years, including making the lifecycle argument, which favors allowing patients to experience the most life stages possible. Egalitarian arguments contest this due to potential ageism and overlooking other health indicators that favor elderly patients (Wilkinson et al. 2020; Cicognani et al. 2007; Chan et al. 2022). However, following the utilitarian maximization principle of saving the most life years, the opposite should be expected, namely that young patients would be prioritized over old ones (Patient Hypothesis 1 [PH1]).

A second factor, *health-status responsibility*, pertains to patients' past behaviors that have affected their current health status. While medical guidelines reject the use of prior individual behavior as a triage criterion, public discourse suggests that it is relevant (Chan et al. 2022:5; Krütli et al. 2016; Cicognani et al. 2007:15; Gradwohl et al. 2024). In such cases, patients may be viewed, to a certain degree, as responsible for their own health conditions (*principle of responsibility*). A behavior often related to individual responsibility is *smoking*, which may have contributed to or accelerated the development of frailty. In this sense, it can be expected that prior smoking tends to reduce the justification for prioritizing a patient (PH2).

A third factor, *resource shortage responsibility*, has been relevant in the discussion regarding triage decisions. During the COVID-19 pandemic, vaccination status and vaccine refusal were invoked by politicians and healthcare professionals as criteria for intensive care (Iserson 2022). Refusing vaccination can contribute to scarcity in that it represents a failure to actively work toward disease prevention (Cicognani et al. 2007).

This may contradict the principles of solidarity and reciprocity. However, ethical guidelines do not consider vaccine refusal, as this may be considered discriminatory. Nevertheless, for those following the principle of responsibility, being vaccinated is likely to be a significant predictor for prioritizing a patient (PH3).

The fourth factor, *perceived usefulness*, includes family obligations to dependents, including being a breadwinner or caregiver, which are often considered as indicators given distributive justice's *principle of need*, as well as for the promotion and rewarding of instrumental value. Ethical committees have considered this an indicator of "usefulness" rather than "value," and in some cases, it is only used as a tiebreaker (Chan et al. 2022; Persad and Largent 2022; Archer et al. 2020; Cicognani et al. 2007:15; Dos Santos et al. 2020:5; Hulsbergen et al. 2020:1489). However, egalitarian views contest the use of this factor, arguing that everyone has equal worth, regardless of their social roles or functions (Archer et al. 2020:542). Concerning the opinions of non-experts, we hypothesized that having familial responsibilities toward dependents is a factor that increases the justification for prioritizing a patient (PH4).

The fifth factor, the *principle of need*, reflects egalitarian theories of distributive justice based on the imperative to treat people equally. The core idea consists of eliminating any potential inequality by prioritizing those with the greatest need (vertical equality). However, it also advocates for equal treatment having patients compete with one another, specifically by allowing rationing on a first-come, first-served basis or based on random selection (horizontal equality). While ethical guidelines reject prioritization based on social class, some studies of laypeople (e.g., Chan et al. 2022) suggest that *social class* may be relevant, as patients from lower classes are seen as having fewer resources with which to find alternative solutions when they are not prioritized. In this sense, we expect that patients from lower social classes will be prioritized to a certain degree over patients from higher social classes (PH5).

The sixth factor, the *utilitarian principle* of promoting and rewarding instrumental value, suggests that individuals who can save others (utility) or have previously saved others or contributed to the community in various ways (reciprocity) should be prioritized. Triage is therefore based on a patient's potential or past benefit to society and perceived usefulness (Hulsbergen et al. 2020). However, this principle raises concerns regarding discrimination against disadvantaged individuals and reliance on non-egalitarian and excessively utilitarian values. This principle has been considered as a possible tiebreaker in some guidelines. Some citizens consider *past contribution to the community and the principle of reciprocity* to be relevant factors despite egalitarian perspectives and ethical guidelines, which tend to exclude them (Dos Santos et al. 2020:5; Daugherty Biddison et al. 2019:851; Chan et al. 2022:3; Cicognani et al. 2007:15; Krütli et al. 2016:3). In this vein, we assume that being born and raised in a given country is a way of measuring past contributions to the welfare of that society; thus, it will tend to be justified as a means of prioritization (PH6).

3.2. Human values as moderators in prioritizing COVID-19 patients

In addition to the impact of patient characteristics, the direct influence of which is determined by ethical principles underlying individual moral intuitions, we hypothesize that

Table 2. Individual human value preferences as moderators in prioritizing COVID-19 patients (II).

Value preferences (moderating patient factors)	Theoretical justification and/or explanation	Measurement and value hypotheses (VH1 to VH4) on justification for prioritizing a patient
1. Moderator: *universalism-concern values*	prefer using **egalitarian principles** for triage justification, as these values underscore equality and oppose unequal treatment	VH1 / *universalism-concern value preference* reduces prioritization based on past contributions: –
2. Moderator: *benevolence-care values*	foster opposition to strict egalitarian triage principles (everyone has equal worth) and **highlighting the principle of need**	VH2 / *benevolence-care value preference* increases prioritization based on family obligations and responsibilities: +
3. Moderator: *power-dominance values*	foster libertarian views on triage by justifying the **preferential treatment of high-status individuals**	VH3 / *power-dominance value preference* increases prioritization of high-class patients: +
4. Moderator: *security-personal values*	may consider vaccination responsible for **protecting community health**, justifying the prioritization of vaccinated patients	VH4 / *security-personal value preferences* increases prioritization of vaccinated patients: +

individual values influence how strongly specific patient characteristics influence an individual's judgment about the legitimacy of triaging patients (cf. Table 2 below). The literature on value change has shown that post-modernization has led to an emphasis on self-expression and values related to autonomy (Inglehart and Welzel 2005), resulting in more permissive moral attitudes (Halman and van Ingen 2015) and emphasizing quality of life over quantity of life (Rudnev and Savelkaeva 2018; Bartolomé and Coromina 2020). The moral dilemma associated with medical triage, however, is a problem of justice in resource allocation. Schwartz's theory of basic human values relates to the question of equality in individuals' value systems. It identifies more values than the theoretical framework of post-materialism (Inglehart and Welzel 2005:97–99) and is therefore better suited to understanding how personal values shape our attitudes toward treating COVID-19 patients.

Basic human values are organized into a "coherent system that underlies and can help to explain individual decision making, attitudes and behavior" (Schwartz 1992; cf. Schwartz et al. 2012:664). Schwartz (1992; cf. also Schwartz et al. 2012:664) distinguishes 10 basic values, namely *self-direction*, *stimulation*, *hedonism*, *achievement*, *power*, *security*, *conformity*, *tradition*, *benevolence*, and *universalism*. In a refined version, the theory distinguishes 19 more narrowly defined values (see Appendix Table A1 for an overview, supplementary material).

The present research focuses on Schwartz's values linked to ethical principles justifying patient prioritization and, therefore, potentially moderating the effects of patient characteristics (PH1–7). Self-transcendence values, such as universalism and benevolence, emphasize equality and concern for others' welfare, supporting egalitarian principles in triage decisions and contesting utilitarian principles. Conversely, self-enhancement values, especially power, legitimize dominance and neglect egalitarian principles. Security values are tied to utilitarian principles, as maximizing benefits through efficient resource use reduces health risks for everyone.

First, individuals emphasizing universalist values will prefer using egalitarian principles for triage justification, as these values underscore equality and oppose unequal treatment. We hypothesize that the more a respondent holds universalist-concern values, the less they will justify prioritization based on past contributions (being born and raised in a given country; Values Hypothesis 1 [VH1]). Similarly, benevolence values, especially benevolence-care, focus on concern for close individuals' welfare, fostering opposition to strict egalitarian triage principles (everyone has equal worth) and highlighting the principle of need, extending the notion of equality to include social dependencies (i.e., balancing existing inequalities caused by need). We hypothesize that the more a respondent internalizes benevolence-care values, the more they will justify prioritization based on family obligations and responsibilities (VH2).

Power values foster libertarian views on triage by justifying the preferential treatment of high-status individuals. We hypothesize that the more a respondent favors power-dominance values, the more they will justify the prioritization of high-class patients (VH3). Security values emphasize individual and social safety. To be protected against COVID-19, individuals who emphasize security-personal values may consider vaccination responsible for protecting community health, justifying the prioritization of vaccinated patients. We hypothesize that the more a respondent emphasizes security-personal values, the more they will justify prioritizing vaccinated patients (VH4).

3.3. Individual affectedness and responsibility as moderators in prioritizing COVID-19 patients

In addition to human values, other individual factors may influence how patient characteristics are considered in prioritization decisions. A relevant set of characteristics will refer to potential personal affectedness regarding the criteria used in triage decisions. For this reason, these factors 'mirror' patient characteristics (cf. Table 3).

The *first moderator* is *age* because it increases the risk of being deprioritized by triage protocols. Younger individuals are more likely to recover, and in this way, they contribute to the saving of more life years or securing more life stages (Knotz et al. 2021). This may reduce the willingness of older people to prioritize younger COVID-19 patients for treatment with ventilators. Thus, in our next hypothesis, we assume that with increasing

Table 3. Individual affectedness and responsibility as moderators in prioritizing COVID-19 patients (III).

Patient characteristics (moderating patient factors)	Theoretical justification and/or explanation	Measurement and individual moderator hypotheses (IH1 to IH4) on justification for prioritizing a patient
1. Moderator: ***age***	increases the risk of being deprioritized by triage protocols; **may reduce the willingness of older people to prioritize younger** COVID-19 patients for treatment with ventilators	IH1 / with increasing age people are less willing to prioritize young patients: –
2. Moderator: ***in-group prioritization***	can be derived from the social identity approach: **people evaluate their own in-group positively** and out-groups negatively	IH2 / more privileged people tend to give less priority to lower-class patients than less privileged ones do: –
3. Moderator: ***health-status responsibility***	**patients can be held accountable** for their outlook regarding recovery and, therefore, not being prioritized	IH3 / smoking reduces willingness to prioritize nonsmokers: –
4. Moderator: ***vaccination refusal***	at least for some people, this may raise the **question of responsible versus irresponsible personal behavior** (principle of responsibility).	IH4 / support of vaccination increases likelihood of prioritization of vaccinated patients: +

age, people will be less willing to justify prioritizing *younger patients* over older ones (Individual Hypothesis [IH1]).

The *second moderator*, in-group prioritization, can be derived from the social identity approach (Hogg and Abrams 1988; cf. also Hogg and Vaughan 2005; Larsen and Schaeffer 2021), which assumes that people evaluate their own in-group positively and out-groups negatively. Accordingly, people with high social status should privilege patients with high social status, whereas the opposite should be true for people with low social status. Based on these arguments, it can be expected that, at least socioeconomically, more privileged people tend to give less priority to lower-class patients than less privileged ones do (IH2).

A *third moderator* is health status responsibility, referring to a respondent trait. We have previously argued that past smoking behavior could be interpreted as an individual contribution to poor health. According to the principle of responsibility, patients can be held accountable for their outlook regarding recovery and, therefore, not being prioritized. Current smokers would be affected by such ways of reasoning. The combination of the principle of responsibility with the social identity approach (Hogg and Abrams 1988; see also Hogg and Vaughan 2005) suggests that smokers may be less willing than nonsmokers to justify prioritizing COVID-19 patients based on past smoking behavior (IH3).

The *fourth moderator* is not related to individual affectedness but, rather, to the discussion about COVID-19 vaccination refusal and individual responsibility. Although a patient's vaccination status may be influenced, in part, by misinformation, vaccine attributes, and values such as naturalness (El-Elimat et al. 2021; Omar and Hani 2021; Kreps et al. 2021; Cordina et al. 2021), refusing vaccination is an individual choice that increasing the likelihood of serious disease. As such, at least for some people, this may raise the question of responsible versus irresponsible personal behavior (principle of responsibility). Therefore, supporters of mandatory vaccination as a solution to the COVID-19 pandemic can be expected to be more willing to justify prioritizing vaccinated patients over non-vaccinated patients than opponents of such regulations (IH4).

4. Method, operationalizations, and data

To test our hypotheses, we first developed a factorial survey (Auspurg and Hinz 2015). A factorial survey is a multivariate experiment in which the researcher combines various descriptions of fictitious situations or persons (vignettes), which the respondents judge. Our factorial survey includes seven dimensions, six to test our person-related hypotheses (PH1–6) above, as well as gender. The last dimension, which is one of the factors that all guidelines ignore regarding decisions about how to allocate scarce resources (Cicognani et al. 2007:14; Wilkinson et al. 2020), was included because it is such a basic category that descriptions of patients are probably seen as incomplete if gender is not mentioned. Table 4 shows the vignette dimensions and their corresponding vignette levels.

Each vignette of the factorial survey contains, as *fixed background information*, a description of the fact that the person described is hospitalized with a severe respiratory disease due to COVID-19 and needs a ventilator but there are not enough ventilators

Table 4. Vignette dimensions (factors) and levels.

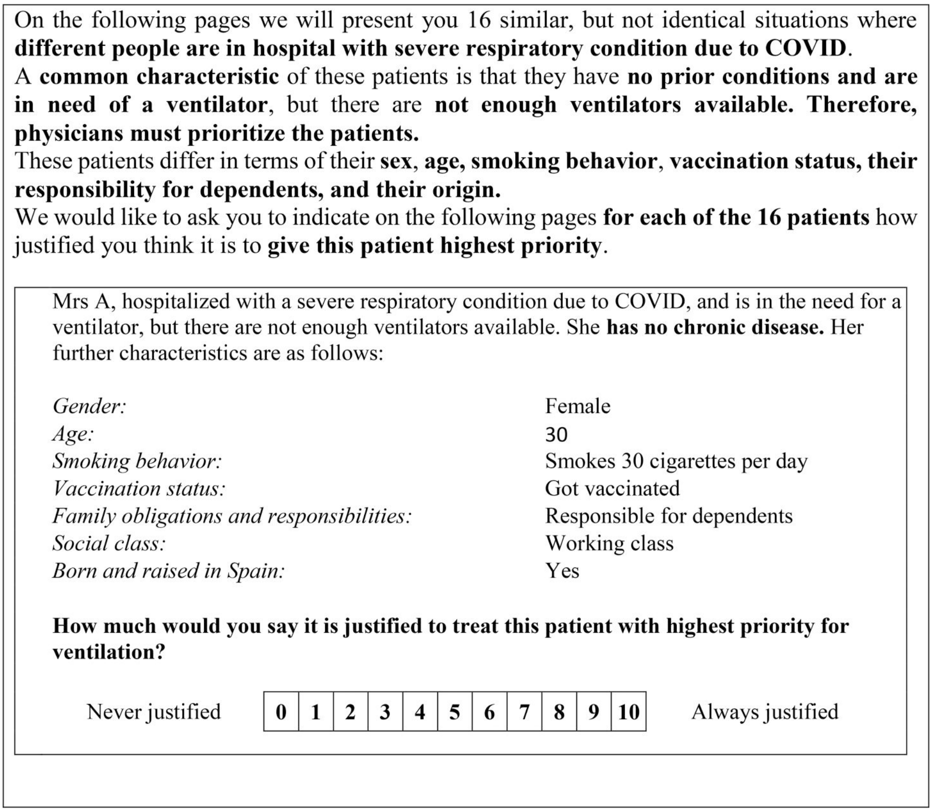
Vignette Dimension (Variables):	Levels (Values) of the Vignette Dimensions:
Gender:	- Male - Female
Age:	– 30 – 75
Smoking behavior:	- Does not smoke - Smokes 30 cigarettes per day
Vaccination status:	- Refused vaccination although possible - Got vaccinated
Family obligations and responsibilities:	- Without dependents - Responsible for dependents
Social class:	- Working class - Upper middle class
Born and raised in Spain:	- Yes - No

Notes: All vignette level variables were 0/+1 dummy-coded, whereby the reference category (coded as 0) of each vignette dimension is listed first.

available. We decided to include only patients without chronic disease in the factorial survey because respondents typically lack the medical knowledge about potential consequences of a disease in terms of life expectancy and life quality. We argue that age is generally correlated with the overall health status and it is intuitive to everyone that age and life expectancy are related. This information was added to each vignette as fixed background information (Shamon et al. 2022:399). This was necessary to make the hypothetical situations sufficiently specific and thus rule out different interpretations of the situation by different respondents. The seven distinct vignette dimensions and their respective levels were displayed in a table format, which is easier for respondents to process than text vignettes (cf. Shamon et al. 2022). Participants were asked to rate, on an 11-point response scale, the extent to which they would say it is justified to treat the described patient with the highest priority regarding ventilation. An 11-point answer scale was used since according to Auspurg and Hinz (2015:66) respondents do well distinguish scales containing 11 categories and since such scales prevail in factorial surveys (Wallander 2009:511). This helps to avoid the problem of censored responses and offers sufficient freedom to discriminate between the vignettes. Figure 2 shows a sample vignette.

Given seven dimensions with two levels, there are $2^7 = 128$ possible combinations of vignette factors. Because it is too burdensome for the respondents to answer all possible vignettes, a reduced design with a smaller set size per respondent was used. For factorial surveys with exclusively dichotomous vignette variables, ready-made confounded factorial designs exist (Kirk 1995:587–664, Atzmüller and Steiner 2010:132, Dülmer 2016:314–316). Confounded factorial designs consist of several different fractional factorial designs. Within each fractional factorial design, main effects are perfectly aliased with higher order interaction effects, so that higher order interaction effects can no longer be separated statistically from main effects. An advantage of using a confounded factorial design over a single fractional factorial design is that it allows confounding aliased interaction effects with set effects across different fractional factorial designs which ensures that the main effects can be estimated without any confounding (Dülmer 2016:311–312).

Using the statistics programme SAS 9.4 (ADX: Two-Level Design) we selected a suitable confounded factorial design consisting of eight vignette sets, each with 16 vignettes



On the following pages we will present you 16 similar, but not identical situations where **different people are in hospital with severe respiratory condition due to COVID**.
A **common characteristic** of these patients is that they have **no prior conditions and are in need of a ventilator**, but there are **not enough ventilators available. Therefore, physicians must prioritize the patients.**
These patients differ in terms of their **sex**, **age, smoking behavior**, **vaccination status, their responsibility for dependents, and their origin.**
We would like to ask you to indicate on the following pages **for each of the 16 patients** how justified you think it is to **give this patient highest priority**.

Mrs A, hospitalized with a severe respiratory condition due to COVID, and is in the need for a ventilator, but there are not enough ventilators available. She **has no chronic disease.** Her further characteristics are as follows:

Gender:	Female
Age:	30
Smoking behavior:	Smokes 30 cigarettes per day
Vaccination status:	Got vaccinated
Family obligations and responsibilities:	Responsible for dependents
Social class:	Working class
Born and raised in Spain:	Yes

How much would you say it is justified to treat this patient with highest priority for ventilation?

Never justified	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	Always justified

Figure 2. Introduction and example vignette (translated version).
Note: The abbreviation of the name of the fictitious vignette person was on each vignette a different one.

per respondent (8 · 16 = 128 vignettes). The selected set size is below the upper limit of 20 vignettes per respondent with fewer than 12 dimensions, which avoids fatigue effects and inconsistent responses even in general population surveys, as Sauer et al. (2011:98) have empirically found out. The number of dimensions and levels is also within the limits of no more than seven (plus/minus two) dimensions, each specifying approximately two to three levels, suggested by Auspurg and Hinz (2015:19, 22) in order to avoid cognitive overload. The design we chose therefore fulfills these recommendations, which should contribute to ensure reliable evaluations. Each of our eight vignette sets is balanced (i.e., the levels of each vignette dimension have equal frequencies) and orthogonal (variables of different dimensions are uncorrelated; cf. Kuhfeld 1997:2, Dülmer 2007:387–388). Thus, each of them allows for the estimation of the main effects of the vignette variables, with a maximal possible D-efficiency of 100. Furthermore, each of the different vignette sets is a Resolution III design (Kuhfeld 2010:58, Auspurg and Hinz 2015:26–27), which means that all main effects are estimable free of each other, but that some of them are aliased with two-way interactions. For the confounded factorial design, not only are all vignette variables balanced and orthogonal, but all their interaction terms are also balanced and orthogonal across all eight vignette sets (the combined design has a D-efficiency of 100). It is a Resolution XIII design, which means that all main effects can be estimated free of each other and free of any confounding with two- to seven-way interactions. For analyzing the data, all vignette variables were dummy coded as either 0 or +1 (cf. also Table 4). The use of dummy coding instead of effect coding (−1 and +1) has the advantage that the reference for the estimated b-coefficient of a vignette variable is not the average effect of the vignette variable, but instead the second category which allows a direct comparison of the two categories of interest with each other. By using dummy coding, the estimated b-coefficients are twice as large as those of effect coding, while the t- and p-values remain the same. The eight vignette sets were randomly assigned to the respondents. To avoid ordering effects, the sequence of the vignettes was also randomized. As factorial surveys meet the criteria for experiments, the results of a factorial survey can be interpreted causally. This is because the variation in the factors (stimuli) cause the changes in the observed respondent answer behavior (Taylor 2005:1196).

In addition to the vignette variables, our analyses included several respondent characteristics, specifically gender; age; education; subjective social status (social ladder); religiosity; subjective health status; smoking behavior; trust in the healthcare system; opinion concerning mandatory vaccination; and the four Schwartz values of universalism-concern, benevolence-care, security-personal, and power-dominance. Within the questionnaires, the order of the Schwartz values was randomized. Except for gender and age, the question wordings and codings are documented in Appendix Table A2 (supplementary material).

The experiment was conducted through an online survey. Since the purpose of the paper was to investigate the attitudes of laypeople toward decisions on medical triage, an online panel was selected. The choice for this was an opt-in panel among people aged 18 and older was administered in Spain between June 9th and July 12th, 2022. The characteristics of these panels are mainly 1) voluntary participation, providing with an initial profile and demographic details, 2) non-probability recruitment, panelists are not randomly selected from the general population, 3) selection of respondents through a large panel size, which help profiling for sampling and better representativity. To avoid underrepresenting older and less educated people, a quota design was used. The gross sample size consisted of 1,035 respondents with Spanish citizenship. The sample was reduced to 876 respondents after excluding respondents with missing values for at least one of the variables describing the respondent characteristics. In the net sample, one vignette was not rated, which reduced the number of validly answered vignettes to 14,015. The proportion of rated vignettes in the net sample of 14,015 vignettes was not completely balanced across the 8 vignette sets (i.e., not exactly 12,5% for each vignette set), but ranged from 10.0% (1,408 vignettes) to 13.8% (1,936 vignettes). The distribution of the respondent characteristics is reported in Appendix Table A3 (supplementary material). As each respondent was asked to rate 16 vignettes, the ratings are nested in the respondents. To account for the hierarchical structure of the data, multilevel analysis (Hox et al. 2018) was used with the multilevel program HLM 8. As our main goal was to measure the effects of the factors included in the vignettes in the way ethical principles and relevant aspects contemplated in the literature, we did not include any further questions on the reasons of the rating. The factorial survey design, with enough number of vignettes, and with all possible combinations of factors contemplated in our theoretical model allows us to infer the reasons from the results of the factorial survey with their exact intensity and statistical significance.

5. Empirical results

The multilevel analysis includes respondent characteristics at level 2 and vignette characteristics at level 1. Table 5 presents the main results from three multilevel models. Model M1 is a pure main-effect model that includes the vignette-level predictors (lower part of the table) and respondent-level predictors (upper part of the table) to test our vignette-level hypotheses. Except for the gender of a fictitious patient ($b = -0.005$, $p > 0.05$), for which we expected no impact, all vignette-level variables turned out to be highly significant ($p \leq 0.01$). Thus, all our vignette-level hypotheses were supported by the data (PH1–6). The strongest factor in determining the justifiability of prioritizing patients was vaccination status and smoking behavior. Being vaccinated increased the justifiability of prioritization over a non-vaccinated patient by 1.776 points on the 11-point response scale. In a similar vein, heavy smoking decreased the justifiability of prioritization by 0.797 points over nonsmokers. Despite these views being rejected by medical guidelines (smoking) or not considered in ethical guidelines (vaccination), our results demonstrate that the principle of responsibility clearly dominates laypeople's priority ratings. The order of the remaining vignette factors in terms of their effect size was as follows: the impact of family obligations (principle of need), being born and raised in Spain (principle of reciprocity), age (utilitarian maximization principle), and social class (principle of need). Prioritization is seen as more justifiable for patients with family obligations ($b = 0.263$) and less justifiable for patients not born and raised in Spain ($b = -0.186$), older patients ($b = -0.157$), and patients from the upper middle class ($b = -0.152$).

M2a and M2b are models that additionally include all theoretically relevant cross-level interaction terms between respondent-level variables on one hand and vignette-level variables on the other. The main effects of the vignette-level predictors in our cross-level interaction models are the effects of a vignette-level variable when the moderating respondent-level variable is coded as zero (Friedrich 1982:821). In Table 5, these effects and their t-values are printed in bold. The difference between M2a and M2b is that they report the conditional effects of the vignette-level variables once when the respective respondent-level variable is coded at its minimum observed value and the second time when the respective respondent-level variable is coded at its maximum observed value (except for age, for which the minimum and the maximum observed age, respectively, were subtracted from the real age). For the sake of clarity, we only report the coefficients of the theoretically relevant predictors in Table 5. All coefficients of the estimated models can be found in Appendix Table A4 (supplementary material).

Three of the four cross-level interaction effects that refer to the personal values of the respondents became significant. While respondents who do not hold universalism-concern values believe that patients born and raised in Spain should be prioritized over those not born and raised in Spain, resulting in a difference of 0.490 scale points ($p < 0.01$), the effect is much weaker among respondents who hold strongly universalism-concern values ($b = -0.490 + 0.075 \bullet 5 = -0.113$, $p < 0.05$). Therefore, VH1 is empirically confirmed. For respondents who do not hold benevolence-care

Table 5. Justifiability of prioritizing a COVID patient for treatment with a ventilator (coefficients for respondent-level control variables included but not reported).

		M1 (Main-Effect Model)		M2a (Cross-Level Interaction Effect Model)		M2b (Cross-Level Interaction Effect Model)	
Level 1 (14015 Vignettes)	R^2	17.05 %		18.18 %		18.18 %	
Level 2 (876 Respondents)	R^2	10.14 %		10.14 %		10.14 %	
		b	t	b	t	b	t
Intercept		2.501	6.473**	4.226	8.656**	4.863	12.167**
Age (transformed: 18 = 0)[a]		.009	2.514*	.009	2.661**	.009	2.661*
Social Ladderb		−.024	−.829	−.022	−.722	.022	.722
Smoker (1 = yes)[b]		.028	.271	−.094	−.891	.094	.891
Vaccination Mandatory (1 = yes)[b]		−.286	−2.583**	−1.033	−6.452**	1.033	6.452**
Universalism Concern[a]		.399	5.390**	.366	4.824**	−.366	−4.824**
Benevolence Care[b]		.103	1.204	.055	.629	−.055	−.629
Security Personal[b]		.041	.509	−.171	−1.682	.171	1.682
Power Dominance[b]		.016	.421	.010	.247	−.010	−.247
Gender (1 = Female)		−.005	−.196	−.005	−.196	−.005	−.196
PH1: Age (30 vs. 75 years)		−.159	−3.940**	**−.088**	**−.986**	**−.248**	**−2.282***
IH1: Age (18 = 0)[a]				−.002	−.883	−.002	−.883
PH2: Smoker (no vs. 30 cigarettes/day)		−.797	−16.198**	**−.980**	**−15.838****	**−.521**	**−6.912****
IH3: Smoker (1 = yes)[b]				.459	4.787**	−.459	−4.787**
PH3: Vaccinated (no vs. yes)		1.776	23.648**	**−.106**	**−.282**	**2.357**	**19.244****
IH4: Vaccination Mandatory (1 = yes)[b]				1.020	6.455**	−1.020	−6.455**
VH4: Security Personal[b]				.289	3.339**	−.288	−3.339**
PH4: Family Obligations (no vs. yes)		.263	9.865**	**−.055**	**−.417**	**.332**	**8.542****
VH2: Benevolence Care[b]				.078	2.442**	−.078	−2.442**
PH5: Social Class (worker vs. higher middle)		−.152	−6.035**	**−.149**	**−2.070***	**−.138**	**−1.736***
IH2: Social Ladder[b]				−.009	−.673	.009	.673
VH3: Power Dominance[b]				.020	1.126	−.020	−1.126
PH6: Born and Raised in Spain (yes vs. no)		−.186	−4.963**	**−.490**	**−2.937****	**−.113**	**−2.086***
VH1: Universalism Concern[b]				.075	1.868*	−.075	−1.868*

Notes: * $p \leq 0.05$; ** $p \leq 0.01$ (tested one-tailed for vignette-level variables and cross-level interaction terms); Full Maximum Likelihood; approximative pseudo R^2 computed according to the simplified formula of Snijders and Bosker (1994); conditional vignette-level effects in bold.

[a] The main effect of a vignette-level variable that interacts with a respondent-level variable describes the effect of the vignette-level variable under the condition that the respondent-level variable is 0 (cf. also Friedrich, 1982:821). Hence, for reasons interpretability we subtracted the minimal observed value for the age of the respondents, i.e., 18 years, from the original age variable. For reasons of consistency this does not only apply to M2a but also to M1. For the same reason, the maximal observed value for age, i.e., 90 years, was subtracted for M2b from the original age variable.

[b] For the same reason we reversed the answer scale for respondent-level variables involved in a cross-level interaction term for M2b; Schwartz values are measured as unweighted additive indexes (means across value items).

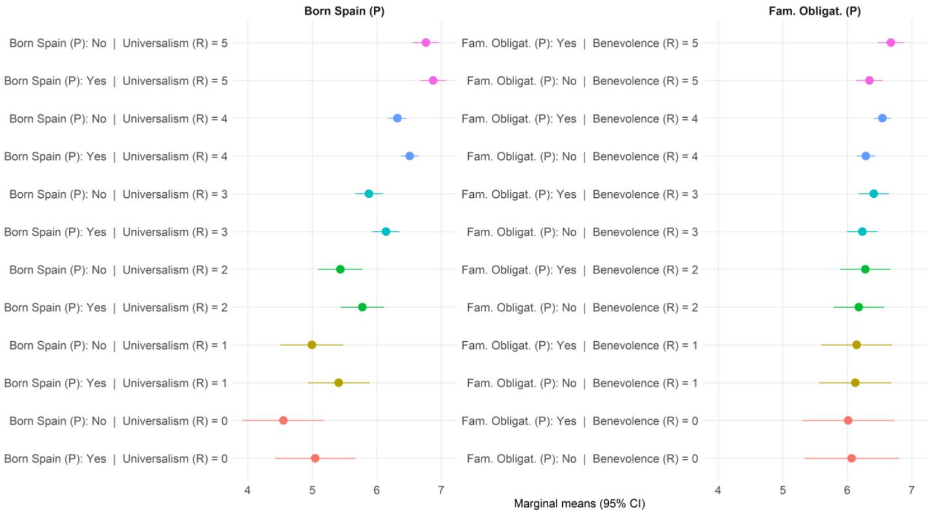


Figure 3. Marginal means for the moderation of the vignette factors “born and raised in Spain” and “family obligations” by respondent level values.
Note. P = Patient characteristic (vignette factor). R = Respondent-level characteristic. The scale of the dependent variable has been shortened for presentation purposes.

values, the presence or absence of family obligations does not affect their attitudes toward COVID-19 patients (b = −0.055, $p > 0.05$). The pattern changes for respondents who adhere strongly to these values. Such people prioritize COVID-19 patients with family obligations by 0.332 ($= -0.055 + 0.077 \bullet 5$, $p > 0.01$) scale points over those without such obligations. Therefore, VH2 is empirically corroborated. In line with the recommendations of Leeper et al. (2020), we demonstrate the empirical significance of moderating vignette-level factors based on respondent characteristics using estimated marginal means (EMMs). EMMs show how the outcome changes at different levels of a within-unit predictor (vignette factor) and different values of a between-unit moderator (respondent characteristics).

Figure 3 shows the EMMs for the interaction effect between the vignette factor ‘born and raised in Spain’ and respondents’ emphasis on universalism-concern (left column). The difference in prioritization between patients born and raised in Spain versus patients who immigrated to Spain almost disappears for respondents who emphasize universalism-concern, while the overall mean prioritization increases due to the positive main effect of universalism. The right-hand column shows that the existence of family obligations becomes slightly more important for priority ratings among individuals emphasizing benevolence-care, although the differences are small overall.

The last confirmed value hypothesis refers to security-personal values (VH4). For each scale point regarding security-personal values, the prioritization of a vaccinated COVID-19 patient over a non-vaccinated one increases by 0.289 scale points ($p < 0.01$). The right-hand column of Figure 4 shows that the spread in marginal means increases with a stronger emphasis on security-personal. The difference is around 1.5 scale points for the highest level of security, but only 0.25 scale points for the lowest level. This indicates strong moderation of vaccination status by security. The cross-level interaction effect of power-dominance is the only one that was not significant. Consequently,

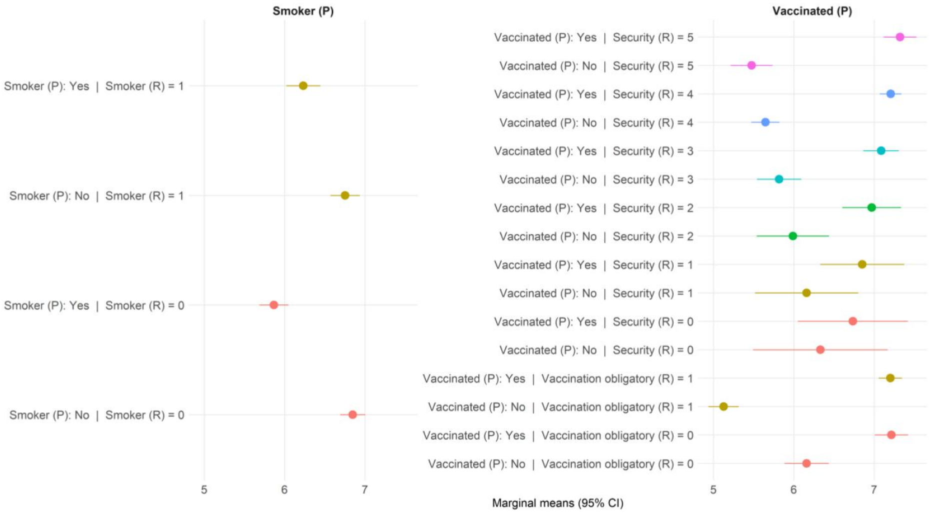


Figure 4. Marginal means for the moderation of the vignette factors "smoker" and "vaccinated" by respondent level characteristics.
Note. P = Patient characteristic (vignette factor). R = Respondent-level characteristic. The scale of the dependent variable has been shortened for presentation purposes.

contrary to our initial hypothesis (VH3), the influence of a patient's social class on the justifiability of prioritizing a patient for treatment is independent of power-dominant values.

In addition to personal values, we also assumed that the individual affectedness and responsibility of respondents would moderate the impact of patient characteristics on the justifiability of prioritizing patients for treatment with a ventilator. In this case, we tested four cross-level interaction effects, two of which were found to be significant. Our evidence indicates that while nonsmokers think that COVID-19 patients who smoke 30 cigarettes per day should be less prioritized for treatment with a ventilator by 0.980 scale points ($p < 0.01$), this effect is reduced to −0.521 ($= -0.980 + 0.459 \bullet 1$, $p < 0.01$) scale points for respondents who do smoke. The EMMs shown in the right-hand column of Figure 4 illustrate this effect. The difference in means is greater for nonsmoking respondents ($R = 0$). This result corroborates IH3.

The other significant cross-level interaction corroborates IH4. For respondents who are supportive of mandatory coronavirus vaccinations, it is 1.020 ($p < 0.01$) scale points more justifiable to prioritize a vaccinated COVID-19 patient over a non-vaccinated one than for respondents who oppose mandatory vaccinations. Once again, the EMMs in Figure 4 (in the lower part of the left-hand column) illustrate this effect. The mean difference between vaccinated and non-vaccinated patients is almost two scale points for those in favor of vaccination obligations, whereas it is only about one scale point for those who object to obligatory vaccination. The cross-level interaction effects between the age of the respondents and the age of the patients, as well as between the respondents' self-assessed social status (social ladder) and the social class of the patient, were not significant (Figures of the EMMs available with the online supplementary materials). Upon a closer examination of the interaction model, it becomes evident that for respondents aged 18 years, the age of the patient has no impact on the priority rating

($b = -0.088$, $p > 0.05$). In contrast, the oldest patients (90 years old) show an altruistic perspective by justifying prioritizing younger COVID-19 patients over older COVID-19 patients ($b = -0.248$, $p < 0.05$). Consequently, IH1, which postulates that as age increases, people become less willing to justify prioritizing younger patients, has been refuted. This result is consistent with that of Reeskens et al. (2021:5), whose self-interest hypothesis was also not confirmed. Among the vignette-level predictors, social class had the smallest variance component (i.e., the variability of the slopes across respondents is lowest; cf. Model 1, Appendix Table A4, supplementary material). There is the greatest degree of agreement among respondents regarding this patient characteristic. This could explain why neither of the two expected cross-level interaction effects were found to be significant.

A final look at the approximate pseudo R^2 values of the reported multilevel models reveals that for the main-effect model (M1), the vignette-level predictors account for approximately 14.5% of the variance in the respondents' ratings, while the respondent-level predictors contribution is about 17.1%. The inclusion of all theoretically relevant cross-level interaction terms (models M2a and M2b) resulted in a slight increase in the percentage of explained variance, to 18.2%, at the vignette-level, with no change being observed at the respondent level. However, it cannot be inferred from this result that including cross-level interaction terms leads to no improvement. Methodologically, the observation could be attributed to the fact that to compute the pseudo R^2s, all vignette-level slopes are fixed (i.e., their variance components are dropped; Snijders and Bosker 1994; cf. also Hox et al. 2018:63). Thus, including cross-level interaction terms cannot much contribute to increasing a model's approximate pseudo R^2. Substantively, we may infer, that unobserved factors not included in our study and models might have contributed to higher pseudo R^2 values, e.g. opting for a lower degree of situational standardization in our preamble to the vignettes which would have resulted in more diversity and variance of the scenarios while running risk of more overcomplexity in the models. E.g., a personal or network member experience of COVID-19 infection might be a relevant respondent level characteristic.

6. Discussion and conclusions

The aim of this paper was to study the criteria of Spanish laypeople use to justify the prioritization of COVID-19 patients for treatment with ventilators. Similar studies based on other contexts on this matter are scarce and show some similarities and also some differences on its results and design, such as the study of Knotz et al. (2021) in Switzerland. By using a factorial survey experiment, we were able to analyze not only the influence of patient characteristics that may be used to justify prioritizing certain COVID-19 patients (main effects) but also whether respondents with different values and other personal characteristics react differently to different patient characteristics (cross-level interaction effects). Our results showed that younger patients were indeed prioritized over the older ones (PH1, main effect). At first glance, this seems to confirm the utilitarian principle of saving the most life years. However, by estimating the cross-level interaction effect between the respondent's age and the patient's age (IH1), it became clear that the youngest respondents treated older and younger patients equally, whereas the oldest respondents prioritized younger patients. This indicates that the old share the utilitarian principle advocated by experts, combining it with an altruistic perspective, because older respondents do so even though they are potentially negatively affected by their judgements.

Another important result of our analyses shows that vaccination status (PH3) and smoking behavior (PH2) were the two patient characteristics with the strongest impact on priority ratings. Thus, for the general public, the principle of individual responsibility was the most important patient characteristic in triage decisions. This result is in accordance with public discourses in which people argue that we should not complain if we have to bear the potentially negative consequences of our own health-threatening and, therefore, irresponsible behaviors. This line of reasoning seems to be deeply anchored in individuals' moral intuitions regarding vaccination refusal, and this argument has even been advocated by certain health practitioners (Iserson 2022). It stands, nonetheless, in clear contrast to ethical guidelines in which the responsibility for prior individual behaviors is not a criterion for use in triage decisions (Chan et al. 2022; Krütli et al. 2016; Cicognani et al. 2007), especially if incomplete or misleading information regarding the vaccine and anxiety about side effects may have convinced people not to become vaccinated (Persad and Largent 2022).

Regarding smoking, one could also argue that a smoker who wanted to give up smoking but was not able to do so is not responsible. However, even smokers, though to a significantly lower degree than nonsmokers, significantly prioritized nonsmokers over smokers for treatment with ventilators, which illustrates how deeply the principle of responsibility is rooted in the moral intuitions of the population. Our results have implications for communication about triage protocols. If there are sound ethical reasons not to include individual responsibility for health-related behavior in the criteria for medical triage decisions, health professionals and policymakers must invest significant effort into explaining the principles involved to the public. Moreover, and going beyond our recommendation of a higher effort on communication with the public, we would advocate for the incorporation of laypeople's moral views and values in the process of reflection and design of ethical guidelines impacting general public′s health even before institutions, administrators and clinicians decide on the inclusion or exclusion of relevant social aspects for the public on medical triage decisions.

Our factorial survey experiment also included family obligations (PH4) and social class (PH5) as indicators of the principle of need (distributive justice). Whereas being a breadwinner or caregiver can be interpreted, from the utilitarian perspective, as an indicator of the usefulness of people, legitimizing its use as tiebreaker (Chan et al. 2022; Dos Santos et al. 2020; Hulsbergen et al. 2020), strictly egalitarian views reject it because according to such views, every person has equal worth (Archer et al. 2020). Social class is excluded from ethical guidelines as a justification for prioritizing patients for treatment. Empirically, however, both of our hypotheses are confirmed: in the view of laypeople, need contributes to legitimizing the prioritization of patients under triage conditions. A final factor included in our factorial survey was whether a patient was born and raised in Spain. Although egalitarian points of view, as well as ethical guidelines, tend to exclude the principle of reciprocity, according to which past contributions to the community should be rewarded, it had a relatively weak but nevertheless significant impact of laypeoples' judgment behavior (PH6).

This finding, however, remains somewhat ambiguous because the indicators may partially measure out-group discrimination (see the paragraph on limitations).

The vignette-level analysis revealed the importance of moral intuitions in patient prioritization. Individuals' values systems are generally considered to be the basis for their moral intuitions. The specific configuration of individuals' values should, therefore, shape how they react to specific moral dilemmas. Our analysis confirms this expectation by analyzing, for the first time, how values shape the effects of patient characteristics on the justifiability of prioritizing COVID-19 patients. Three of the four cross-level interaction terms included in the model were significant: universalism-concern reduced the impact of being born and raised in Spain (VH1), benevolence-care increased the impact of family obligations (VH2), and security-personal increased the impact of vaccination status (VH4) on the legitimacy of prioritizing a COVID-19 patient for treatment. The only cross-level interaction effect that was insignificant was that between power dominance and a patient's social class (VH3).

In sum, our study revealed differences between the criteria used by experts and laypeople to legitimize prioritizing patients under triage conditions. However, the results may also reflect existing controversies involving experts from different philosophical schools. This should come as no surprise, as triage remains a dilemma and sometimes leads to a moral gray area in which it is difficult to find a solution that satisfies all ethical convictions. In this regard, an interesting path for further research could focus on conducting the same survey and methodology to clinicians and professionals in charge of designing the triage protocols in order to identify the elements of dissent and dissonance between experts and developers and the general public on their values and attitudes toward the principles applied for triage. This might help pinpoint the elements where better dialogue and communication could be addressed.

Despite the strength of factorial surveys as an experimental method, our study has several limitations: *first*, in a study of public attitudes, we cannot include details about medical aspects of triage, such as the results of SOFA and similar standardized assessments. Respondents' ratings in the study are exclusively based on their commonplace understanding of the vignette descriptions. Providing respondents with more information may change their judgements, but at the same time, it carries the risk of cognitive overload. *Second*, our contribution focuses on ethical principles in medical decision-making but does not address all dimensions of social discrimination. We cannot find evidence for discrimination against women or other groups that may be discriminated against in terms of public opinion, particularly ethnic minorities and people with disabilities.

The factorial survey design allows both social science and medical researchers to gain a better understanding of laypeople's, as well as professionals', complex moral justifications in triage decision scenarios (i.e., under conditions of scarce resources, such as during the COVID-19 pandemic). Based on this study, in future research, comparative studies may shed light on other contextual (e.g., cultural) factors affecting respondents' ethical decision-making rationales and the moderating effects of personal human values and individual affectedness. Social scientific research in the medical field should thus provide a better understanding of the micro- and macro-level social contexts of judgments and decision-making.

Author contributions

CRediT: **Edurne Bartolomé Peral**: Cocneptualization, original draft, writing- review & editing, securing funding; **Hermann Dülmer**: Conceptualization, Formal analysis, Investigation,

Methodology, Validation, Writing – original draft, Writing – review & editing; **Pascal Siegers**: Conceptualization, Formal analysis, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing; **Tilo Beckers**: Conceptualization, Investigation, Validation, Writing – original draft, Writing – review & editing.

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