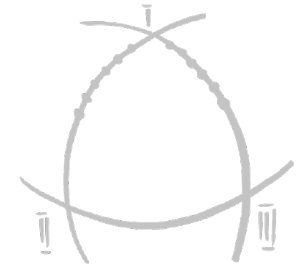


# Modelos mixtos:

## De la teoría a la publicación



**Eduardo Garcia-Garzon**

IA Specialist



SHA  
KERS

[https://github.com/edugargar/AEMCCO\\_2022\\_MML](https://github.com/edugargar/AEMCCO_2022_MML)



# Guía del curso

1. Introducción teórica
2. Claves estadísticas
3. Extensiones del modelo
4. Lme4, gracias por tanto



## Orientación 1

Curso aplicado y práctico

## Orientación 2

Preguntas son bienvenidas

## Orientación 3

De nuevo, no quedarse con dudas.

El certificado está asegurado.



# Curso semi-dirigido

- Hay materiales dirigidos preparados para poder realizar todos los análisis en el curso.
- Hay pequeños quizzes y ejercicios.
- Tenemos tareas de análisis completos para practicar.



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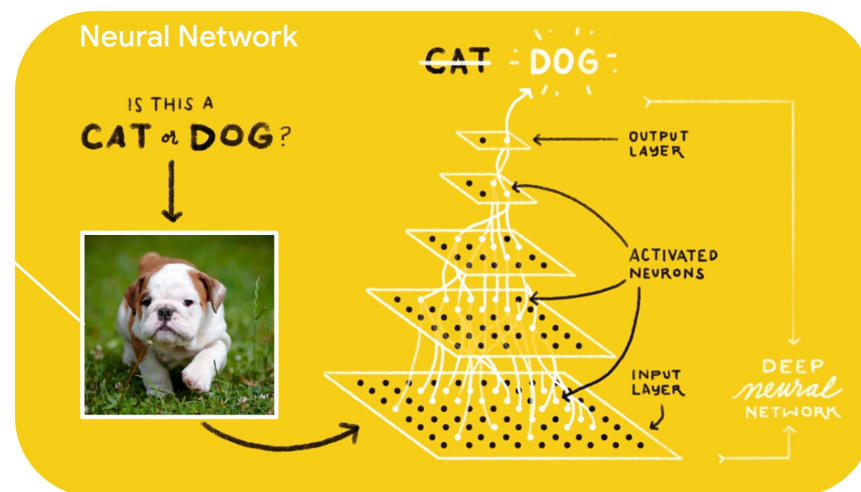
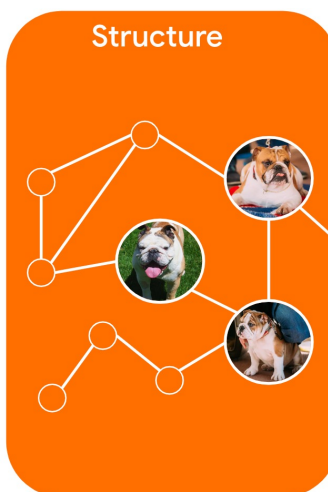
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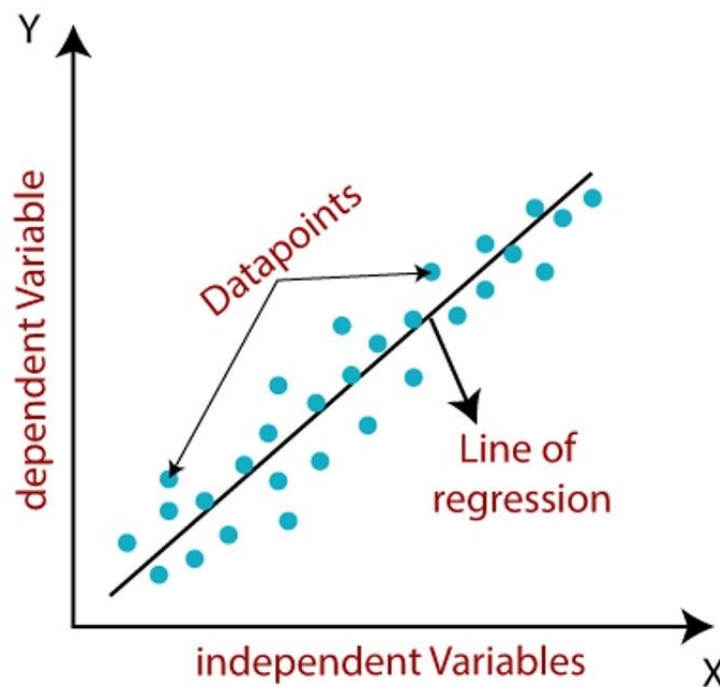
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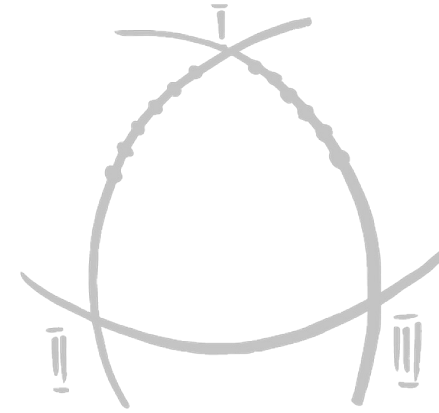


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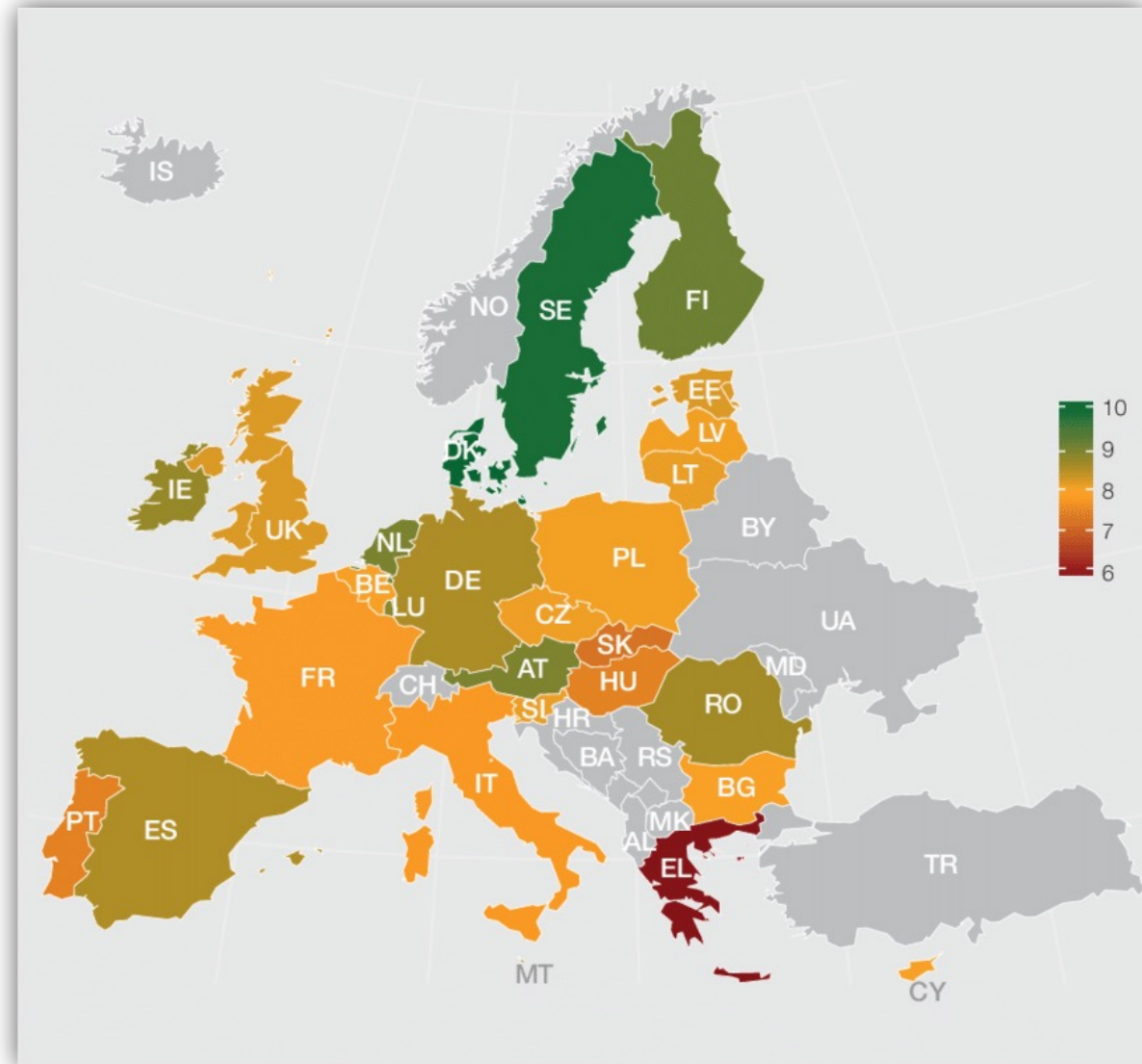
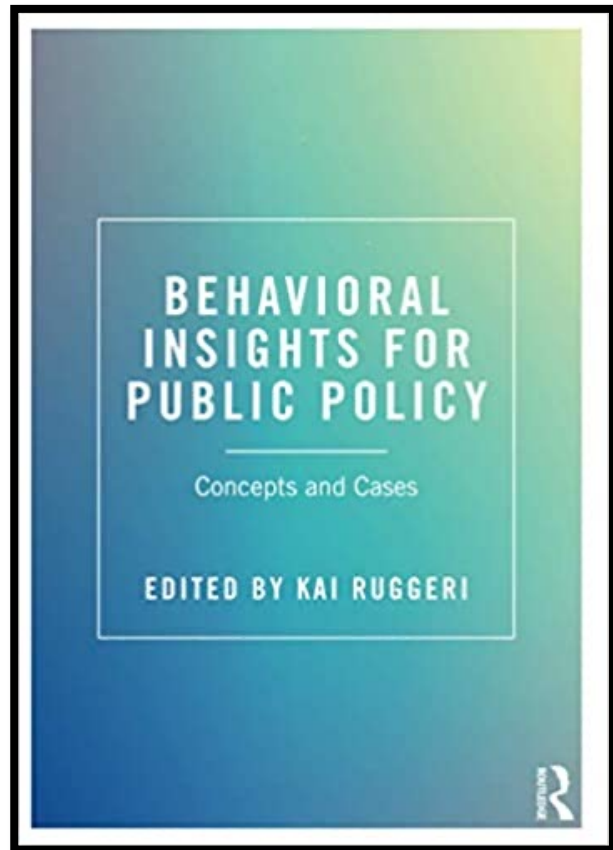


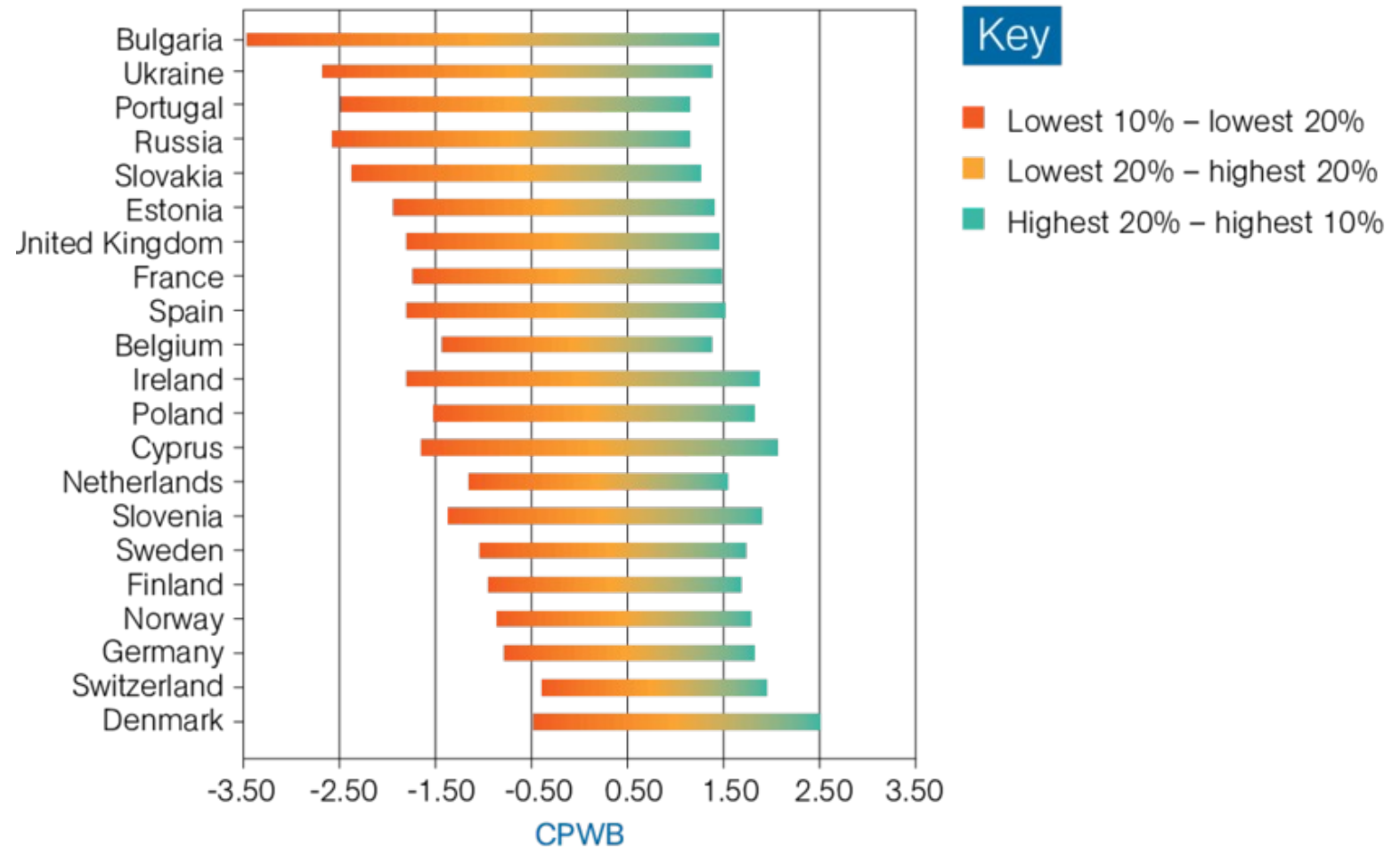
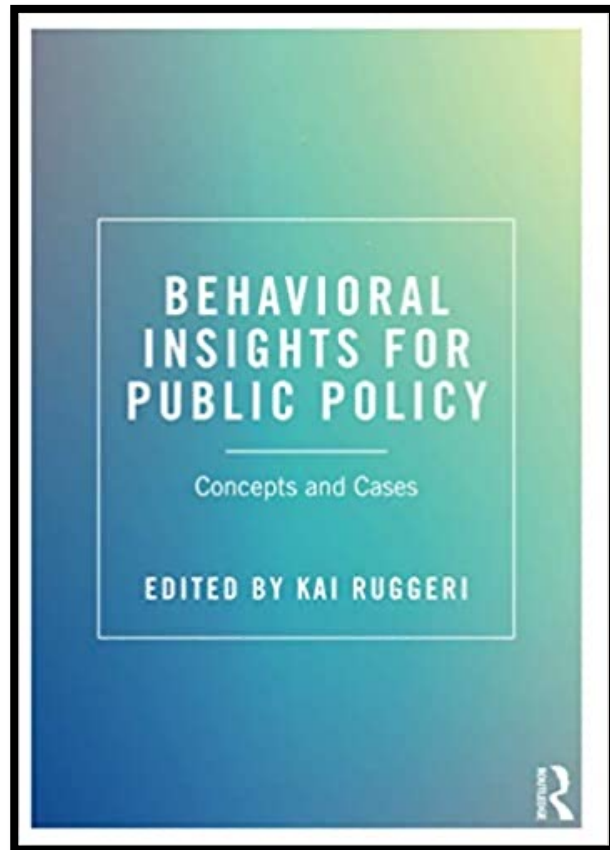
Modelos bi-factoriales exploratorios



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RESEARCH

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## Well-being is more than happiness and life satisfaction: a multidimensional analysis of 21 countries

Kai Ruggeri<sup>1,2\*</sup>, Eduardo Garcia-Garzon<sup>3</sup>, Aine Maguire<sup>4</sup>, Sandra Matz<sup>5</sup> and Felicia A. Huppert<sup>6,7</sup>

### Abstract

**Background:** Recent trends on measurement of well-being have elevated the scientific standards and rigor associated with approaches for national and international comparisons of well-being. One major theme in this has been the shift toward multidimensional approaches over reliance on traditional metrics such as single measures (e.g. happiness, life satisfaction) or economic proxies (e.g. GDP).

**Methods:** To produce a cohesive, multidimensional measure of well-being useful for providing meaningful insights for policy, we use data from 2006 and 2012 from the European Social Survey (ESS) to analyze well-being for 21 countries, involving approximately 40,000 individuals for each year. We refer collectively to the items used in the survey as multidimensional psychological well-being (MPWB).

**Results:** The ten dimensions assessed are used to compute a single value standardized to the population, which supports broad assessment and comparison. It also increases the possibility of exploring individual dimensions of well-being useful for targeting interventions. Insights demonstrate what may be masked when limiting to single dimensions, which can create a failure to identify levers for policy interventions.

**Conclusions:** We conclude that both the composite score and individual dimensions from this approach constitute valuable levels of analyses for exploring appropriate policies to protect and improve well-being.

**Keywords:** Well-being, Mental health, Composite measures, Economic policy, Exploratory structural equation models

### Background

#### What is well-being?

Well-being has been defined as the combination of feeling good and functioning well; the experience of positive emotions such as happiness and contentment as well as the development of one's potential, having some control over one's life, having a sense of purpose, and experiencing positive relationships [23]. It is a sustainable condition that allows the individual or population to develop and

thrive. The term subjective well-being is synonymous with positive mental health. The World Health Organization [45] defines positive mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community". This conceptualization of well-being goes beyond the absence of mental ill health, encompassing the perception that life is going well.

Well-being has been linked to success at professional, personal, and interpersonal levels, with those individuals high in well-being exhibiting greater productivity in the workplace, more effective learning, increased creativity,

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## Multilevel Modeling and Policy Development: Guidelines and Applications to Medical Travel

Eduardo Garcia-Garzon<sup>1,2\*</sup>, Peter Zhukovsky<sup>3</sup>, Elisa Haller<sup>4</sup>, Sara Plakolm<sup>5</sup>, David Fink<sup>6</sup>, Dafina Petrova<sup>7</sup>, Vaishali Mahalingam<sup>8</sup>, Igor G. Menezes<sup>9</sup> and Kai Ruggeri<sup>1,10</sup>

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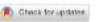
Medical travel has expanded rapidly in recent years, resulting in new markets and increased access to medical care. Whereas several studies investigated the motives of individuals seeking healthcare abroad, the conventional analytical approach is limited by substantial caveats. Classical techniques as found in the literature cannot provide sufficient insight due to the nested nature of data generated. The application of adequate analytical techniques, specifically multilevel modeling, is scarce to non-existent in the context of medical travel. This study introduces the guidelines for application of multilevel techniques in public health research by presenting an application of multilevel modeling in analyzing the decision-making patterns of potential medical travelers. Benefits and potential limitations are discussed.

**Keywords:** medical travel, public health, policy, multilevel model, hierarchical linear model, medical tourism, policy research

### INTRODUCTION

In recent years there has been a global increase in international medical travel (Lunt and Carrera, 2010). To date, research on medical travel has been typically focused on patients traveling for treatment unavailable or inaccessible in their home countries (Lunt and Mannion, 2014). Although, country- or region-specific studies are starting to emerge (Johnston et al., 2012; Noree et al., 2014) little is known as to why potential patients travel to specific foreign locations to pursue medical treatment. Given the clear rapid growth of medical travel, understanding which factors influence patients' decisions on a cross-cultural level will provide essential background for the development of effective global health access policies (GHAPs).

A small number of qualitative and quantitative studies have attempted to unravel why individuals choose to travel for medical treatment. However, several shortcomings become evident when reviewing previous work in the psychological and epidemiological literature. First, the extended use of survey methods with a lack of psychometrically validated questionnaires. Second, the primarily descriptive approaches when analyzing medical travel data, which inadequate



### OPEN

## The globalizability of temporal discounting

Kai Ruggeri<sup>1,2,3</sup>, Amma Panin<sup>3</sup>, Milica Vdovic<sup>4</sup>, Bojana Veckalov<sup>5</sup>, Nazeer Abdul-Salaam<sup>1</sup>, Jascha Achterberg<sup>6,7</sup>, Carla Akil<sup>8</sup>, Jolly Amatya<sup>9</sup>, Kanchan Amatya<sup>10</sup>, Thomas Lind Andersen<sup>11</sup>, Sibebe D. Aquino<sup>12,13</sup>, Arjoon Arunasalam<sup>14</sup>, Sarah Ashcroft-Jones<sup>15</sup>, Adrian Dahl Askelund<sup>16,17</sup>, Nelida Ayacaxli<sup>1</sup>, Aseman Bagheri Sheshdeh<sup>18</sup>, Alexander Bailey<sup>19</sup>, Paula Barea Arroyo<sup>19</sup>, Genaro Basulto Mejia<sup>20</sup>, Martina Benvenuti<sup>21</sup>, Mari Louise Berge<sup>22</sup>, Aliya Bermaganbet<sup>23</sup>, Katherine Bibilouri<sup>14,24</sup>, Ludvig Daas Bjørndal<sup>17</sup>, Sabrina Black<sup>25</sup>, Johanna K. Blomster Lyshtol<sup>26</sup>, Tymofii Briki<sup>27</sup>, Eike Kofi Buabang<sup>28</sup>, Matthias Burghart<sup>29</sup>, Ash Bursaloglu<sup>30</sup>, Naos Mesfin Buzayu<sup>31</sup>, Martin Čadež<sup>32</sup>, Nathalia Melo de Carvalho<sup>33,34</sup>, Ana-Maria Cazan<sup>34</sup>, Melis Çetincelik<sup>35</sup>, Valentino E. Chai<sup>36</sup>, Patricia Chen<sup>36</sup>, Shiyi Chen<sup>37</sup>, Georgia Clay<sup>38</sup>, Simone D'Ambrgio<sup>39</sup>, Kaja Damjanović<sup>39</sup>, Grace Duffy<sup>40</sup>, Tatianna Dugue<sup>41</sup>, Twinkle Dwarkanath<sup>41</sup>,

**Economic inequality is associated with preferences for smaller, immediate gains over larger, delayed ones. Such temporal discounting may feed into rising global inequality, yet it is unclear whether it is a function of choice preferences or norms, or rather the absence of sufficient resources for immediate needs. It is also not clear whether these reflect true differences in choice patterns between income groups. We tested temporal discounting and five hypothetical intertemporal choice anomalies using local currencies and value standards in 61 countries ( $N = 13,629$ ). Across a diverse sample, we found consistent, robust rates of choice anomalies. Lower-income groups were not significantly different, but economic inequality and broader financial circumstances were clearly correlated with population choice patterns.**

Effective financial choices over time are essential for securing financial well-being<sup>1</sup>; yet individuals often prefer immediate gains at the expense of future outcomes<sup>2</sup>. This tendency, known as temporal discounting<sup>3</sup>, is often treated as a behavioural anomaly measured by presenting a series of choices that vary values, timelines, framing (for example, gains or losses) and other trade-offs. Responses can then be aggregated or indexed in ways that test different manifestations of the anomaly, whether strictly the trade-off of immediate versus future or the threshold at which individuals are willing to change their preference<sup>4</sup>.

Anomalies identified under temporal discounting are routinely associated with lower wealth<sup>5–15</sup>, which is especially concerning given incongruent impacts on economic inequality brought about by the COVID-19 pandemic<sup>16</sup>. Inequality and low incomes have also routinely been associated with greater discounting of future outcomes<sup>17–20</sup>, so it is not surprising that global studies would find temporal discounting (to varying degrees) in populations around the world<sup>21</sup>. However, the prevailing interpretations (that is, that lower-income groups show more extreme discounting<sup>16,22</sup>) may result from narrow measurement approaches, such as only assessing immediate gains versus future gains.

Another iteration of interpretations regarding discounting and economic classes involves the relative aspect of financial choices compared to income and wealth. Consider the patterns presented in Fig. 1a, which represents six months of spending patterns for 15,568 individuals in the United States who received stimulus payments as part of the 2020 CARES Act<sup>23</sup>. If the average amount spent 60 days prior to receiving the payment is used as a baseline, the lower-income group spent over 23 times more than baseline immediately after receipt, compared with around 10 times more than baseline for middle- and

higher-income individuals. Apart from those days immediately following receipt, the relative spending patterns are almost identical for all three groups. However, as indicated on the right, those with higher incomes spent more in raw values, indicating that behaviours are more extreme only relative to income, and in fact, high-income individuals spent the most on average after receiving stimulus payments. While relative values may differentiate the consequences of spending, the spending patterns were generally about the same.

In this research, we aimed to test how broadly generalizable patterns of temporal discounting are around the world, incorporating social and economic factors as well as multiple measures of intertemporal choice. With broader testing of more anomalies, rather than being limited to indifference points (a threshold value for preferring now versus later), more robust conclusions can be drawn about choice patterns. In this vein, the most comprehensive related study found that lower-income countries had lower trust in systems and had the steepest rates of discounting (that is, the threshold for giving up an immediate gain for a later, larger one was much higher)<sup>24</sup>. As the indifference point was the primary indicator, these results are extremely important but do not necessarily mean that lower-income populations have distinct decision-making patterns. Three similar studies also tested temporal choice in large, multi-national populations, some including more than 30,000 participants from more than 30 countries<sup>24,25</sup>. These studies typically focused on smaller-sooner versus larger-later constructs of temporal discounting. Most concluded that lower income and wealth, among other micro and macro variables, were strong predictors of higher discounting (or lower patience). However, these studies did not incorporate a broad range of temporal choice constructs, as their focus was typically specific to time preferences.

A full list of affiliations appears at the end of the paper

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## ¿Por qué?

Los **modelos mixtos** gozan de una popularidad extrema en ciencias del comportamiento.

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