

UNIVERSIDADE DE LISBOA

Faculdade de Psicologia



The Intergroup Time Bias Effect and Its Psychological Mechanisms in the Medical Context

Emerson Araújo Do Bú

Orientadores: Prof. Doutor Cícero Roberto Pereira

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Tese especialmente elaborada para a obtenção do grau de Doutor em Psicologia,
especialidade em Psicologia Social

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It is the time that you spent on your rose that makes your rose so important.

Antoine de Saint-Exupéry

For a person that studies time, you should give time a try.

Cian O'Connor

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Abstract

The Intergroup Time Bias (ITB) effect is a discriminatory behavior characterized by individuals' motivation to invest more time in members of their own social group as compared to those from different social groups. This phenomenon can profoundly impact various facets of social life, especially within the context of healthcare provision. In the healthcare domain, time is a crucial factor that notably influences both medical decision-making and the ultimate satisfaction of patients with their care outcomes. However, what if the allocation of time in this context is not distributed equally among patients from different social groups, revealing an unobtrusive and often overlooked form of intergroup discrimination? What are the implications of the ITB effect on healthcare outcomes for patients? In the medical context, is the ITB effect associated with well-known racial attitudes, such as aversive racism? This dissertation presents a comprehensive research program that provides evidence that the ITB represents one of the primary insidious discriminatory behaviors exhibited by aversive racists, which ultimately impacts the quality of medical care provided to patients. Our research program was conducted within the clinical assessment and medical decision-making processes to investigate whether White medical trainees exhibit a bias in their investment of time that favors White (*vs.* Black) patients. Additionally, we investigated whether the ITB effect contributes to healthcare disparities, impacting patient care quality. Critically, the research examines the relationship between ITB and aversive racism in two distinct ways. First, we propose that the ITB is most prevalent among individuals who claim to uphold egalitarian beliefs, consider themselves non-racist, but hold nonconscious negative attitudes and beliefs about Black individuals (i.e., aversive racists). Second, we suggest that avoidance behavior, specifically physical examination avoidance of patients, may serve as an underlying mechanism through which patients' skin color influences the time invested, particularly among individuals exhibiting an aversive racist profile. In addition to discussing the significance of time in psychological literature and discrimination in healthcare provision within asymmetric intergroup relationships (Chapter 1), this research program includes eight studies and

eight pre-tests of paradigms and materials organized in three empirical chapters. These chapters examine whether White medical trainees invest more time in White than Black patients across various healthcare aspects. Specifically, Chapter 2 reveals that White trainees display ITB in forming first impressions, indicating diagnostic hypotheses, assessing pain, and prescribing opioids, with the effect being stronger in those with an aversive racist profile. Chapter 3 replicates the ITB effect in the diagnostic and clinical action recommendation realms and demonstrates that this time bias mediates the effect of patients' skin color on diagnostic accuracy and recommendation quality. Chapter 4 extends the ITB investigation to the communication domain, exploring whether physical examination avoidance underlies the ITB effect in medical context among individuals who express an aversive racist profile. The synthesis of this research program provides the first experimental evidence that bias in time investment, favoring White over Black patients, is associated with aversive racism and impacts healthcare outcomes. These findings contribute to understanding the socio-psychological implications of time investment in healthcare, offering a new theoretical explanation for an understudied, insidious form of discrimination underlying racial healthcare disparities.

Keywords: intergroup relations; intergroup time bias; aversive racism; aversive affect; medical context; healthcare disparities.

Resumo

O Enviesamento do Tempo nas Relações Intergrupais (em inglês – *Intergroup Time Bias*) é um comportamento discriminatório caracterizado pela motivação dos indivíduos em investir mais tempo nos membros do seu próprio grupo social em comparação com aqueles de diferentes grupos sociais. Este fenómeno pode ter um impacto profundo em várias facetas da vida social, especialmente no contexto da prestação de cuidados de saúde. No domínio da saúde, o tempo é um fator crucial que influencia notavelmente tanto a tomada de decisões médicas como a satisfação final dos pacientes com os resultados dos seus cuidados. Entretanto, e se o tempo nesse contexto não fosse investido de forma equitativa entre pacientes de diferentes grupos sociais, refletindo uma forma discreta e muitas vezes negligenciada de discriminação intergrupar? Quais seriam as implicações do efeito ITB para os cuidados de saúde dos pacientes de diferentes grupos sociais? No contexto médico, o efeito ITB está associado ao racismo aversivo? Esta dissertação apresenta um programa de pesquisa que fornece evidências de que o ITB representa um dos principais comportamentos discriminatórios insidiosos exibidos por racistas aversivos, que impacta a qualidade dos cuidados médicos prestados aos pacientes. O nosso programa de pesquisa foi realizado nos contextos de avaliação clínica e da tomada de decisões médicas para investigar se estudantes de medicina Brancos enviesam a sua alocação de tempo de modo a favorecer pacientes Brancos (*vs.* Negros). Além disso, investigamos se o efeito ITB contribui para as disparidades de saúde, impactando a qualidade do cuidado ofertado aos pacientes. Criticamente, a pesquisa também examina a relação entre ITB e racismo aversivo de duas formas. Primeiramente, propomos que o ITB é mais prevalente entre indivíduos que suportam crenças igualitárias, consideram-se não racistas, mas possuem atitudes e crenças negativas não conscientes sobre indivíduos negros (ou seja, racistas aversivos). Em segundo lugar, sugerimos que o comportamento de evitação, especificamente a evitação de exame físico de pacientes, pode servir como um mecanismo subjacente através do qual a cor da pele dos pacientes influencia o tempo investido, particularmente entre indivíduos que apresentam um perfil de racista aversivo.

Além de discutir a importância do tempo na literatura psicológica e fornecer uma análise abrangente das disparidades nos cuidados de saúde no contexto das relações intergrupais assimétricas (Capítulo 1), esta pesquisa inclui oito estudos e oito pré-testes de materiais e paradigmas organizados em três capítulos empíricos. Esses capítulos examinam se os estudantes de medicina Brancos investem mais tempo em pacientes Brancos do que em pacientes Negros em vários aspectos dos cuidados de saúde. Especificamente, o Capítulo 2 revela que os participantes apresentam o efeito ITB na formação de primeiras impressões, indicando hipóteses diagnósticas, avaliando a dor e prescrevendo opioides, sendo o efeito mais forte naqueles indivíduos que apresentam um perfil racista aversivo. O Capítulo 3 replica o efeito ITB no âmbito diagnóstico e de recomendação de ações clínicas e demonstra que o viés de investimento de tempo medeia o efeito da cor da pele dos pacientes na precisão do diagnóstico e na qualidade da recomendação. O Capítulo 4 estende a investigação do ITB para o domínio da comunicação, explorando se a evitação do exame físico do corpo do paciente está na base do efeito ITB no contexto médico entre aqueles que expressam um perfil racista aversivo. A síntese deste programa de pesquisa fornece a primeira evidência experimental de que o viés no investimento de tempo, favorecendo pacientes Brancos em detrimento de pacientes Negros, está associado ao racismo aversivo e impacta os resultados dos cuidados de saúde. Estas descobertas contribuem para a compreensão das implicações sociopsicológicas do investimento de tempo nos cuidados de saúde, oferecendo uma nova explicação teórica para uma forma de discriminação insidiosa e pouco estudada que está na base das disparidades raciais nos cuidados de saúde.

Palavras-chave: relações intergrupais; enviesamento do tempo nas relações intergrupais; racismo aversivo; afeto aversivo; contexto médico; disparidades nos cuidados de saúde.

Resumo Alargado

O tempo tem cativado o pensamento humano ao longo da história (McGrath & Kelly, 1986; Youngreen & Silcox, 2020). Não obstante os inúmeros métodos que concebemos para o contar, a sua verdadeira essência persiste como um enigma, servindo de fonte de inspiração para diversas expressões culturais (Jaques, 1990; Waugh, 2001; Zimbardo & Boyd, 2009). A ciência contemporânea proporciona uma compreensão mais vasta do tempo enquanto característica fundamental do universo, intrinsecamente ligada ao conceito de espaço e ao movimento de corpos celestes (Linton, 2004; Roy, 2021). Contudo, o tempo continua a ser objeto de especulação para cientistas e filósofos, com alguns a postular a possibilidade de o tempo ser não mais do que uma ilusão (Callender, 2010; Jaffe, 2018; Rovelli, 2018). Independentemente de sua natureza, seja ela considerada matéria sensível ou ilusão, é inegável que a duração das ações humanas possui significado e acarreta consequências para a vida em sociedade (Vala et al., 2012). Nesse sentido, compreender a forma como as pessoas utilizam este recurso valioso é crucial para entender as vivências humanas e a complexa dinâmica do nosso mundo.

Com efeito, o tempo é um recurso finito e valioso na vida humana (McGrath & Kelly, 1986). Em consequência, as pessoas tendem a agir como se valorizassem o seu tempo. Isso é particularmente ilustrado pelo adágio popular “tempo é dinheiro”, que sublinha a ideia de que o tempo, tal como o dinheiro, é um recurso limitado que deve ser gerido e alocado com cautela (Leclerc et al., 1995). Neste contexto, a maneira como utilizamos o nosso tempo revela aquilo que valorizamos, assim como as nossas prioridades (Hamermesh, 2019; Vala et al., 2012). Isto é evidente nas atividades em que nos envolvemos. Se dedicamos uma quantidade significativa de tempo a uma determinada tarefa, isso sugere que nutrimos um forte interesse por ela e consideramo-la valiosa (Hamermesh, 2019). A título de exemplo, alocar tempo para a leitura de um texto, como este, pode ser um indicador do valor que o leitor confere aos temas abordados nele, ou à fonte, ou ao autor do texto. Contudo, um indivíduo pode optar por investir mais do seu

tempo a ler um texto publicado por uma instituição com maior reputação ou escrito por um perito respeitado na área. Isto levanta a questão de se o investimento de tempo nas nossas atividades diárias reflete não só os nossos próprios interesses e aquilo que valorizamos, mas também os do contexto social. Além disso, incentiva a inquirição sobre se a análise do papel e do investimento de tempo em relações sociais é uma abordagem viável para as compreender.

Investigações empíricas têm consistentemente destacado a importância do investimento de tempo nas relações interpessoais (Agnew et al., 2019; Burt, 2000; Hall, 2019; Hays, 1985). Por exemplo, o investimento de tempo é um conceito fulcral nesta área de estudo, dado ser uma variável decisiva na formação de novas relações sociais (Hall, 2019; Hays, 1985) e na manutenção ou aprimoramento das já existentes (Burt, 2000). Similarmente, no contexto das relações românticas, investir tempo nas pessoas é frequentemente interpretado como um sinal de disponibilidade para o compromisso (Agnew et al., 2019). Pesquisas empíricas recentes também sugerem que o foco no tempo, em detrimento do dinheiro, pode impulsionar comportamentos pró-sociais dos indivíduos (Reed et al., 2016), assim como uma comunicação mais atenta (Reutner & Greifeneder, 2018). Apesar da importância bem estabelecida do investimento de tempo nas relações interpessoais, corroborada por vasta literatura (Huxhold et al., 2022; Ogolsky & Bowers, 2013; Oswald et al., 2004), o seu significado e potencial para a compreensão das relações intergrupais permanecem largamente inexplorados.

Pesquisas recentes, particularmente no contexto da formação de impressões, identificam o tempo como um fator crítico na avaliação e atribuição de valor a grupos sociais (Aguiar et al., 2008; Lima, 2003; Vala et al., 2012). De fato, um programa de pesquisa seminal desenvolvido por Vala et al. (2012) consolidou o efeito do Enviesamento do Tempo nas Relações Intergrupais (em inglês – *Intergroup Time Bias – ITB*), e propôs que este viés no investimento de tempo ocorre durante o processo de avaliação e formação de impressões porque os indivíduos estão motivados a investir mais deste recurso valioso e escasso nos membros do seu próprio grupo, em

detrimento dos outros, conforme destacado no âmbito da teoria da identidade social (Tajfel & Turner, 1979). Especificamente, essa investigação demonstrou que participantes Brancos consistentemente investiram mais tempo para formar impressões de indivíduos Brancos comparativamente a Negros, fornecendo evidência robusta para o fenómeno ITB no contexto de dinâmicas sociais racializadas. No entanto, apesar dos avanços dos investigadores na compreensão do ITB como uma forma de comportamento discriminatório, a sua prevalência em diferentes contextos sociais ainda não foi demonstrada. Além disso, as investigações sobre o ITB têm sido principalmente focadas no domínio da formação de impressões (Aguilar et al., 2008; Lima, 2003; Vala et al., 2012) e não exploraram o seu impacto noutras tarefas avaliativas que podem favorecer os membros do grupo de pertença em detrimento dos outros, com raras exceções, tais como nos estudos desenvolvidos por Teixeira (2014) e Pimentel (2018). Adicionalmente, embora estudos tenham encontrado uma associação entre o efeito ITB com preconceito implícito e racismo (Vala et al., 2012), os seus mecanismos subjacentes ainda não foram explorados.

Este programa de pesquisa pretende aprofundar a compreensão do fenómeno do ITB, abordando as lacunas existentes por meio das seguintes questões de investigação: a) O Enviesamento do Tempo nas Relações Intergrupais é presente em vários domínios da vida social, especialmente no contexto médico, onde a discriminação racial tem consequências graves para grupos socialmente desvalorizados?; b) Quais são as implicações do efeito ITB nos cuidados de saúde ofertados para os pacientes?; c) No contexto médico, o efeito ITB está associado ao racismo aversivo?

Em suma, esta dissertação apresenta um programa de pesquisa destinado a fornecer evidências empíricas para a nossa hipótese de que o ITB é um comportamento discriminatório insidioso expresso por racistas aversivos, com consequências significativas para grupos raciais desvalorizados. Essa hipótese foi abordada dentro de ambientes simulados de cuidados em saúde.

Especificamente, hipotetizamos que o ITB permeia o contexto médico, de modo que estudantes de medicina Brancos exibem um viés em seu investimento de tempo em processos de avaliação clínica e tomada de decisão que favorece pacientes Brancos (em comparação com pacientes Negros). Além disso, hipotetizamos que o ITB afeta a acurácia dos diagnósticos, bem como a quantidade e a qualidade das recomendações clínicas e da comunicação com pacientes. Com destaque, também prevemos que o efeito ITB está associado ao racismo aversivo de duas maneiras distintas. Primeiro, propomos que o ITB é mais prevalente entre indivíduos que suportam crenças igualitárias, se consideram não racistas, mas possuem atitudes e crenças negativas não conscientes sobre indivíduos Negros (ou seja, racistas aversivos). Segundo, hipotetizamos que o comportamento de evitação, especialmente a evitação do exame físico de pacientes, pode servir como um mecanismo subjacente através do qual a cor da pele dos pacientes influencia o tempo investido no paciente, particularmente entre indivíduos que exibem um perfil de racista aversivo.

Para testar estas hipóteses, começamos por realizar uma revisão abrangente da literatura sobre a psicologia social do tempo e as disparidades de saúde (Capítulo 1). Depois, desenvolvemos um programa de pesquisa para estudar o efeito ITB no contexto médico através de quatro dimensões clínicas: formação de primeiras impressões de pacientes, avaliação clínica, prescrição de recomendações clínicas e comunicação. O estudo dessas dimensões foi realizado através de oito estudos empíricos e oito pré-testes de materiais/paradigmas. Estes estudos estão organizados em três capítulos empíricos, cada um dos quais aprofunda aspectos específicos das dimensões em investigação.

O Capítulo 2 apresenta os resultados de seis estudos (cinco experimentais e uma metanálise) que revelam a presença do ITB em diferentes contextos, como a formação de impressões, diagnóstico, avaliação da dor e prescrição de opioides para pacientes, principalmente entre os participantes que possuem um perfil racista aversivo. No Capítulo 3, são apresentados os

resultados de um estudo experimental no contexto do diagnóstico e processo de indicação de recomendações clínicas. Nesse estudo, foi possível replicar o efeito do ITB além de apresentar evidências de que o viés de investimento de tempo atua como mediador do efeito da cor da pele dos pacientes na acurácia diagnóstica e na qualidade das recomendações clínicas. Finalmente, o Capítulo 4 expande a investigação do ITB para o domínio da comunicação através de um estudo experimental, explorando se a evitação do exame físico do corpo do paciente é um mecanismo do efeito do ITB no contexto médico entre aqueles que expressam um perfil racista aversivo.

Em síntese, este programa de investigação fornece as primeiras evidências experimentais de que o viés no investimento de tempo, favorecendo pacientes Brancos em relação aos pacientes Negros, está associado ao racismo aversivo e impacta os cuidados em saúde oferecidos a pacientes. Esses achados contribuem para a compreensão das implicações sociopsicológicas do investimento de tempo na área da saúde, oferecendo uma explicação teórica para uma forma insidiosa e pouco estudada de discriminação que está na base das disparidades raciais nos cuidados de saúde.

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List of Abbreviations

ABIM – American Board of Internal Medicine
AFPI – Avoidance of Forming Prejudice Impressions
ANOVA – Analysis of Variance
ATI – Actual Time Invested
CAT – Clinical Assessment Tasks
CI – Confidence Interval
COVID-19 – Coronavirus Disease
GMT – Greenwich Mean Time
HIV – Human Immunodeficiency Virus
IBGE – Brazilian Institute of Geography and Statistics
IFT – Impression Formation Task
ITB – Intergroup Time Bias
IAT – Implicit Association Test
M – Mean
MANOVA – Multivariate Analysis of Variance
MG - Milligrams
MS – Milliseconds
MSE – Mean Squared Error
OLS – Ordinary Least Squares
OSF – Open Science Framework
SD – Standard Deviation
SDO - Social Dominance Orientation
SDT – Signal Detection Theory
SE – Squares Error
ST – Subjective Time
STI – Subjective Time Invested
RRT – Relationship Receptivity Theory
TI – Time Invested
UNESCO – United Nations Educational, Scientific and Cultural Organization

As we begin our exploration into the meaning and implications of the time individuals devote to others, I invite you to reflect on how you invest your valuable time during an average week. Undoubtedly, a wide array of activities spring to mind, ranging from pursuing professional and financial goals to engaging in physical activities, intellectual endeavors, and social connections with loved ones. As you consider these diverse activities, identify those you genuinely value. It seems reasonable to dedicate more time to these pursuits, while reducing your involvement in those that fail to align with your interests or priorities. Yet, could this rationale of time investment be extended to our broader social interactions? If so, what might be the repercussions of such an approach to comprehending intergroup relations dynamics?

To ponder potential answers to these questions, imagine a job interview scenario in which a diverse group of candidates gathers to showcase their skills and potential for a position at a prestigious company. The interviewer, a Harvard graduate, has only an afternoon to conduct the interviews. As the process unfolds, a behavior pattern emerges: the interviewer invests more time with candidates who also hold Harvard degrees, delving deeper into conversations that reveal more details about their past job experiences. In this situation, one could argue that this behavioral pattern unobtrusively facilitates the process for those categorized as ingroup members, as compared to outgroup counterparts, creating barriers for candidates from less privileged backgrounds, and ultimately decreasing their chances for success in the job application process.

Now, consider a similar situation but in a different context, where skin color serves as the primary factor in the social categorization process. Picture a hospital's emergency room where time is both scarce and valuable. White healthcare providers interact with patients from diverse social groups (e.g., White and Black patients), assessing clinical information to make the most accurate diagnoses and recommend appropriate treatments. In cases of

diseases with equivalent diagnostic complexity, one might question whether these White healthcare providers invest equal amount of time in diagnosing, prescribing treatments, and communicating with patients, regardless of their skin color. If not, that is, if providers bias time investment in favor of one social group, could this time investment bias negatively impact the quality of clinical care provided to patients? Additionally, it is important to explore potential mechanisms that may underlie this time bias within the medical field. To comprehensively address these aspects, it is crucial to begin by discussing a key component at the core of this phenomenon: the social-psychological meaning of time.

Time, encompassing its varied meanings and far-reaching implications, has persistently puzzled and captivated the human mind throughout history (McGrath & Kelly, 1986; Waugh, 2001; Younggreen & Silcox, 2020). Though we have invented numerous methods of counting it, such as the development of watches or chronometers, the true essence of time remains largely enigmatic and has consistently been a source of fascination and inspiration for cultural expressions (Jaques, 1990; Roy, 2021; Waugh, 2001). In ancient Greek mythology, for example, Kronos, the son of Uranus (the starry sky) and Gaia (the earth), was often personified as the god of time and depicted as the leader of the Titans, with the ability to manipulate the passage of time (Macey, 2010; Waugh, 2001). Contemporary science, however, offers a more comprehensive understanding of time as a fundamental feature of the universe, inextricably linked to the concept of space and the displacement of celestial bodies (Linton, 2004; Roy, 2021). Despite our sophisticated observation instruments, time remains a subject of conjecture for scientists and philosophers, with some even positing the possibility of time being a mere illusion (Callender, 2010; Jaffe, 2018; Rovelli, 2018). Regardless of its nature, whether considered tangible matter or illusion, it is undeniable that the duration of human actions holds significance and entails consequences for life in society (Vala et al., 2012; Younggreen & Silcox, 2020). In this sense, understanding how people use

this valuable resource is crucial for understanding human experiences and the complex dynamics of our world.

Indeed, time is a finite and precious resource in human life (McGrath & Kelly, 1986). Consequently, people often act as though they greatly value their time, as evidenced by the popular saying “time is money,” which emphasizes the idea that time, like money, is a limited resource that must be managed and allocated carefully (Leclerc et al., 1995). In this context, the way we use our time reveals what we value, as well as our priorities (Hamermesh, 2019; Vala et al., 2012). This is particularly evident in the activities we engage in. If we invest a significant amount of time in a particular activity, it suggests that we have a strong interest in it and consider it valuable (Hamermesh, 2019). For example, investing time in reading a text, like this one, could be an indicator of the value that you, the reader, place on the topics contained within it, or on the source or writer of the text. At this juncture, some readers might object: “But I am reading out of obligation.” In response to this, one could argue that the act of reading dissertations, whether for evaluative purposes or to learn from examples of previous work in a given scientific and thematic domain, carries its own social value. Thus, even when reading out of obligation, one’s time investment may signify the socially recognized worth of engaging with scholarly material, underscoring the multifaceted ways in which we assign value to our time. However, an individual may choose to invest more of their time reading a text published by a more reputable institution or written by a respected expert in the field. This raises the question of whether the investment of time in our daily activities reflects not only our own interests and what we value, but also those of the broader social context. Additionally, it prompts inquiry into whether examining the role and investment of time in social relationships is a viable approach to understanding them.

Overall, empirical research has consistently demonstrated the importance of time investment in interpersonal relationships (Agnew et al., 2019; Burt, 2000; Hall, 2019; Hays,

1985). For instance, time investment is a foundational concept in this area of study, as it is a crucial variable in the formation of new social relationships (Hall, 2019; Hays, 1985) and the maintenance or improvement of existing ones (Burt, 2000). Similarly, in romantic relationships, investing time in the relationship is often seen as a sign of readiness for commitment (Agnew et al., 2019). Recent empirical investigations have also suggested that directing attention to time rather than money may increase the prosocial behaviors of individuals (Reed et al., 2016), as well as their communication attentiveness (Reutner & Greifeneder, 2018). Despite the well-established importance of time investment in interpersonal relationships, as supported by extensive literature (Agnew et al., 2019; Arriaga et al., 2019; Huxhold et al., 2022; Ogolsky & Bowers, 2013; Oswald et al., 2004), its meaning and potential in understanding intergroup relationships remain largely unexplored (Younggreen & Silcox, 2020).

In a recent research direction, specifically within the domain of impression formation, time has emerged as a critical factor in how individuals evaluate and attribute value to social groups (Vala et al., 2012). The chronological development of this research line began with Lima's (2003) pioneering studies, which demonstrated that White individuals spent more time forming impressions of fellow White than Black individuals. The studies also found that activating competitive meritocracy norms, as opposed to equality norms, led to quicker impressions of Black (*vs.* White) targets, emphasizing the influence of social norms in shaping this time bias phenomenon (Lima, 2003). Similarly, Aguiar et al. (2008) found that White Portuguese participants took longer to form impressions of White Portuguese individuals compared to those from the Gypsy community. In recent years, this line of research has centered on examining biases in time investment during impression formation as an unobtrusive form of discriminatory behavior against socially devaluated groups. A seminal research program developed by Vala and colleagues (2012) consolidated the Intergroup Time

Bias (ITB) effect and proposed that this bias in time investment occurs during the process of evaluating and forming impressions because individuals are motivated to invest more of this valuable and scarce resource in members of their own group at the expense of others, as highlighted within the framework of social identity theory (Tajfel & Turner, 1979).

Specifically, the research of Vala and co-authors (2012) illustrated that White participants consistently invested more time in forming impressions of Whites compared to Blacks, providing robust evidence for the ITB phenomenon within the context of racialized social dynamics. However, despite researchers making strides in understanding the ITB as a form of discriminatory behavior, its prevalence in different social contexts remains unclear.

Investigations into the ITB have also been primarily focused on the domain of impression formation (Aguilar et al., 2008; Lima, 2003; Vala et al., 2012) and have not explored its impact on other evaluative tasks that may favor ingroup members over others, with rare exceptions, such as the studies conducted by Teixeira (2014) and Pimentel (2018).

Additionally, while studies have found an association between the ITB effect with implicit prejudice and racism (Vala et al., 2012), its underlying mechanisms have not been thoroughly explored.

This work aims to deepen our understanding of the ITB phenomenon by addressing these existing gaps and exploring the following research questions:

- ❖ Is the Intergroup Time Bias pervasive across various domains of social life, especially in healthcare, where racial discrimination has severe consequences for socially devalued groups?
- ❖ What are the implications of the ITB effect on healthcare outcomes for patients?
- ❖ In the medical context, is the ITB effect associated with aversive racism?

We conducted a comprehensive research program to investigate the ITB phenomenon in the medical context, given that the existing body of literature extensively acknowledges

and highlights the persistent healthcare disparities that exist between Black and White individuals (Hamed et al., 2022; Penner et al., 2019; Williams et al., 2019). These disparities are theorized to result from a complex interplay of socioeconomic, political, and structural factors (Braveman, 2006), as well as the presence of racial biases among healthcare providers (Dovidio et al., 2016). These biases can manifest in various aspects of patient care, including decision-making processes, pain perception, nonverbal cues, and verbal interactions (FitzGerald & Hurst, 2017; Hirsh et al., 2015; Madeira et al., 2022a; Madeira et al., 2022b; Penner et al., 2019; Rufino, 2013). However, despite extensive research examining racial disparities in treatment decisions and outcomes (Penner et al., 2019; Williams et al., 2019), there has been a lack of emphasis on the role of time investment in shaping treatment recommendations (Hirsh et al., 2015). This is particularly notable considering observational studies that have highlighted the association between patient skin color and variations in the amount of time physicians spend communicating with them (Gross et al., 1998; Mende-Siedlecki et al., 2022; Oliver et al., 2001; Waitzkin, 1985).

Our central argument is that because social groups are valued differently in society, with White individuals being more highly valued and Black people being targets of racism (Bratt, 2022; Dovidio et al., 2016; Hamed et al., 2022; Pereira et al., 2018; Ramos et al., 2019; Roberts & Rizzo, 2021), healthcare providers might invest their time in a manner that favors White patients over Black patients during clinical assessments and medical decision-making processes. Consequently, this dissertation presents the outcomes of a research program designed to investigate the main hypothesis that the ITB effect manifests in healthcare settings, with White providers investing more time in forming first impressions, diagnosing, recommending clinical interventions, and communicating with White than Black patients, ultimately resulting in worse healthcare outcomes provided for Black (*vs.* White) patients.

Furthermore, considering that healthcare settings are fertile ground for the manifestation of aversive racism (Penner et al., 2010; Hagiwara et al., 2016), given that egalitarian norms are enforced in the medical field (Penner et al., 2019), yet research indicates that physicians still harbor implicit negative attitudes towards Black people (Dovidio et al., 2016; Hagiwara et al., 2020), we take a step further in understanding the ITB phenomenon and its relation to the aversive racism. Specifically, acknowledging that the ITB effect is an unobtrusive discriminatory behavior, and that aversive racists individuals, when placed in contexts where discrimination is against the norm (i.e., medical context), tend to exhibit subtle and indirect discriminatory behaviors towards Black individuals (as opposed to overt discriminatory behaviors) due to their aversion towards the idea of being prejudiced (Dovidio et al., 2016; Dovidio & Gaertner, 2004; Gaertner & Dovidio, 2005), we will test whether aversive racist providers may exhibit a stronger ITB effect than traditional prejudiced or non-prejudiced providers.

Moreover, according to the aversive racism theory, Black individuals may elicit aversive responses from White physicians (Dovidio et al., 2002; Dovidio & Gaertner, 2004; Gaertner & Dovidio, 2005). If this is indeed the case, it is plausible that these physicians who express an aversive racist profile may demonstrate avoidance behaviors toward Black (*vs.* White) patients, leading to shorter consultations and, consequently, less precise diagnoses and quality in clinical recommendations and communication provided to Black (*vs.* White) patients. Therefore, we intend to test the hypothesis that physicians' avoidance behavior towards Black (*vs.* White) patients mediates the effect of the patients' skin color on the time invested in clinically assessing these patients. We specifically expect this mediating effect to be more pronounced among providers who express an aversive racist profile.

In summary, this dissertation presents a research program aimed at providing empirical evidence for our proposal that *the Intergroup Time Bias (ITB) represents a primary*

insidious discriminatory behavior exhibited by aversive racists, with significant consequences for racialized devalued outgroups. This proposal was addressed within simulated healthcare settings. We specifically hypothesize that *the ITB permeates the medical context, wherein White medical trainees exhibit a bias in their investment of time towards clinical assessment and decision-making processes that favors White (vs. Black) patients.* Additionally, we hypothesize that *the ITB affects the accuracy of diagnoses, as well as the quantity and quality of clinical recommendations and patient communication.* Importantly, we predict that *the ITB effect is associated with aversive racism* in two distinct ways. First, we propose that *the ITB is most prevalent among individuals who claim to uphold egalitarian beliefs, consider themselves non-racist, but hold significant negative attitudes and beliefs about Black individuals (i.e., aversive racists).* Second, we suggest that *avoidance behavior, particularly physical examination avoidance, may serve as an underlying mechanism through which patients' skin color influences the time invested, particularly among individuals exhibiting an aversive racist profile.*

To test these hypotheses, we first conducted a comprehensive literature review on the social psychology of time, discussed our theoretical rationale and detailed prior research on healthcare disparities, where the ITB effect could potentially be a pervasive phenomenon (Chapter 1). We then developed a framework for studying the ITB effect in the medical context across four clinical dimensions: patient impression formation, clinical assessment, prescription of clinical interventions, and patient-provider communication. The study of these dimensions was conducted through eight empirical studies and eight pre-tests of materials or paradigms. These studies are organized into three empirical chapters, each of which delves into specific aspects of the dimensions under investigation.

In the context of impression formation and clinical assessment (Chapter 2), we tested the hypothesis that White medical trainees invest more time in forming first impressions,

diagnosing, assessing the pain and indicating medication for White patients than Black patients, and that this time bias would be stronger in providers who exhibit an aversive racist profile (i.e., high implicit bias and egalitarianism beliefs but low racism). In Chapter 3, we investigate whether White medical trainees invest more time in evaluating a clinical case and indicating clinical recommendations for White than Black patients. Additionally, we examine the mediating role of time investment bias on the relationship between patient skin color and diagnostic accuracy, and the quantity and quality of clinical recommendations for patients. In Chapter 4, we go further by examining the impact of time investment bias in the context of medical diagnosis and prescription, but also with a focus on the communicational aspect between patients and providers. We further investigate whether physical examination avoidance is an underlying mechanism of the ITB effect in the medical realm among those who express an aversive racist profile. Finally, we present a general discussion and final considerations regarding the research conducted in this thesis, including the limitations of our research program. Additionally, we propose suggestions for future investigations in this research line.

This research program is framed within the context of national Portuguese research, conducted at the Institute of Social Sciences (ICS) and the Faculty of Psychology (FP) at the University of Lisbon. By conducting the majority of the studies presented in this thesis in Portugal, we aim to contribute to the growing body of knowledge on the social psychological processes underlying healthcare disparities (Bernardes et al., 2021; Bernardes & Lima, 2010; Diniz et al., 2020; Madeira et al., 2022a; Madeira et al., 2022b; Rufino, 2013), with a specific focus on addressing the ITB effect in the medical context. The collaborative spirit fostered by the active involvement of both ICS and FP at the University of Lisbon reflects our commitment to academic rigor and an interdisciplinary approach in this research endeavor.

CHAPTER 1 – BEYOND CHRONOS: MEANING AND CONSEQUENCES OF TIME

INVESTMENT IN SOCIAL RELATIONS

Anthropologists have long argued that time is a socially constructed phenomenon, and different societies have different ways of perceiving and measuring time (Evans-Pritchard, 1940; Adam, 1994). Furthermore, sociologists point out that time interacts with political dynamics among social groups, as seen in the case of the establishment of Greenwich Mean Time (GMT) as a standard time for trade between countries. Britain made this decision despite opposition from other countries like France, and it shows how power plays a role in determining which local time other countries should compare themselves to (Lee & Liebenau, 2000). Within this framework, time serves as a fundamental facet of social interactions. Grasping how it is allocated among social groups is key to comprehending the dynamics and nature of intergroup relations.

Since this dissertation explores the time investment bias in intergroup relations, specifically the Intergroup Time Bias (ITB; Vala et al., 2012), this chapter describes the social psychological theoretical rationale of the ITB based on a comprehensive literature review of the meaning of behavioral time investment, its consequences, and the underlying mechanism. The chapter is structured as follows: Firstly, we provide an overview of the study of time in psychology and social psychology, building on this foundation to differentiate between the meanings attributed to time in social psychology and the specific case of the ITB. Secondly, we examine discrimination in healthcare provision within asymmetrical intergroup relationships, establishing the relevance of studying the ITB effect in this context. Additionally, we discuss the potential consequences of the ITB effect in the healthcare context, exploring its probable impact on interactions between providers and patients and ultimately its influence on healthcare outcomes. Finally, we explore the relationship between the ITB effect and aversive racism in the medical field, shedding light on the potential mechanism underlying this effect, i.e., physical examination avoidance.

The Study of Time in Psychology

Time, as a complex and essential aspect of human experience, carries great significance (McGrath & Kelly, 1986; Younggreen & Silcox, 2020). In Psychology, to the best of our knowledge, the first paper addressing the concept of time is credited to Israeli (1932a). In this seminal study, the author scrutinized the emotional responses of individuals in relation to their past, present, and future. Specifically, this line of research sought to investigate the emotions of individuals in relation to how they represent the progression of time in their lives, and how these representations considerably impact their mental well-being as they navigate the temporal dimensions of their existence. Israeli's research revealed, for example, that when asking individuals to think about different periods of their lives, past experiences had minimal impact on the participants' emotional behavior over time. While only 13% were highly preoccupied with their past misfortunes, 94.5% displayed a positive outlook towards their future. Additionally, 67.4% of the participants were concerned with present issues, 56.3% fantasized about future events, and 89.3% planned ahead. This pioneering work laid the foundation for a more profound comprehension of time perception, expanding into diverse psychological areas such as psychopathology and development (Israeli, 1932a; Israeli, 1932b).

In the realm of experimental psychology, considerable research has been devoted to the study of time perception. This includes investigations into how objective time is transformed into our subjective experience of it (Doob, 1971). The focus of these studies has been to determine the extent to which the distortion of objective time depends on the conditions under which we experience time subjectively (Fraisse, 1994). For example, a study by Thomas and Weaver (1975) revealed that the more an individual focuses on time, the longer it seems. However, the perceived passage of time appears to be shorter when a task that a participant is doing is difficult and/or considered interesting. This research line focuses

on the intricate processes of time perception leading to two key understandings. First, individuals' perception of time duration is inherently linked to individuals psychological present (i.e., psychological present corresponds to the span of an experiential process rather than to a specific duration period). Second, the estimation of time duration comes into play when memory connects a past event to the present moment or establishes a link between two past events (Fraisse, 1994). Essentially, this body of work highlights the crucial role of time perception as an indicator of information processing. It sheds new light on how our internal clock and memory work together to create our unique experience of the passage of time, shaping our understanding of reality.

Attention and its connection with time have also been explored since the early days of psychological research, as pioneering studies like Stroop (1935) demonstrated that participants spend more time on tasks when faced with incongruent stimuli than when stimuli are congruent. Specifically, this research found that when individuals are tasked with identifying the ink color of a word that itself signifies a different color, their response time lengthens compared to situations where the ink color and the color indicated by the word are congruent. This temporal discrepancy is interpreted as evidence of an interference effect, or the Stroop effect, where incongruent stimuli impact an individual's behavior, as seen in the slowed pace of ink color identification. The Stroop effect is, in this way, intrinsically linked to attentional processes because it requires selective attention to respond to one aspect of the stimulus (the ink color) while simultaneously ignoring another aspect (the word).

Investigations into sustained attention (Mackworth, 1948), and attentional blink (Raymond et al., 1992) have similarly employed time as a crucial factor in understanding the dynamics and limitations of our attentional processes. In the case of sustained attention, the focus is on the duration for which attention can be maintained effectively, noting a decline in performance over extended periods. Time here acts as a measure of endurance or the attentional stamina of

an individual, revealing how attentional capacities can deteriorate over time, especially during monotonous tasks (Mackworth, 1948). On the other hand, the concept of attentional blink deals with the temporal processing of rapidly presented stimuli, where time becomes a critical factor in revealing the brief moment of “blindness” following the detection of a target in a rapid serial visual presentation stream (Raymond et al., 1992). Overall, by studying time as an indicator of attention, psychologists have gained valuable insights into different aspects of human cognition, including memory (Baddeley, 1992), learning (Sweller, 1988), decision-making (Kahneman, 2011), and multitasking (Salvucci & Taatgen, 2008). Thus, research on these topics has employed direct observation of the time individuals take to complete a task as a means to deduce subjective psychological processes at work. These may include cognitive interpretations that could influence an individual's behavioral response to specific stimuli that have been previously presented to them.

Not only actual time has been used to address cognitive processes, but also the subjective perception of time duration has also long been recognized as a significant factor closely associated with motivation, as evidenced by numerous research studies (Nuttin, 1964). Essentially, we arrange major life events based on what we need to accomplish or do, using time as a benchmark to synchronize our motivation with our behaviors and plans (Nuttin, 1964). For example, Conti (2001) carried out a study to explore the subjective experience of time and its relationship with intrinsic motivation (i.e., intrinsic motivation is defined as an action performed by an individual because it has inherent value or interest to them; Ryan & Deci, 2000). The results indicated that individuals who scored higher on a self-reported intrinsic motivation scale perceived the duration of the task to be shorter compared to those who scored lower on the same scale (i.e., those with greater intrinsic motivation seemed to experience time passing more quickly). Moreover, studies have found that rewards

given close to the completion of an activity can increase intrinsic motivation (Woolley & Fishbach, 2018).

In a different vein, more recent research has further explored individuals' abilities to consciously simulate specific personal events in the future (McCormack & Hoerl, 2020) and the potential benefits of subjective perception of mental time travel (Baumeister et al., 2020). For instance, in a study conducted by Baumeister et al. (2020), participants were asked to record their most recent thoughts over a designated time period during the day. Researchers found that thinking about the future allows individuals to anticipate situations with multiple possible scenarios. By considering these possibilities, individuals may actively guide events towards outcomes that are more favorable to them. Thus, this research line has suggested that prospective thinking may function as an adaptive mechanism, allowing individuals to anticipate and prepare for a range of future scenarios, even those that may be unexpected or challenging (Baumeister et al., 2020).

In summary, the study of time in psychology spans a wide array of research areas and has significant implications for understanding human behavior and cognition. Beginning with the early works of Israeli (1932), it was revealed that people's emotional responses and well-being are intricately tied to how they perceive temporal dimensions of their existence. The transformation of objective time into subjective experiences, and the role of memory within the context of time perception, have also been thoroughly investigated. A link between time and attention was demonstrated through experiments, such as those conducted by Stroop (1935), showing how time can be an indicator of cognitive processes involved in attention. Subsequent studies have further interpreted time spending as memory, learning, decision-making, and multitasking cognitive process effects. The role of time in motivation has also been underscored, with research indicating that our perception of time can influence our level of intrinsic motivation. Lastly, more recent work has explored the concept of mental time

travel, suggesting that thinking about the future can serve as an adaptive mechanism, allowing individuals to anticipate and prepare for positive vs. negative life events.

Consequently, the study of time in psychology, as well as its utilization as a methodological tool can provide a comprehensive lens through which we can better understand the intricate tapestry of human behavior and cognition.

The Social-Psychological Meaning of Time

Within social psychology, time has been predominantly studied as (a) an indicator of attention (Neuberg & Fiske, 1987) and motivation (Brewer, 1988) that individuals allocate when forming an impression of a person; (b) as a reflection of individuals' psychological readiness for commitment in close relationships; (c) in how its association with money influences social behavior and psychological well-being (Reed et al., 2016; Reutner & Greifeneder, 2018); (d) as a measure of threat to the belief in a just world (Aguilar et al., 2008; Correia et al., 2007; Hafer, 2000); (e) as a measure of implicit prejudice (e.g., Fazio et al., 1995; Fazio & Olson, 2003; Dovidio et al., 1986) and implicit stereotyping (e.g., Wittenbrink et al., 2001); (f) as a measure of implicit associations in categorization tasks involving attributes and people (Greenwald et al., 1998); and, more recently, (g) as an unobtrusive discriminatory behavior (e.g., Vala et al., 2012). Consequently, depending on the study's context and the nature of the tasks employed by social psychologists, time means attention, motivation, stereotyping, prejudice towards a specific target, or discriminatory behavior.

Time Spent in Impression Formation

In the realm of impression formation research, the time individuals spend forming an impression reflects the amount of attention they give to a target. For example, Neuberg and Fiske (1987) found that people who dedicated more time to examining details about a person created more individualized impressions, stemming from distinctive and specific traits of the

subject, while those who dedicated less amount of time created more category-oriented impressions, which depended on generalizations and stereotypes about the target's social group. Brewer (1988), on the other hand, presents a different perspective on the process of impression formation. According to the Dual Process model proposed by Brewer, the assimilation of new information about a person with pre-existing knowledge from long-term memory unfolds in two different ways. The first is a category-based or "top-down" approach, where we rely on generalized knowledge or stereotypes to shape our impressions (which is assumed to be short in duration). The second is a person-based or "bottom-up" approach, which takes longer as impressions are formed based on the unique, individual traits of the person, independent of any preconceived categories or stereotypes. The type of processing used can fluctuate depending on an individual's motivation to form an impression of the person in question.

Building on this previous research, Fiske & Neuberg (1990) integrated diverse perspectives on impression formation in their Continuum Model of Impression Formation. They assert that when forming an individuated impression, the observer is more interested and motivated in understanding the person, which results in increased attention to the target and a slower impression formation process (i.e., an individual-based impression formation). Conversely, when forming a category-oriented impression, the observer is less interested and motivated, dedicating less attention to the target and forming evaluative impressions more quickly (Fiske & Neuberg, 1990). Thus, according to these authors, people form impressions of others through a range of motivational and cognitive processes that lie along a continuum, reflecting the extent to which the perceiver utilizes the target's specific attributes. As these processes can be observed in individuals' behaviors, Fiske and Neuberg (1990) propose that the time individuals spend forming impressions of others is influenced by cognitive processes such as attention and motivation.

Time in Romantic Relationships

In romantic relationship research, time has been used as a proxy for motivational construal, since it is assumed as a crucial factor in pinpointing relevant conditions of social interactions between partners, such as the emergence of partner aggression (Arriaga et al., 2016). Additionally, time is emphasized in the Relationship Receptivity Theory (RRT; Agnew et al., 2019; Arriaga et al., 2019), which posits that actual personal time investment is a central concept in understanding relationship dynamics. Specifically, according to the RRT, the quantity of time individuals spend in close relationships can reflect their psychological readiness for commitment (Agnew et al., 2019; Le & Agnew, 2003). Research has also shown that individuals who are in long-lasting relationships, as opposed to those in dating relationships that end shortly, tend to exhibit greater psychological attachment, a stronger long-term orientation, and a higher intention to persist in the relationship (Arriaga et al., 2001). These findings highlight the importance of considering the role of time in understanding relationship dynamics and outcomes.

Time and Money

Time has also been studied in relation to money in a research line that explores how the two concepts are interrelated and how this association influences social behavior and psychological well-being. Considering that individuals internalize an association between time and money, Devoe and Pfeffer (2007a, 2007b), for example, investigated the “time is money” effect, which suggests that individuals who are paid hourly wages are less likely to engage in activities where time is perceived as being spent rather than invested, such as volunteering. Furthermore, these studies suggest that individuals paid hourly place greater importance on the monetary value of time, as they are more willing to self-report trade more time for money compared to those not paid hourly. The authors interpreted this effect by supposing that being paid by the hour in a job made the culturally grounded association

between time and money more accessible. As a result, individuals respond as if they have internalized the economic value of time (DeVoe & House, 2012). However, the association of time and money can negatively impact psychological well-being, as individuals who focus solely on the economic value of time may miss out on the enjoyment of leisure and pleasurable activities. This is because they consider it a waste of money to invest their time in such activities, which ultimately leads to a poorer quality of life and lower levels of happiness (DeVoe & Pfeffer, 2012; DeVoe & House, 2012). Other studies have found that valuing time over money is associated with greater happiness and well-being (Whillans et al., 2016; Whillans et al., 2019), and that focusing on time rather than money can increase prosocial behavior (Reed et al., 2016) and attentiveness in communication (Reutner & Greifeneder, 2018). Overall, research on the relationship between time and money sheds light on how these concepts influence social behavior and psychological well-being.

Time as Threat to Belief in a Just World

Recent research utilizing a modified Stroop paradigm, namely the Emotional Stroop Task, has employed the interference effect, as indicated by the duration it takes to complete a task, as a measure of perceived threat (Aguiar et al., 2008; Correia et al., 2007; Hafer, 2000). A notable example is the study by Correia et al. (2007), where they examined the effect of observing an innocent victim's suffering on individuals' belief in a just world (BJW). They proposed that becoming aware of innocent victims can pose a threat to an individual's BJW, particularly when the victims are part of the observer's in-group as opposed to their out-group. To investigate this, participants were shown a video that told a story of victimization. Following this, the participants were asked to perform an emotional modified Stroop task in which they were required to identify the color of asterisks that appeared after justice-related or neutral words were subliminally primed. The duration it took for participants to complete this task was utilized as an implicit measure of the threat to BJW. The findings of the study

showed that it was chiefly the innocent victims, especially those from the observer's in-group, that triggered a threat to the observer's BJW. The study also broadened the application of the BJW theory to encompass intergroup contexts, thereby contributing additional insights into the psychological mechanisms involved in social categorization, justice, and victimization. Consequently, this research underscores the value of utilizing time as an indirect indicator of implicit processes pertaining to social perception and attitudes, thereby enhancing our comprehension of how these processes can influence perceptions of victims and justice.

Time as Implicit Prejudice and Implicit Stereotyping

In the study of implicit prejudice, implicit stereotyping, and implicit bias, time is frequently used as a measure of these constructs. Researchers examine the speed at which associations are formed between targets (e.g., a Black person) and stimuli (e.g., negative stereotypes) as it can provide insights into the underlying attitudinal processes that are not directly observable (see MODE model; Fazio & Towles-Schwen, 1999).

One of the earliest and most influential works that examined intergroup relations by utilizing time as an indicator of psychological processes dates to the 1970s. In a helping behavior experiment, where participants received a telephone call and were asked to assist by calling a service garage, Gaertner (1973) found that White liberal participants hung up faster when speaking to Black callers than when speaking to White callers. Gaertner interpreted this time difference as potentially motivated by an antiblack sentiment that liberals may hold towards Black individuals, which influences behavior in contexts where social norms are not clear to guide their behaviors. This effect was later used to illustrate the indirect forms of discrimination that individuals who hold aversive or negative beliefs about Black individuals, but also support egalitarian beliefs, may express towards Black individuals (Dovidio & Gaertner, 2004; Gaertner & Dovidio, 2005).

Years after the initial study, Dovidio et al. (1986) built upon a new association paradigm proposed by Rosch (1975) regarding cognitive representations of semantic categories. Their work reaffirmed the use of reaction time techniques as an alternative and less reactive method for researching prejudice and stereotyping. They found that individuals are quicker to press a keyboard letter (i.e., the behavioral response) to indicate a word with negative valence (i.e., the second stimulus) when primed with the word “Blacks” (i.e., the first stimulus) (Dovidio et al., 1986). Fazio et al. (1995) introduced modifications to these procedures by incorporating priming stimuli in the form of photos depicting White and Black faces. Their study revealed that White individuals respond more quickly to pressing a keyboard letter (i.e., the behavioral response) when a word has negative valence (Stimulus 2, as in Dovidio et al., 1986) after being primed with photos of Black targets (Stimulus 1) (Fazio et al., 1995).

In a similar vein, Wittenbrink et al. (2001a, 2001b) employed time as a measure of implicit stereotyping. Unlike previous paradigms, they presented a subliminal Stimulus 1 (i.e., at a speed faster than participants’ conscious perception threshold), consisting of racially categorized descriptors (i.e., names typically associated with White or Black individuals). Their findings showed that participants were quicker to press a keyboard letter to indicate a set of letters forming a word stereotypical of White people in the USA after being primed with the word “White.” Similarly, they observed that individuals responded more quickly to press a key when a set of letters formed a word stereotypical of Black people after being primed with the word “Blacks” (Wittenbrink et al., 2001a, 2001b). In another paradigm, time has also been employed as an indicator of racial bias in the decision to shoot. Studies conducted by Correll and colleagues involving university students (Correll et al., 2002) or police officers (Correll et al., 2007) have revealed that individuals exhibit faster response times in shooting an armed target if they are Black compared to White. Conversely, they

show quicker decisions not to shoot an unarmed target if they are White compared to Black. The procedure of this paradigm generally involves presenting participants with a combination of stimuli: Black or White individuals, holding or not weapons. Participants are then required to press a key to indicate whether they would shoot or not. In this paradigm, the action of pressing the key serves as a proxy for the behavior of shooting, and the time taken is interpreted as being caused by a facilitation process triggered by the stereotypical association between the two experimentally pairing stimuli. The researchers argue that this racial bias in the decision to shoot originates from the stereotypical associations of Blacks with concepts of danger and threat deeply ingrained in our culture. Therefore, within this context, time becomes implicitly linked to the process of stereotyping. It is important to note that these paradigms share a common procedural structure. They involve an initial stimulus (referred to as the prime) that provides information about race-based social categories. Subsequently, participants are presented with a second stimulus, which can be a non-stereotypical valenced word (Dovidio et al., 1986; Fazio et al., 1995) or a word stereotypical of the prime stimulus (Wittenbrink et al., 2001a, 2001b). In the paradigms described, researchers infer a subjective, unobserved psychological process from the observed behavior of participants (i.e., pressing a key). However, while Dovidio et al. (1986) and Fazio et al. (1995) propose that the timing of participants' behavior allows for inferences about a more affective process, mainly due to its association with a valenced stimulus, paradigms developed by Wittenbrink et al. (2001a, 2001b), Correll et al. (2002) and Correll et al. (2007) suggest that participants' behavior reflects a more cognitive process. This is because in these paradigms, the stimuli for target-person group categorization are preceded by stereotypical cues, such as a word or an object like a weapon, before the behavioral response, which typically involves pressing a keyboard key. Overall, the time taken by participants to press a key is interpreted as indicative of subjective associations between racial-based categories and stimuli in these lines of research,

which researchers interpret as potential indicators of both implicit prejudice and implicit stereotyping.

In the late 1990s, breakthrough studies on cognitive facilitation and implicit cognition laid the groundwork for the development of a widely recognized paradigm in assessing implicit attitudes: the Implicit Association Test (IAT). This innovative tool uses the time individuals take to press a keyboard key as a measure of implicit associations between a target stimulus and two different categories of stimuli. One category encompasses the target-person stimuli and a valenced set of stimuli, while the other category does not. Within this paradigm, participants are assigned a task that involves pressing a specific keyboard key to correctly categorize the target stimulus presented on a computer screen (Greenwald et al., 1998). In studies on racialized intergroup behavior (Greenwald et al., 2022; Payne & Hannay, 2021), consistent findings have revealed that participants tend to display quicker behavioral responses when presented with target stimuli representing Black individuals and are instructed to press a key indicating whether they share the same category as negative words (compared to positive words). Similarly, participants also display swift behavioral responses when the target stimuli represent White individuals and are instructed to press a key to categorize them with positive words (compared to negative words). In these studies, researchers interpret the observed time differences as reflections of implicit cognitive processes that facilitate behavioral responses to stimuli that are congruently associated (e.g., Black + Negative; White + Positive) while inhibiting responses to stimuli that are incongruently associated (e.g., Black + Positive; White + Negative). These time differences are interpreted as a result of implicit biases within individuals' associative memory. Specifically, the faster associations between Black targets and negative attributes, as well as the quicker associations between White targets and positive attributes, are interpreted as

evidence of a stronger implicit racial bias against Black individuals (Greenwald et al., 2022; Jost et al., 2009; Payne & Hannay, 2021).

The paradigms investigated in this section have often employed time as a measure to evaluate psychological phenomena that arise within individuals' minds while engaging in behavior. This methodology has facilitated an in-depth exploration of how implicit associations and biases impact the processing of information and responses to social stimuli. Consequently, the referred research demonstrates how time is inherent to cognitive, motivational and behavioral dimensions of human interactions.

The Intergroup Time Bias (ITB) Case

As highlighted in the previous section, studies in social psychology have revealed that the extent to which individuals are interested in a person affects the amount of cognitive resources they allocate to form an accurate impression of that person, with low interest leading to a faster formation of impressions (Continuum Model of Impression Formation; Neuberg & Fiske, 1987). Similarly, the Dual Process Model of Impression Formation (Brewer, 1988) suggests that the amount of time people spend forming an impression of a person reflects their motivation to engage in social interaction with that person. This is crucial since factors that influence an individual's interest in another person are highly context-dependent, with group membership being a critical element in shaping one's interest. Importantly, research on time as a measure of implicit attitudes (Correll et al., 2002; 2007; Dovidio et al., 1986; Fazio et al., 1995; Greenwald et al., 2003; Wittenbrink et al., 2001a, 2001b) have observed time biases in racialized intergroup behavior. However, interpreting the observed duration of a specific behavior in response to experimental stimulus pairings as an indicator of an unobserved psychological state, supposedly activated by those pairings, can introduce subjectivity and abstraction to the concept of time. In fact, time in performing a task may be first interpreted as a manifestation of the actual behavior of an individual. In

other words, time is an inherent aspect of behavior itself, objectively intertwined with the actions performed. Without the actual behavioral performance, the duration of the action would be nonexistent. Therefore, taking a pragmatic approach, time is behavior¹ and can provide valuable insights into understanding the various facets of discriminatory behaviors in racialized social relations. It serves as a key interpretive tool in uncovering implicit aspects of such behaviors, namely in the intergroup relation research framework.

Extensive research has shown that people often evaluate others based on their group affiliations (Tajfel & Turner, 1979). As a result, a person's perceived value within a group is closely linked to their group membership, and their skin color can significantly influence the amount of time others spend forming an impression of them (Vala et al., 2012). In other words, a person's social value is heavily influenced by the social significance of their group affiliation, and skin color plays a crucial role in this evaluation process (Bratt, 2022; Ramos et al., 2019; Vala & Pereira, 2012). Vala et al. (2012) not only reaffirmed the notion that people's evaluations of others are influenced by their group affiliations, but they also expanded on this concept by introducing a new perspective on the meaning of time in the process of impression formation. They proposed that due to its scarcity and resultant social value, the time individuals invest in social relations follows a behavioral pattern that favors ingroup (*vs.* outgroup) members in processes of evaluation. Within this context, Vala et al. (2012) offer a valuable contribution to our understanding of the allocation of time in intergroup relations by recognizing its inherent connection to behavior. The initial studies in this line of research date back to the early 2000s. While conducting his doctoral research on the effects of meritocratic individualism and egalitarianism on the infra-humanization of Blacks, Lima (2003) found that White individuals spent more time forming impressions of

¹ In fact, time is objectively defined as the measurement of the Earth's rotation around itself (a day) and its orbit around the Sun (a year), as well as the movement of both around the center of the Milky Way (i.e., galactic year/cosmic year) and beyond (Linton, 2004; Roy, 2021). Therefore, time represents the behavior of displacement along space.

Whites than Blacks. He also discovered that the activation of meritocracy norms, as opposed to equality norms, led participants to form quicker impressions of Black people. They linked this phenomenon to social norms and named it *outgroup depersonalization*. Years later, Aguiar et al. (Study 2, 2008) found that White Portuguese individuals devoted more time to forming impressions of individuals they perceived as members of their own group (i.e., Portuguese White Children) than those they considered part of an outgroup (e.g., Gypsy Children). They similarly named this phenomenon *outgroup derogation*, a concept less distant from what time as a behavior. In the following decade, Vala and colleagues (2012) further explored this phenomenon. Using Lima's experimental paradigm, they developed a research program on time individuals invest to form impressions of ingroup and outgroup members. White individuals were randomly presented with people of Black and White skin tones, one at a time. Alongside these people, a trait would be displayed, and participants' task was to indicate whether the people presented were characterized by this trait or not. No time limit was imposed on the participants. Vala and colleagues' central argument was that due to the higher social value placed on White individuals in society, and considering that time is a socially valuable and limited resource, individuals might be motivated to invest more of their time in forming impressions of their own group (i.e., White targets) than the outgroup (i.e., Black) targets. Indeed, the authors consistently found across four studies that individuals invest more time in evaluating ingroup targets. Specifically, White participants invested more time forming impressions of White targets than Black ones. The phenomenon was coined as the Intergroup Time Bias (ITB) effect, an unobtrusive discriminatory behavior characterized by the individuals' motivation to invest more time in evaluating and making decisions on ingroup over outgroup members. Moreover, the ITB effect was predicted by implicit prejudice (Study 1) and racism (Study 3); occurred regardless of the traits' stereotypicality (stereotypical vs. nonstereotypical) and valence (positive vs. negative) (Study 2); and was not

influenced by the motivation to control for prejudice (Study 3). Finally, the ITB effect also occurred in a minimal group context (Study 4). This phenomenon has been supported by other studies as well (Pimentel, 2018; Teixeira, 2014).

However, despite the advancements made by Vala et al. (2012) in understanding the significance of time in intergroup relations, their studies did not fully disentangle time from motivation and the social value of groups. This limitation weakens their argument and hampers a comprehensive understanding of the Intergroup Time Bias (ITB) phenomenon. It is important to recognize that the ITB is a complex phenomenon influenced by various factors, including prejudice, racism, social norms, group membership, and other known variables that shape discriminatory behaviors. Therefore, the time invested in intergroup relations should be interpreted as a manifestation of discrimination influenced by these elements, rather than simply a reflection of an abstract psychological state. Taking a behavioral perspective on time, it becomes clearer that the concept of ITB is best understood as a form of discrimination. This viewpoint aligns with previous evidence demonstrating the association between time bias and the key variables that influence unobtrusive discriminatory behaviors (Lima, 2003; Vala et al., 2012).

In summary, through their examination of time investment bias linked to the social value of groups, Vala and colleagues (2012) have significantly advanced our understanding of intergroup relations within asymmetric social groups. This research approach, which considers time as both a scarce resource and a social value, builds upon earlier studies of impression formation by positioning time as a resource leveraged to favor ingroup members in evaluative and task performance settings. Nonetheless, Vala and colleagues (2012) further propose that ITB could be a widespread phenomenon pervading various social spheres. This bias towards one's own group can, in turn, significantly impact the quality of outcomes for members of outgroups (*vs.* ingroup). Consequently, such unobtrusive discriminatory behavior

holds the potential to account for disparities observed in many critical facets of social life, such as the provision of medical care. However, what is known regarding biases in healthcare provision within asymmetrical intergroup relationships? Is it plausible to reflect on the ITB effect's impact within a healthcare environment involving patients? What could be the speculative repercussions of this time bias? These inquiries are addressed in the forthcoming segment of this chapter.

The ITB Effect on Biased Healthcare

The medical context provides a unique social-psychological environment to address the meaning, pervasiveness, and consequences of the ITB for critical racialized intergroup behavior. Indeed, the 2021 report by UNESCO's Global Forum against Racism and Discrimination highlighted a substantial disparity in Covid-19 mortality rates within the United States, showing that the Black community faced a mortality rate twice as high as that of their White counterparts. In the United Kingdom, the 2020 Office for National Statistics reports similarly underscores a worrisome gap, indicating that Black men had a 3.3 times higher mortality rate from Covid-19 than White men, while Black women had a 2.4 times higher rate than White women. These disparities in life expectancy, as well as medical care and healthcare outcomes between Black and White populations, consistently shown in the literature (for review see Penner et al., 2019), highlight the deeply-rooted social issues stemming from racism and discrimination against Black individuals. Slavery, which served the socioeconomic needs of Europeans for centuries and rapidly expanded from the 15th to the 17th centuries, represents a key historical factor associated with the expression of racism (Fredrickson, 2015; Ramos et al., 2019; Vala & Pereira, 2012; Wilson, 1996). It reinforced and perpetuated the notion of White superiority over Black individuals, legitimizing violent and discriminatory behaviors that persist in today's society in both blatant and subtle forms (Fredrickson, 2015; Vala & Pereira, 2012).

Racism, as defined by Vala and Pereira (2012), encompasses key concepts related to human nature and society. At its core, it comprises five principal elements. Firstly, the categorization process posits that humans can be divided into distinct racial or ethnic groups. Secondly, differentiation is a belief system that emphasizes deep-seated differences among these classified groups. Thirdly, hierarchy is a viewpoint that suggests certain groups are superior based on perceived differences. Fourthly, essentialization asserts that the differences among these groups are innate, constant, and unalterable. Finally, the idea of ‘radical alterity’ suggests that not all groups possess the typical ‘human essence’ (Leyens et al., 2001). Furthermore, Vala and Pereira (2012) identify two significant dimensions of racism: biological and cultural. Biological racism involves the classification of humans into racial groups based on the notion of ‘race’. On the other hand, cultural racism, also referred to as ethnicism, categorizes humans into various ethnic groups based on the concept of ‘ethnicity’.

In healthcare, racism hinders the pursuit of equitable and considerate medical services among social groups (Williams & Mohammed, 2013). Recent comprehensive analyses of the literature argued that racism underlies disparities and imbalances in healthcare provision across numerous countries and care domains, such as diabetes management, mental health support, end-of-life services, cardiology, and pain management (Hamed et al., 2022; Williams & Mohammed, 2013). Racialized minority groups not only experience poorer healthcare but are also perceived as less desirable healthcare users compared to the majority group (i.e., White) (Hamed et al., 2022). In fact, healthcare providers, similar to the general population (Sabin et al., 2009), may exhibit biases in their decision-making (FitzGerald & Hurst, 2017), non-verbal behaviors (e.g., non-synchrony behaviors) (Hamel et al., 2018), and language use (Siminoff et al., 2006) when interacting with patients from different racial backgrounds. For example, Black patients are less likely than Whites to receive treatments for a wide range of diseases (Williams et al., 2019), and physicians’ racial bias can lead to

less appropriate treatment recommendations for Black patients with chest pain symptoms (Green et al., 2007) and fewer prescriptions for post-surgical pain medication (Sabin & Greenwald, 2012).

Additionally, within the realm of healthcare disparities literature, studies also suggest the intergroup time bias in medical care (Pimentel, 2018; Teixeira, 2014), as empirical research indicates that non-Black doctors allocate less time to treatment planning, health education, answering queries, and assessing the health awareness of Black patients as compared to White patients (Gross et al., 1998; Oliver et al., 2001). However, as far as we know, although these findings are critical and alarming, the theoretical rationale, as well as its social-psychological mechanisms, have not been extensively explored by researchers in recent decades.

Developing a social psychological theorizing to understand this phenomenon is of utmost importance, especially considering the scarcity and value of time in the medical context (Yahanda & Mozersky, 2020). Indeed, a systematic review of studies from 67 countries reported that general practitioners' consultations typically last only a few minutes (Irving et al., 2017). In the United States, for instance, a 2018 study involving 20,329 physicians demonstrated that most providers spend between 17 and 24 minutes with their patients (33%), with this duration ranging from 9-12 minutes (27%), 13-16 minutes (29%), and over 25 minutes (11%) (Health, United States, 2018). In Portugal, recent discussions regarding the role of time in medical appointments prompted the *Ordem dos Médicos* (the organization responsible for regulating physicians' professional conduct in the country) to implement a new regulation in September 2019. This regulation stipulates a minimum duration for medical appointments, which varies from 5 to 60 minutes. The duration is determined based on several factors, such as the nature of the appointment (e.g., tele appointment), the physician's speciality, and whether it is an initial consultation or a follow-

up encounter with the patient. The organization justified this action, asserting that time is a crucial aspect of clinical care with significant implications for clinical practice (Ordem dos Médicos, Portugal, 2019). Supporting this notion, Morrell and colleagues (1986) found that providers who spent less time with patients identified fewer health issues.

From the perspective of patients, previous research has also shown that they are often aware of doctors' time constraints, evident through crowded waiting rooms and healthcare professionals operating under high levels of pressure (Lussier & Richard, 2007). Studies have also shown that consultation duration is the primary cause of patient dissatisfaction in primary care (Cape, 2002). Time constraints are particularly detrimental in racially asymmetrical and discordant clinical interactions (i.e., when non-Black physicians interact with Black patients). Extensive research on provider-patient communication reveals that Black patients often speak less and experience lower-quality, shorter face-to-face interactions with White providers than their White counterparts (for review, see Cooper & Roter, 2003; Penner et al., 2012; Shen et al., 2018). For instance, Siminoff et al. (2006) found that physicians engaged in more relationship building with White than no-White patients with cancer, also educating or counseling less the former group of patients. Similarly, Beach et al. (2011) showed that in the realm of patient-provider communication, Black (*vs.* White) patients with HIV speak less with their non-White physicians, which might lead us to suppose that this behavior arises from the physician's reduced time investment in the clinical care of these patients. Pimentel (2018) also found that White physicians tended to dedicate less time to consultations with Black patients compared to White and Brown patients. Additionally, analyzing the likelihood to prescribe treatments to relieve patients' pain, Hirsh et al. (2015) found that non-Black physicians spent more time rating the pain White than Black fictitious patients, which is an indication of an ITB effect in this domain, although the authors did not theorize about this possibility. However, regarding these last findings, the

authors indicate that they should be interpreted carefully given the unbalanced nature of the groups analyzed in the study.

Taking into account the aforementioned evidence, incorporating the rationality of the ITB effect from social psychology can make a significant theoretical contribution to the study of healthcare disparities in medical settings. By employing a systematic approach to study time investment in evaluative clinical tasks, we go further by theorizing that, given time is a scarce and therefore a valuable resource in the medical context, providers may invest it in a way that favors White patients versus Black ones during different processes of clinical evaluation such as impression formation, clinical assessment, and communication processes. Additionally, considering the intricate nature of medical evaluation, it is reasonable to posit that physicians who invest more time in clinically assessing and making decisions about patients' cases are more likely to reach accurate diagnoses and offer appropriate clinical recommendations and written communication to patients (Elia et al., 2016; Lighthall & Vazquez-Guillamet, 2015; Moulton et al., 2007). Consequently, this research program also investigates the impact of time investment biases on the quality of healthcare outcomes provided to patients.

The ITB Effect and Aversive Racism in the Medical Field

As explored in the previous section, numerous studies have consistently shown that there are persistent healthcare disparities between Black and White populations (Penner et al., 2019; Williams & Mohammed, 2013). The aversive racism framework has emerged as a prominent theoretical explanation for the expression of biases in this context (Penner et al., 2010). This is because healthcare providers widely embrace egalitarian norms in the medical realm, yet they may unconsciously harbor negative feelings and beliefs towards Black individuals (Hagiwara et al., 2016; Penner et al., 2016; Penner et al., 2019). Essentially, the aversive racism theory posits that individuals in Western societies learn, through their

socialization process, that good people are egalitarian and non-prejudiced. However, they also learn implicit negative beliefs, attitudes, and behaviors that society associates with Black people. As a result, individuals internalize both prejudiced and non-prejudiced belief systems and act to avoid or minimize the discomfort caused by the values-based motivational tension between their prejudiced and non-prejudiced values (Dovidio & Gartner, 2004; Gartner & Dovidio, 1986).

There are two main consequences of the aversive racism documented in the literature: firstly, individuals tend to discriminate systematically when the norms for appropriate behavior are ambiguous (Dovidio & Gaertner, 2004; Gaertner & Dovidio, 2005), or when they can attribute their discriminatory actions to factors other than race (Dovidio et al., 2017). Secondly, they may withdraw from interracial encounters, thus disengaging from such situations (Dovidio & Gaertner, 2008; Gaertner & Dovidio, 2005; Murrell, 2020). The first consequence has been extensively documented and scrutinized across various contexts such as healthcare outcomes, intergroup relations, intergroup conflict, educational outcomes, stress and mental health issues, and enduring economic disparities (see Murrell, 2020 for review). Conversely, the second consequence, the tendency to avoid interracial interactions, has not been as thoroughly examined (for a review, see Dovidio et al., 2017). This tendency assumes that individuals socialized within the aforementioned ambivalent context may feel uncomfortable and subsequently attempt to withdraw from the interaction as swiftly as possible (Dovidio & Gaertner, 2004). This is because not only is the Black individual perceived as an aversive stimulus to these individuals, but the idea of being prejudiced in an interracial encounter is also considered aversive (Gaertner & Dovidio, 2005).

Aversive racism has also been investigated as a particular combination of explicit and implicit racial bias towards Blacks (Dovidio & Gaertner, 2004; Dovidio et al., 2017). Specifically, an aversive racism pattern occurs when individuals nurture low explicit but also

high implicit biases towards Black people (Dovidio & Gaertner, 2004; Hagiwara et al., 2016; Penner et al., 2010). Previous, although limited, evidence on healthcare inequalities had shown that providers who expressed this pattern of biases had fewer positive reactions of Black patients towards them when compared to providers who are low in both explicit and implicit bias or high in explicit and implicit bias (Penner et al., 2010). Penner et al. (2013) further found that patients exhibited lower trust in physicians who demonstrated this pattern of racial biases. This reduction in trust was observed four weeks following patient-physician interactions. More recently, Hagiwara et al. (2016) demonstrated that physicians who exhibited low explicit but high implicit racial bias tended to engage less and display more negative affect towards Black patients in comparisons with physicians that expressed different racial attitude profiles (i.e., traditionally prejudiced, or non-prejudiced providers). This was especially the case when interacting with Black patients who had previously experienced discrimination.

Nevertheless, despite the insights from these studies indicating that physicians' low explicit but high implicit biases impact the way Black patients evaluate, trust, or engage with providers, no study has comprehensively explored whether the manifestation of aversive racism is associated with the time providers invest in forming impressions, conducting clinical assessments, or communicating with patients. Furthermore, as per the aversive racism theory (Dovidio et al., 2002; Dovidio & Gaertner, 2004; Gaertner & Dovidio, 2005), in fields as sensitive as healthcare, Black individuals might provoke aversive reactions from White physicians. If this is the case, it is conceivable that such physicians might display avoidance behaviors towards Black patients as compared to their White counterparts, leading to shorter consultations. Consequently, this could result in less accurate diagnoses and a decline in the quality of clinical recommendations and communication provided to Black patients, as opposed to White patients. Therefore, our aim is to explore whether physicians' avoidance

behavior towards Black patients (as opposed to White patients), mediates the effect of the patients' skin color on the time aversive racist physicians invest in clinically assessing these patients.

Overview

In this chapter, we examine the foundational principles that shape our comprehension of time investment bias within intergroup dynamics and healthcare disparities. We initially traverse the landscape of time study within psychology and social psychology, underscoring its import within various theoretical constructs and research models. Thereafter, we delve into the multifaceted perspectives on time, highlighting its essential role in understanding the ITB phenomenon. Within this theoretical structure, we introduce an innovative socio-psychological interpretation of racial discrimination in healthcare services. This assessment underscores the necessity to probe the ITB effect within the medical realm. As we close this chapter, we draw a theoretical parallel between the ITB effect and aversive racism within a medical context. We further postulate that avoidance behaviors could act as the primary catalyst for this effect.

In the forthcoming chapters, our exploration pivots towards the hypothesis that White medical trainees invest more time in forming first impressions, diagnosing, assessing pain, and prescribing medication for White patients than for Black patients. Moreover, we suggest that this bias in time investment would be stronger among providers who display an aversive racist profile (Chapter 2). Chapter 3 centers on the investigation of whether White medical trainees invest more time in evaluating clinical cases and prescribing clinical recommendations for White patients as opposed to Black patients. We also aim to investigate the mediating role of time investment bias in the relation between patients' skin color and diagnostic accuracy, as well as the number and quality of clinical recommendations provided to patients. Chapter 4 plunges into the evaluation of the impact of time investment bias not

only in medical diagnosis and clinical recommendations but also within the sphere of patient-provider communication. We extend our exploration to understand whether the avoidance of physical examination underlies the ITB effect in the healthcare among individuals who express an aversive racist profile. In the last section of this dissertation, we encapsulate our comprehensive discussion and final thoughts on the research conducted in this program, solidifying the discoveries and their implications.

**CHAPTER 2 - INTERGROUP TIME BIAS AND AVERSIVE RACISM IN THE
MEDICAL CONTEXT**

Abstract ²

Time is fundamental to organizing all aspects of human life. When invested in relationships, it has a psychological meaning as it indicates how much individuals value others and their interest in maintaining social relationships. Previous research has identified an intergroup time bias (ITB) in racialized social relations, defined as a discriminatory behavior in which White individuals invest more time in evaluating White than Black individuals. This research proposes an aversive racism explanation for the ITB effect and examines its consequences in the medical context. In four experimental studies ($N = 434$), we found that White medical trainees invested more time in forming impressions of White (vs. Black) male patients. Study 5 ($N = 193$) further revealed more time investment in diagnosing, assessing pain, and prescribing opioids for White than Black male patients. This biased time effect mediated the impact of patients' skin color on healthcare outcomes, leading to greater diagnostic accuracy and pain perception, and lower opioid prescriptions. A meta-analytical integration of the results (Study 6) confirmed the ITB effect reliability across experiments and that it is stronger in participants with an aversive racist profile (vs. consistently prejudiced or non-prejudiced). These findings provide the first evidence that bias in time investment favoring White (vs. Black) patients is associated with aversive racism and impacts medical healthcare outcomes. Furthermore, these results offer insights into the socio-psychological meaning of time investment in healthcare and provide a theoretical explanation for an understudied insidious form of discrimination that is critical to comprehending the persistency of racial healthcare disparities.

Keywords: racial discrimination; aversive racism; intergroup time bias; impression formation; healthcare disparities.

² This paper was invited for resubmission to the Journal of Personality and Social Psychology. Authors: Emerson Araújo Do Bú, Ana Filipa Madeira, Cicero Roberto Pereira, Nao Hagiwara, & Jorge Vala.

Time is one of the most valuable resources in human life, and it is a fundamental dimension of social interaction (McGrath, 1988). Indeed, time is ubiquitous in how we socially organize ourselves, including our work lives, leisure activities, educational experiences, or relationships with our families and friends (Hamermesh, 2019). It is central to understanding how people function in society because it is a social value, as expressed by the popular saying, “time is money” (Leclerc et al., 1995). In recent decades, the way people use and perceive time has become the object of research in various fields of knowledge (Hamermesh, 2019; Youngreen & Silcox, 2020). Recent studies have shown, for example, that time is considered even more important than money in framing individuals’ general well-being (see Dunn et al., 2020; Whillians et al., 2016; Whillians et al., 2019, for a review). In general, a social and psychological consequence of time as a valuable resource is that the quantity of time individuals invest in an activity reflects the extent to which that activity is important to them (Hamermesh, 2019). Within this assumption, when invested in relationships, time has a psychological meaning as it indicates how much individuals value other people and are interested in continuing a social relationship with them (Hall, 2019; Reutner & Greifeneder, 2018; Woolley & Fishbach, 2018).

In a more recent research line, time has also been investigated as the social value individuals give to different social groups (Vala et al., 2012). Specifically, within the context of racialized social relations, the time invested by individuals to members of their own group (ingroup), in comparison to that allocated to members of another group (outgroup), has been studied as a discriminatory behavior against socially devalued groups (Aguiar et al., 2008; Vala et al., 2012). For example, Vala and colleagues (2012) found that when evaluating ingroup and outgroup members, individuals bias their time by investing more of it when forming impressions of White than Black targets, which is referred to as the Intergroup Time Bias (ITB) effect. The current research program extends the scope of the ITB effect in three

critical ways. First, the study seeks to demonstrate the pervasive nature of the ITB across various social spheres, with a particular focus on its implications for socially devalued groups in high-stress contexts, such as the medical field. Second, by delving into the underlying racial attitudes that contribute to the ITB prevalence, we further present an aversive racist explanation for this phenomenon and discuss the social and psychological implications of time investment. Finally, our study is the first to comprehensively investigate the downstream consequences of the ITB on healthcare outcomes for patients, providing insights into the impact of this bias in medical decision-making.

Intergroup Time Bias in Clinical Interactions

Time has been studied by numerous research lines in social psychology, and its meaning varies depending on the characteristics of the object of study, the context, and the main theoretical framework used by researchers (see Youngren & Silcox, 2020, for a review). For example, within the impression formation literature, time has been studied as the amount of attention individuals give to processing information about a target-person's attributes (Neuberg & Fiske, 1987). The time spent forming an impression of a person has also been analyzed as an indicator of the perceiver's motivation and interest in forming an accurate impression of a target-person (Brewer, 1988). Moreover, within the implicit attitudes' literature, time reaction to evaluative and conceptual stimuli has been the cornerstone of well-known measurement paradigms of implicit stereotyping (e.g., Wittenbrink et al., 2001), implicit prejudice (e.g., Dovidio et al., 1986; Fazio et al., 1995); and the more general implicit bias in social categorization (Greenwald et al., 1998; Greenwald et al., 2003).

Despite the centrality of time as a methodological tool for assessing a person's information processing and for measuring implicit attitudes, only recently have the socio-psychological meaning and consequences of time investment become the focus of interest in

intergroup relations. Specifically, since time is a valuable and scarce resource, time investment in social interactions can be motivated by individuals' general tendency to favor ingroup over outgroup members (Tajfel & Turner, 1979; Vala et al., 2012). Accordingly, the time individuals devote to interacting with ingroup and outgroup members can reveal a form of intergroup discrimination. This possibility is consistent with the notion that time investment might be related to psychological forces operating in racialized social relations. Previous research by Vala and colleagues (2012) on the ITB effect in interracial relations has suggested that the time individuals invest in intergroup relations can reveal a discriminatory behavior characterized by individuals' motivation to invest more time in interacting with members of the ingroup than the outgroup. In several experimental studies, Vala et al. (2012) found that White participants consistently invested more time forming impressions of White than Black targets. Moreover, the ITB effect was predicted by participants' implicit prejudice and explicit racism.

In the medical context, previous observational research has indirectly alluded to a similar phenomenon in doctor-patient communication. Specifically, non-Black physicians typically spent less time providing treatment planning, health education, answering questions, and assessing Black (*vs.* White) patients' knowledge about health (Gross et al., 1998; Oliver et al., 2001; Waitzkin, 1985). Additionally, Hirsh et al. (2015) found that non-Black physicians spent more time rating the pain of White than Black fictitious patients. In terms of time waiting for medical care, the opposite effect is found, as previous research has shown that Black patients wait longer than White ones for clinical appointments (Qiao et al., 2016; Ray et al., 2015). To our knowledge, however, no research to date has examined whether there is a time bias while providers form first impressions of patients, even though previous studies have pointed to its importance (e.g., clinical first impressions of patients formed by physicians within the first seconds of contact can be linked to subsequent diagnosis) (Balla et

al., 2012; Beglinger et al., 2015; Bosner et al., 2014; Breyspraak et al., 1977; Kostopoulou et al., 2016). Furthermore, despite observational evidence pointing to more time invested in White than Black patients in communication processes, no study to date has systematically investigated whether time investment bias in the clinical decision-making process can affect the actual healthcare outcomes for patients. Also, it is critical to analyze whether this bias in time investment is related to one of the expressions of racism in egalitarian and democratic western societies. Specifically, since the ITB effect can reveal an unobtrusive form of discrimination, it might be specially expressed by individuals who define themselves as egalitarian and non-prejudiced, but who nonetheless harbor nonconscious implicit bias against Black individuals (Dovidio & Gaertner, 2004). With this in mind, we examined the role of providers' explicit and implicit racial biases and egalitarian beliefs in the ITB effect within the aversive racism framework.

Intergroup Time Bias and Aversive Racism in Clinical Interactions

Healthcare disparities between Black and White individuals are the most well-documented in the literature (Penner et al., 2019). Such inequalities have been attributed to unjust economic, political, and social factors (Braveman, 2006), but are also rooted in basic psychological mechanisms which foster providers and patients' racial bias (Dovidio et al., 2017). The aversive racism framework has been one of the proposed theoretical explanations addressing such bias in the medical context (for review, see Dovidio et al., 2017; Penner et al., 2019). It is a specific type of contemporary racial bias held by people who endorse egalitarian values, believe themselves to be unprejudiced, but nonconsciously hold negative attitudes and feelings toward Black individuals (Dovidio & Gaertner, 2004). The theory assumes that most people in the contemporary United States have internalized the justice principle that all people are equal and deserve the same rights and opportunities, and for this reason, they sustain non-prejudiced beliefs (Dovidio & Gaertner, 2004). However, such

individuals still harbor nonconscious negative attitudes they have learned in their socialization process, in which a hierarchical social structure that disadvantages Black people is still maintained (Dovidio et al., 2017).

To capture aversive racists, a combined pattern of explicit (conscious, deliberate) and implicit (nonconscious, spontaneous) racial bias towards Black people has been used (Dovidio, 2001; Dovidio & Gaertner, 2004; Hagiwara et al., 2016). Predominantly, previous research has shown that aversive racists discriminate against Black individuals in different situations. For example, when they find a justification other than the target's skin color (e.g., aversive racists defend their refusal to help Black people by emphasizing the duration of a task, implying that they are lengthy; for a review, see Saucier et al., 2005); but also through subtle behaviors toward Black people (e.g., distancing non-verbal behavior) (Dovidio et al., 2002). In the medical context, previous studies have found that non-Black physicians with low explicit but high implicit racial biases elicit fewer positive responses and less trust from Black patients when compared to providers with other racial attitudes profiles (Penner et al., 2010; Penner et al., 2013). More recently, Hagiwara and colleagues (2016) further showed that when physicians with an aversive racist profile (relative to other profiles) interacted with patients who reported prior discrimination incidents in their lives, they were rated as having a greater negative affect and, more importantly, as being less engaged during clinical appointments with Black patients. Indeed, it is well-documented that Black individuals respond quite negatively to aversive racists. This is probably because aversive racists often convey mixed messages toward Black people, such as positive verbal behaviors that do not match with their negative non-verbal behaviors (Dovidio et al., 2002; Hagiwara et al., 2016). We argue that less time invested by aversive racists in Black patients represents an understudied insidious form of discriminatory behavior.

In fact, there is no direct experimental evidence that aversive racism affects the time physicians invest in patients, specifically at the beginning of consultations, where doctors form their first impressions of patients, or when they diagnose and make clinical decisions for patients (e.g., recommend medication dosage). However, findings on time expansion effects (Kenrick et al., 2016; Moskowitz et al., 2015, Moskowitz et al., 2017) might provide insight into why aversive racists are more likely to invest less time in the clinical assessment of Black (*vs.* White) patients. Specifically, time expansion effect research has shown that individuals with higher levels of intergroup anxiety (Moskowitz et al., 2015) and strong external motivation to appear non-prejudiced are particularly likely to perceive time slowing when evaluating Black faces (Kenrick et al., 2016; Moskowitz et al., 2017). Critically, aversive racists are more likely than any other individuals to experience intergroup anxiety in interracial situations (Dovidio & Gaertner, 2004; Levine & Hogg, 2010; Mendes et al., 2007; Page-Gould et al., 2008). This suggests that healthcare providers with an aversive racist profile are likely to experience the time expansion effect when interacting with Black patients. If they perceive that they spend longer time with Black patients than with White patients, then they are also likely to conclude that they have invested a significant amount of time in Black patients. Subsequently, this may lead these providers to end their interactions with Black patients early (Moskowitz et al., 2015).

Furthermore, despite the significance of previous findings on aversive racism in medical care (Penner et al., 2010; Penner et al., 2013; Hagiwara et al., 2016), studies developed in this realm have not considered racially concordant interactions between doctors and patients. In other words, they only considered the interaction of non-Black physicians and Black patients and did not account for the effect of patients' skin color (e.g., Black *vs.* White). Therefore, given that (a) values such as equality and fairness are central to the medical context, (b) healthcare providers have nonconscious racial biases against Black

individuals (Penner et al., 2019), and considering (c) time as a valuable and scarce resource that is used to favor ingroup over outgroup members (Vala et al., 2012), we hypothesize that aversive racist medical trainees may be unintentionally more prone to disengage from interactions with Black patients and to invest more of their time assessing White patients.

The Present Research

We analyzed time investment in the medical context, as time is considered a valuable and scarce resource for treating patients (Yahanda & Mozersky, 2020) with consequences in physician-patient communication (Choy & Ismail, 2017; Hagiwara et al., 2013; Hashim et al., 2017); trust in the physician-patient relationship (Skirbekk et al., 2011); patients and physicians' satisfaction with the assistance provided (Dugdale et al., 1999; Lin et al., 2001; Linzer et al., 2009; Linzer et al., 2015; Mawardi et al., 1979); and physicians' malpractice risk (Hickson et al., 2004; Levinson, 1994; Levinson et al., 1997). Furthermore, the amount of time invested by a physician in clinical consultations might vary according to the patient's group membership. In fact, research shows that Black patients speak less, have lower quality and briefer face-to-face interactions with White providers when compared to White patients (for review, see Cooper & Roter, 2003; Penner et al., 2019; Shen et al., 2018). Yet, scholars have given little attention to systematically examining potential time biases in the assessment of White and Black patients and have devoted even less attention to the elaboration of theoretical explanatory models to comprehend clinicians' discrimination in time investment, despite its importance in patient evaluation and clinical practice (Senft et al., 2018). Given this framework, and in the light of the theoretical underpinnings of the ITB effect, we examine critical aspects of the clinical consultation: when a physician forms the first impressions of a patient (Balla et al., 2012; Bosner et al., 2014; Kostopoulou et al., 2016), and when they diagnose and make decisions on the pain and medication dosage for patients (Hirsh et al., 2015). Specifically, we test the hypothesis that White medical trainees bias their

time by investing it more in White than Black patients. Moreover, we have explored whether this time bias is associated with different forms of racism expressed in western societies (Dovidio & Gaertner, 2004; Freng et al., 2022).

Firstly, building on the impression formation paradigm from Vala et al. (2012), we conducted four studies aiming to analyze whether there is an ITB effect in the time White medical trainees invest forming first impressions of White and Black patients. We also examined the relationship between this effect and aversive racism. Specifically, in Study 1 we tested the hypothesis that participants invest more time forming first impressions of White than Black patients (i.e., the ITB effect). Moreover, we hypothesize that the ITB effect would be stronger in those with an aversive racist profile. In Study 2, we aimed to replicate the ITB effect using a diverse set of stimuli in a different cultural context, also testing the role of aversive racism. In Study 3, we went further by improving the experimental paradigm and measuring egalitarian values to examine whether individuals who consciously describe themselves as egalitarian, non-racists but also exhibit high implicit racial bias express a stronger ITB. In Study 4, we aimed to replicate the ITB effect using an eye-tracking procedure. We also explored whether eye fixation on specific areas of patients' faces (e.g., whole face, eyes, mouth, and nose), as well as on positive and negative attributes associated with them influenced the time participants invested in forming impressions of patients. Based on previous studies on racial stereotypical features perception (e.g., Burgund, 2021; Cassidy et al., 2019; Friesen et al., 2019; Kawakami et al., 2014), we specifically explored whether participants would invest more time looking at the faces of White (*vs.* Black) patients and would invest more time looking at the eyes of White compared to those of Black patients. Additionally, we explored whether participants would look more at the nose and mouth of Black (*vs.* White) patients (Bean et al., 2012; Friesen et al., 2019).

In Study 5, we expanded our investigation of the ITB effect beyond patient impression formation and examined the consequences of this bias in other clinical dimensions (i.e., diagnostic accuracy, pain assessment and medication prescription). We further explored whether this effect is stronger in participants with an aversive racist profile. Moreover, we examined the downstream consequences of the ITB on diagnostic accuracy, pain perception, and medication prescription, hypothesizing that investing more time in the patient would lead to better diagnosis and treatment recommendations.

Finally, in Study 6, we employed a meta-analytical approach to examine the consistency of the ITB effect across studies and explore its potential moderators. We investigated whether the valence of information associated with patients, paradigm used in studies, cultural context, participants' avoidance of forming prejudiced impressions, and racial attitudes profiles of participants moderate the ITB effect. Specifically, we investigated whether participants invested less time while assessing patients when negative (*vs.* positive or clinical) information was associated with them (Baumeister et al., 2001), particularly when considering Black (*vs.* White) patients. This hypothesis is in line with the notion that, when judging Black patients with negative traits, participants may become aware of the possibility of being racist, which, according to the aversive racism theory (Dovidio & Gaertner, 2004), could elicit an aversive response and lead to even faster disengagement while forming impressions. Additionally, we examined whether the ITB varies based on the type of paradigm used in studies (impression formation *vs.* clinical tasks) and the context in which data was collected (Brazil *vs.* Portugal). We also tested whether the avoidance of forming prejudiced impressions of patients predicts the ITB effect across studies. Finally, we investigated whether the ITB effect was stronger among those who exhibited an aversive racist profile compared to consistently prejudiced or non-prejudiced participants across the five studies.

This research program received ethical approval from the Ethics Review Board of the Faculty of Medicine and Institute of Social Sciences of the University of Lisbon. Data and materials from the studies can be found online (https://osf.io/7jf8z/?view_only=de1e61eeba614075909173f61564bab1).

Study 1

We asked White medical trainees to form first impressions of Black and White male individuals by evaluating whether a set of positive and negative traits characterized them. We also measured both explicit and implicit bias by asking participants to perform the Implicit Association Test (IAT; Greenwald et al., 2003) and fill in a self-reported racism scale (Vala et al., 2012). Based on previous studies on the ITB effect (Vala et al., 2012), we predicted that participants would invest more time forming first impressions of White than Black people. Additionally, we analyzed the associations between participants' avoidance of forming prejudiced impressions and both explicit racism and implicit racial bias with the ITB effect. Finally, we explored whether the ITB effect is related to aversive racism. Specifically, we operationalized aversive racists as those individuals who scored lowest on the explicit racism scale, but expressed higher implicit racial bias (Dovidio, 2001; Penner et al., 2010), and then examined if the ITB effect was stronger in participants who exhibited such a profile.

Method

Participants and Experimental Design

128 Brazilian medical trainees were invited to participate in this study. Thirty-four did not complete the study and nine self-declared as Black, therefore the final sample included 85 White medical trainees (50.6% female), aged 18 to 43 years ($M = 23.12$; $SD = 5.20$). Participants were in their first (37.6%), second (41.2%), and fourth (21.2%) year of training. A sensitive power analysis conducted in WebPower (Zhang & Yuan, 2018) indicated that this sample had a power of .80 to detect an effect size of $f = .30$ or higher with $\alpha = .05$. We used a

within-subjects unifactorial experimental design in which the independent variable was the targets' skin color (Black vs. White), and the main dependent variable was the time participants invested in forming impressions of the targets.

Procedures and Measures

We collected data online using the E-prime Go software. To recruit participants, we contacted two Brazilian universities and asked professors to share a link to the online experiment with their medical students. First, self-enrolled participants performed an impression formation task in which we measured the ITB and trait judgments. Then, they performed the IAT (Greenwald et al., 2003), with which we measured the participants' implicit racial bias. Thereon, we assessed their explicit racism by using a self-reported Racial Beliefs Scale (Vala et al., 2012). Finally, they indicated demographical information (i.e., gender, skin color, nationality, and year of medical training) and were fully debriefed. Participants received course credits in exchange for their time participating in the study.

In the impression formation task, we used a paradigm developed by Vala et al. (2012), which starts by asking participants to form impressions of some people as fast and precisely as possible. We used eight pre-tested digital color photos of males with neutral facial expressions (four of Black and four of White men) (DeBruine & Jones, 2017). These photos were pre-tested using self-report measures of racial prototypicality, attractiveness, age, and photo quality (see supplementary material for norming data). In addition to the photos, we also used eight non-stereotypical traits of Black and White people, four of which were positive (i.e., honest, sincere, wise, and hard-working) and four were negative (i.e., dishonest, ignorant, liar, and lazy) that served as stimuli (see supplementary for norming data)³. The

³ In this study, we used only non-stereotypical pre-tested traits for the social groups studied in the impression formation task, since previous experimental research has shown that the ITB effect occurs regardless of the stereotypicality of the traits associated with the targets (Vala et al., 2012). In the trait pre-test, we randomly presented 163 traits to White Portuguese individuals and asked them to rate on a scale from 1 to 5 the extent to which they believed the Portuguese society considers each trait characteristic of White and Black individuals.

procedures involved two phases. The first was a categorization task in which participants were asked to focus on a fixation point (+) for 1,000ms in the screen center, which was automatically replaced by one random photo of the targets. The participants' task was to indicate whether the targets were Black or White by pressing a key on the keyboard. The second phase was constituted by the impression formation task in that each trial started by asking participants to focus on a fixation point (+) for 1,000ms in the screen center. The fixation point was immediately substituted by a photo accompanied by one of the eight non-stereotypical traits (presented below the picture). In this phase, we instructed participants that "As a medical trainee, your task is to select 'yes' or 'no' to indicate whether the trait characterizes the person in the photograph or not." We imposed no time constraint, so the system was paused until the participant had responded. The first eight trials served as practice, with no interval separating these eight practice trials from the 64 experimental trials. Response latencies were measured during the second phase of the task, comprising the experimental trials. We did not exclude any trials based on erroneous categorization during the first phase of the impression formation task.

Intergroup Time Bias (ITB) Measurement. We used response latency to measure the time participants invested in forming impressions of the targets. We conducted outlier analyses and excluded trials that deviated beyond 2.0SDs from each variable's mean (Ratcliff, 1993; Tabachnick & Fidell, 2001). The intergroup time bias (ITB) represented the difference in latencies for Black and White individuals (i.e., White latencies minus Black latencies). Accordingly, higher scores represented a greater investment of time in forming first impressions of White people (Vala et al., 2012).

Trait Judgments. The impression formation task enabled us to evaluate the extent to which participants identified positive and negative traits as characteristic of each target.

Participants' responses were assigned a code of 0 if the trait did not characterize, or 1 if the trait characterized the target.

Implicit Racial Bias. We used the IAT to measure implicit bias toward Black people (Greenwald et al., 2003). This task was performed in five trial blocks. Blocks one, two, and four corresponded to practical trials, whereas blocks three and five corresponded to the critical blocks. The presentation of the critical blocks was counterbalanced. In the compatible categorization block trials, the participants categorized White targets and positive words by pressing a specific key (i.e., White + Good) and categorized Black targets and negative words by pressing another specific key (i.e., Black + Bad). In the incompatible categorization block trials, they categorized White targets and negative words with a single key (i.e., White + Bad) and categorized Black targets and positive words with another single key (i.e., Black + Good). We followed the procedures indicated by Greenwald et al. (2003) to compute the D-IAT scores after defining reaction times less than 300ms and greater than 10 000ms as incorrect responses. Comparing response time among compatible *vs.* incompatible categorization blocks (i.e., incompatible *minus* compatible blocks) and dividing it by the pooled standard deviation, we obtained the D-IAT scores that provided us with the measure of implicit racial bias. The faster associations of Black targets with negative attributes and quicker associations of White targets with positive attributes indicate a stronger implicit bias toward Black people. In this study, D-IAT scores varied from -.87 to .88 ($M = .162$; $SD = .407$). Such scores were significantly higher than zero, indicating an implicit pro-White racial bias, $t(84) = 3.66$, $p = .001$, $d = .41$.

Explicit Racism. We measured explicit racism using the Racial Beliefs Scale (Vala et al., 2012). This instrument assesses beliefs about the biological nature of differences between groups ($\alpha = .59$; $\omega = .63$). The 7-item version (1 = totally disagree; 7 = totally agree) includes items such as "The mixture of different human groups may weaken the biological evolution

of the human species” and “The human species is divided into racial groups that are very different from each other.” Higher scores on this scale indicate stronger explicit racism.

Results

Intergroup Time Bias

ANOVA results showed a reliable targets’ skin color effect, $F(1, 84) = 22.775$, $MSE = .136$, $p = .001$, $\eta_p^2 = .213$. As predicted, participants invested more time in forming impressions of White than Black people. The main effect of the traits’ valence was non-significant, $F(1, 84) = 1.157$, $MSE = .095$, $p = .285$, $\eta_p^2 = .014$. In addition, results show that participants invested more time in forming impressions of White (*vs.* Black) individuals, regardless of whether the traits were positive ($b = .133$, $SE = .050$, $p = .009$, $d = .582$) or negative ($b = .248$, $SE = .049$, $p = .001$, $d = 1.08$). This provides evidence for an ITB effect on both positive and negative traits. The interaction effect between the targets’ skin color and valence was marginally significant ($F(1, 84) = 3.896$, $MSE = .283$, $p = .052$, $\eta_p^2 = .044$), suggesting a trend of a stronger ITB effect when participants judged targets with negative traits. The means of the response latencies are presented in Table 1.

Trait Judgments

The second panel of Table 1 shows the means of trait judgments. We did not find a significant main effect of the target’s skin color, $F(1, 84) = .063$, $MSE = .124$, $p = .803$, $\eta_p^2 = .001$. However, we found a significant main effect of the valence of the traits ($F(1, 84) = 80.721$, $MSE = 2.172$, $p = .001$, $\eta_p^2 = .490$), indicating that participants judged the targets, regardless of skin color, as being characterized by more positive than negative traits. We also found a significant interaction between the targets’ skin color and the trait valence, $F(1, 84) = 72.901$, $MSE = .686$, $p = .001$, $\eta_p^2 = .465$. Participants judged Black targets as being characterized by positive traits to a greater degree than White targets ($b = .757$, $SE = .098$, $p = .001$, $d = 1.69$). Additionally, participants judged White targets as being characterized by

more negative traits than Black targets ($b = .776$; $SE = .097$, $p = .001$, $d = 1.74$). This pattern of results suggests that participants tended to form more positive and less negative impressions of Black targets compared to White targets, which is in line with previous research showing the effects of the antiprejudice norm (see Pettigrew & Meertens, 1995). To explore the association between this avoidance to form prejudiced impressions and the ITB effect in later analyses, we computed an index that, as proposed by Vala et al. (2012), quantifies the extent to which participants were more likely to endorse positive traits for Black targets and negative traits for White targets. We computed this index using the equation $[(\text{Black positive} - \text{Black negative}) + (\text{White negative} - \text{White positive})]$ to calculate such index. Higher scores indicate a greater avoidance of forming prejudiced impressions.

Table 1

Means and Standard Deviations (in Parentheses) of the Latencies (in Seconds) and Trait Judgment.

	Study 1		Study 2		Study 3		Study 4	
	White	Black	White	Black	White	Black	White	Black
Latencies								
Positive	1.91 (.824)	1.77 (.709)	1.57 (.527)	1.57 (.506)	1.53 (.701)	1.46 (.737)	1.12 (.382)	1.10 (.315)
Negative	2.00 (.805)	1.75 (.740)	1.34 (.410)	1.21 (.384)	1.31 (.745)	1.16 (.576)	1.00 (.340)	.942 (.315)
Trait Judgments								
Positive	1.92 (1.21)	2.69 (1.17)	1.64 (1.08)	1.79 (1.09)	1.93 (1.14)	2.03 (1.18)	2.46 (1.22)	2.23 (1.24)

Negative	1.25	.494	.254	.096	.177	.120	.112	.077
	(1.11)	(.756)	(.378)	(.245)	(.362)	(.380)	(.408)	(.400)

Correlates of the ITB

We regressed the ITB scores on the study's measured variables and explored the interaction between implicit racial bias and explicit racism (see Table 2). We found a marginally positive association between the implicit racial bias and the ITB in participants low in explicit racism ($b = .239$, $SE = .129$, $p = .064$), but not in those with high explicit racism ($b = -.062$, $SE = .128$, $p = .631$). This pattern was captured by a marginal interaction between explicit and implicit racial biases (see Figure S1 in supplementary material).

The ITB in Racism Profiles

We analyzed the predicted value of ITB in the three racial attitudes profiles of participants (see Penner et al., 2010)⁴. Because both the explicit racism and implicit racial bias are continuous variables, we defined the aversive profile to correspond to those participants with low explicit (i.e., those scoring $-1SD$ from the mean) and high implicit racial bias (i.e., those with $+1SD$ from the IAT mean). We then compared the ITB effect of these participants with two other profiles (see Figure 1): consistently prejudiced participants (high in both implicit and explicit racial bias), and non-prejudiced participants (low in both implicit and explicit racial bias). Using maximum likelihood regression-based estimates, we obtained the ITB effect in participants' racist profiles. Results showed that the ITB effect was significantly different from zero in participants with an aversive racism profile ($b = .331$, $SE = .080$, $p = .001$, $d = .900$), marginally significant in those who express a non-prejudiced profile ($b = .136$, $SE = .073$, $p = .062$, $d = .405$), and not significant among consistently

⁴ In the present and forthcoming studies, we estimated these analysis parameters while controlling for participants' avoidance of forming prejudiced impressions. The analysis was conducted using MPlus software (8th version; Muthén & Muthén, 2017).

prejudiced participants ($b = .119$, $SE = .081$, $p = .143$, $d = .317$). Further contrast-based comparisons showed that the ITB in aversive racist participants significantly differs from the other two profiles pooled ($b = .203$, $SE = .096$, $p = .034$, $d = .458$). Also, the ITB effect was marginally stronger than that expressed by consistently prejudiced ($b = .212$, $SE = .118$, $p = .072$, $d = .309$) and non-prejudiced participants ($b = .195$, $SE = .105$, $p = .064$, $d = .401$).

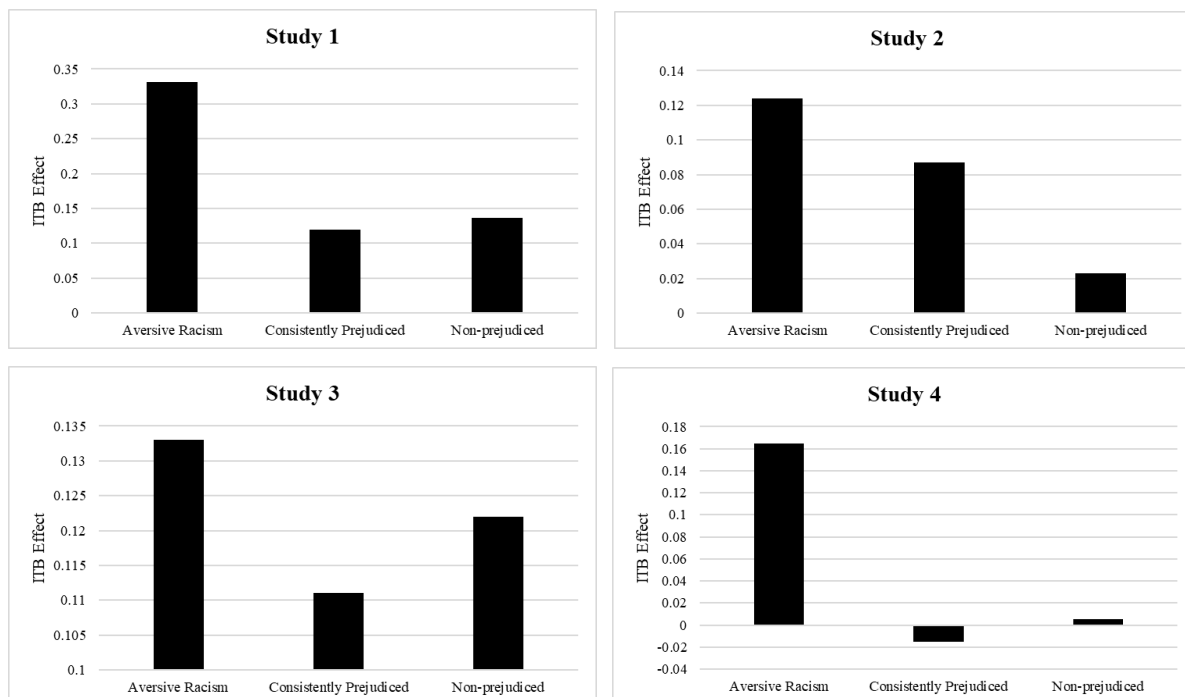
Table 2*Estimated OLS Regression Coefficients of the Correlates of the ITB Effects*

	Study 1			Study 2			Study 3			Study 4		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept	.189	.039	.001	.068	.019	.001	.093	.026	.001	.042	.051	.404
Implicit racial bias	.089	.096	.358	.089	.045	.048	.081	.067	.227	.254	.200	.204
Racism	-.058	.052	.264	-.008	.028	.769	-.002	.033	.962	.002	.023	.928
AFPI	.011	.024	.656	.047	.018	.011	.028	.027	.309	.034	.016	.034
Implicit racial bias*Racism	-.194	.110	.078	-.043	.062	.487	-.061	.098	.533	.123	.091	.179
Egalitarianism							-.014	.027	.610	.044	.041	.274
Implicit racial bias*Egalitarianism							.004	.068	.953	.263	.163	.107
Racism*Egalitarianism							-.060	.030	.047	.003	.022	.880
Implicit racial bias*Racism* Egalitarianism							.158	.090	.080	.164	.088	.061
Adjusted R ²	.053			.061			.113			.243		

Note. AFPI = Avoidance of Forming Prejudice Impressions.

Figure 1

ITB in First Impressions of Patients according to Racism profiles: aversive racists (i.e., high implicit racial bias, high egalitarianism, low racism), consistently prejudiced (i.e., high implicit racial bias, low egalitarianism, high racism), and non-prejudiced participants (i.e., low implicit racial bias, high egalitarianism, low racism)



Discussion

White medical trainees invested more time in forming first impressions of White than Black men. They also judged Black men more positively than White men, whereas they judged White men more negatively than Black men. Furthermore, results showed that the ITB effect was related to aversive racism. In other words, participants with low explicit racism but high implicit bias toward Black individuals showed greater ITB than the other racial attitudes profiles (i.e., consistently prejudiced and non-prejudiced). These results provided preliminary evidence of an ITB effect in the medical context, suggesting the

existence of an implicit intergroup bias in the behavior of White medical trainees, which holds potential for observing discriminatory behaviors in patient assessment.

Notably, the pattern of results was consistent with the prediction that aversive racism is related to how future providers invest their time in interracial relations. However, an alternative explanation could be that the time bias observed in the formation of first impressions of Black and White individuals merely reflected that participants acted stereotypically, not based on attributes, as we used pretested non-stereotypical traits in the impression formation task, but on the basis of the stereotypicality of the targets of impression formation. Given that Black individuals constitute the majority of the Brazilian population (IBGE, 2010) and are targets of racial discrimination in all sectors of Brazilian society (Santos & Pereira, 2021; Silva & Lima, 2016), cultural representations of the Black social category and its characteristics may have been more accessible to participants when asked to form impressions of Black versus White individuals. For this reason, it is critical to determine whether the ITB effect on patient impression formation occurs in racial contexts other than Brazil, particularly where the prevalence of Black individuals is lower than that of White ones. Furthermore, it is important to examine whether the ITB effect also occurs where the quality of healthcare service offered to the population is higher than that offered in Brazil (Araújo et al., 2018). We addressed these issues in Study 2 and intended to replicate the findings by varying the stimuli and social context used in this study.

Study 2

We aimed to replicate the ITB effect in an impression formation of White and Black people with White medical trainees using a diverse set of traits and a different cultural context from those used in Study 1. Moreover, we aimed to test the role of aversive racism in such an effect. Therefore, we conducted this study in Portugal, where the majority of the population is White, and the quality of the healthcare system is considered to be higher than

in Brazil (Araújo et al., 2018). Based on previous findings, we predicted, despite strikingly different cultural contexts between Brazil and Portugal, that White Portuguese medical trainees would invest more time in forming impressions of White than Black individuals. We also predicted that the ITB effect would be stronger for individuals with an aversive racial profile. Furthermore, we examined whether the avoidance of forming prejudiced impressions was related to the ITB effect.

Method

Participants and Experimental Design

194 Portuguese medical trainees were invited to participate in a study of impression formation, in exchange for a €5 gift card. Twenty-three identified themselves as non-White and so were ineligible for the final sample because they did not meet the study's inclusion criteria. After exclusion, 171 White medical trainees remained, mostly female (70.8%), aged between 18 and 45 years old ($M = 21.05$; $SD = 3.24$). Participants were in their first (9.9%), second (12.9%), third (18.7%), fourth (18.1%), fifth (24.6%) and sixth (15.8%) year of training. A sensitive power analysis indicated that this sample size had a power of .80 to detect an expected effect of $f = .22$ with $\alpha = .05$. We used the same experimental design as Study 1.

Procedures and Measures

We conducted an online survey using the Qualtrics platform to collect data. We used a recruitment approach similar to Study 1. Specifically, we contacted all universities in Portugal that have medical schools and requested that they distribute a link to the online study to their students. After confirming their status as medical students, self-enrolled participants completed the impression formation task, and the implicit association task, as well as answered an explicit racism and sociodemographic measures.

We adapted the impression formation task used in Study 1 to the Qualtrics platform, while retaining all instructions and target pictures.⁵ However, we used the same eight non-stereotypical pretested traits used in previous studies on the ITB (Vala et al., 2012, Study 2). Four of them were positive (e.g., appealing, delightful, favorable, and sincere) and four were negative (e.g., awful, horrible, repulsive, and upsetting). Measures from the impression formation task were obtained using the same procedures as in Study 1 to assess the ITB, trait judgments and participants' avoidance of forming prejudiced impressions.

Implicit Racial Bias. We used *iatgen* (survey-software IAT) to measure the implicit bias towards White and Black targets (Carpenter et al., 2019). *Iatgen* is an R package that allows researchers to create IATs to be run online (through Qualtrics). Because *iatgen* originally provided the instructions for the IAT in English and the native language of our participants was Portuguese, we translated these instructions using an R feature that allowed this (Santos et al., *in prep*). D-IAT scores varied from -.84 to 1.30 ($M = .429$; $SD = .423$). As in Study 1, an implicit pro-White racial bias was found ($t(170) = 13.28$, $p = .001$, $d = 2.03$).

Explicit Racism. We used the Racial Beliefs Scale to measure explicit racism as in the previous study (Vala et al., 2012). Its internal consistency for this study was $\alpha = .63$; $\omega = .59$.

Results

Intergroup Time Bias

As in Study 1, participants invested more time in forming impressions of White than of Black targets, $F(1, 170) = 11.792$, $MSE = .059$, $p = .001$, $\eta_p^2 = .065$. Also, the main effect of valence was significant [$F(1, 170) = 144.864$, $MSE = .107$, $p = .001$, $\eta_p^2 = .460$], indicating that participants invested more time judging targets with positive than negative traits.

Moreover, the target skin color \times valence interaction was significant, $F(1, 170) = 14.545$,

⁵ We followed procedures validated by Carpenter et al. (2019) to limit participants' access to the questionnaire to only computers.

$MSE = .050, p = .001, \eta_p^2 = .079$: participants invested more time judging negative traits for White (vs. Black) targets ($b = .129, SE = .022, p = .001, d = .912$), but this difference did not occur when the traits were positive ($b = .001, SE = .029, p = .961, d = .007$). The mean values of response latencies are shown in Table 1.

Trait Judgments

The second panel of Table 1 presents the descriptive statistics of trait judgments. The results of the ANOVA showed that the main effect of the target skin color was not significant, $F(1, 170) = .027, MSE = .167, p = .870, \eta_p^2 = .001$. However, there was a significant main effect of trait valence ($F(1, 170) = 353.601, MSE = 1.158, p = .001, \eta_p^2 = .675$) as well as a target skin color \times valence interaction ($F(1, 170) = 15.794, MSE = .253, p = .001, \eta_p^2 = .085$). Consistent with the findings from Study 1, participants judged male targets more positively than negatively in general. When considering the target skin color \times valence interaction, participants judged Black targets more positively than White targets ($b = .148, SE = .064, p = .022, d = .35$). Conversely, more negative judgments were made towards White targets compared to Black targets ($b = .158; SE = .029, p = .001, d = .85$).

Correlates of the ITB

OLS regression estimates showed a significant positive association between the avoidance of forming prejudiced impressions and implicit racial bias with the ITB effect (Table 2). Also, a significant positive association between the implicit racial bias and the ITB in participants low in explicit racism was found ($b = .119, SE = .057, p = .037$), but not in those with high explicit racism ($b = .059, SE = .067, p = .382$). However, these different patterns were not captured by the interaction between implicit racial bias and explicit racism (see Figure S2 in supplementary material).

The ITB in Racism Profiles

Mirroring the results we found in Study 1, participants with an aversive racism profile exhibited a significant ITB effect that differed significantly from zero ($b = .124$, $SE = .040$, $p = .002$, $d = .472$). A similar effect emerged in participants with a consistently prejudiced profile ($b = .087$, $SE = .032$, $p = .007$, $d = .414$), but it did not occur in non-prejudiced participants ($b = .023$, $SE = .031$, $p = .450$, $d = .115$) (see Figure 1). The ITB in individuals displaying aversive racism did not significantly differ from the other two racist profiles pooled ($b = .068$, $SE = .044$, $p = .119$, $d = .238$). In fact, although the estimated ITB effect was stronger in aversive racist participants than in non-prejudiced ($b = .100$, $SE = .048$, $p = .037$, $d = .318$), differences found among aversive racists and prejudiced participants did not reach significance ($b = .037$, $SE = .051$, $p = .469$, $d = .110$).

Discussion

Using a different set of non-stereotypical stimuli and a different cultural context, the pattern of results in the current study generally replicated the main findings we found in Study 1. In this way, we observed that Portuguese White medical trainees invested more time forming impressions of White than Black male people and avoided forming prejudiced impressions of Black individuals. Moreover, participants with aversive racist and consistently prejudiced profiles showed stronger bias (*vs.* non-prejudiced participants) in the time invested in forming impressions of White and Black targets.

The current study showed a noteworthy effect we did not detect in Study 1, namely that the avoidance of forming prejudiced impressions was associated with the ITB. This finding is consistent with the aversive racism theory predictions. Previous research provides evidence that people with an aversive racist profile often engage in overcompensation bias by explicitly denying negative attributes and exacerbating positive ones to Black individuals because they are motivated to avoid either seeing themselves as prejudiced or being

perceived as prejudiced by others (Aberson et al., 1999; Dovidio & Gaertner, 2004; Hing et al., 2005). Given the task employed in this study and the aversive racism framework, it is possible that participants may have attempted to disengage from developing negative impressions of Black targets by responding consistently “no” to negative traits and “yes” to positive traits as rapidly as possible. Consequently, in certain circumstances, particularly when the social context favors aversive racism, participants may have exhibited a pattern of behaviors that facilitated the association of the ITB effect with the avoidance of forming prejudiced impressions. Thus, the current evidence further supports our proposal that the ITB effect may be driven by aversive racist individuals who strive to avoid being seen as holding negative attitudes towards Black individuals.

However, even though we have framed the impression formation tasks in Studies 1 and 2 within the physician-patient context, the frame of stimuli used cannot necessarily correspond to those used by medical trainees in their actual interactions with patients. That is, the instructions did not explicitly present the targets as patients from the national healthcare system, although we assumed that this would be inferred from the study’s contextual frame. Another limitation concerns the operationalization of the aversive racism profile. In both Studies 1 and 2, we specified aversive racism as a combination of explicit denial of racism and implicit racial bias towards Black people. However, denying racism is only one of two core aspects of aversive racism. According to Dovidio and Gaertner (2004), aversive racists support equality and genuinely believe they are not prejudiced. Thus, another core aspect of aversive racism is explicit support for egalitarian values. We consider individual differences in egalitarianism when examining the aversive racism profile in Study 3.

Study 3

In this study, we tested whether White medical trainees invest more time evaluating White than Black patients while emphasizing that the targets were patients from the national

healthcare system. We also tested whether the disproportionate time invested in forming impressions of White (vs. Black) patients (i.e., ITB effect) was related to the avoidance of forming prejudiced impressions and the aversive racism. Critically, while in the previous studies we operationalized the aversive racist profile by merely combining explicit racism and implicit racial bias (Dovidio, 2001; Hagiwara et al., 2016; Penner et al., 2010), the current study goes further by using a different operationalization of aversive racism. Specifically, we examined whether aversive racists, now classified as those individuals who deny explicit racism, support strong equalitarian principles, and still harbor implicit racial bias, invest more time in forming first impressions of White rather than Black patients.

Method

Participants and Experimental Design

We invited 143 Portuguese medical trainees to take part in a study on the impression formation of patients from the national healthcare system. 23 were non-White participants and did not meet the study's inclusion criteria. The final sample consisted of 120 White medical trainees, predominantly female (70.8%) and aged between 18 and 35 years ($M = 21.73$; $SD = 3.03$). Participants were in their first (13.3%), second (21.7%), third (12.5%), fourth (12.5%), and fifth (40%) year of training. A sensitive power analysis revealed that this sample size had a power of .80 to detect an expected effect of $f = .26$ with $\alpha = .05$. The experimental design we used in this study was the same as in previous studies. The trainees received a €5 gift card for participating in the study.

Procedures and Measures

Data collection procedures were similar to that of Study 2. We used the Qualtrics platform to conduct an online survey and applied the same recruitment procedures to invite medical students to participate. Consistent with previous studies, we utilized the same procedures for the impression formation task, with the exception of emphasizing in the

instructions that the individuals being evaluated were patients from the national healthcare system. Time invested and trait judgments in forming impressions of patients were calculated using the same methods as in prior research. Moreover, building upon the approach of Studies 1 and 2, we also calculated participants' avoidance of forming prejudiced impressions of patients.

Implicit Racial Bias. As in Study 2, we used *iatgen* to measure implicit bias towards Black people (Carpenter et al., 2019; Santos et al., *in prep*) and calculated the D-IAT scores (ranged from .76 to 1.27; $M = .474$; $SD = .423$). Mirroring results from the previous studies, we found an implicit pro-White racial bias ($t(119) = 12.30$, $p = .001$, $d = 2.24$).

Explicit Racism. We used the Racial Beliefs Scale (Vala et al., 2012) to measure explicit racism ($\alpha = .69$; $\omega = .76$).

Egalitarian Beliefs measure. We measured egalitarianism with the following four items from the egalitarianism dimension of the SDO scale (Ho et al., 2015): “Group equality should be our primary goal”; “It is unjust to try to make groups equal” (reversed); “We should do what we can to equalize conditions for different groups”; and “We should work to give all groups an equal chance to succeed”. The participants indicated their agreement with each item on a 5-point scale (1 = totally disagree; 7 = totally agree). We averaged participants' scores, in that higher scores indicated greater egalitarianism ($\alpha = .65$, $\omega = .78$).

Results

Intergroup Time Bias

Replicating previous results, participants invested more time in forming first impressions of White than Black patients, $F(1, 119) = 19.797$, $MSE = .074$, $p = .001$, $\eta_p^2 = .143$. The main effect of trait valence was also significant, $F(1, 119) = 103.130$, $MSE = .078$, $p = .001$, $\eta_p^2 = .464$: participants spent more time making judgements of positive traits than negative traits. However, these significant main effects were qualified by a significant race \times

valence interaction, $F(1, 119) = 3.868$, $MSE = .040$, $p = .001$, $\eta_p^2 = .031$. Simple effects showed the same pattern of results found in Study 1; that is, a stronger ITB effect when participants were judging negative traits ($b = .146$, $SE = .028$, $p = .001$, $d = .938$), as compared to positive traits ($b = .074$, $SE = .033$, $p = .027$, $d = .409$) (see mean values of response latencies in Table 1).

Trait Judgments

Consistent with the previous findings, we observed no significant main effect of patients' skin color on trait judgments, $F(1, 119) = .453$, $MSE = .139$, $p = .453$, $\eta_p^2 = .004$. However, we found a significant main effect of traits' valence ($F(1, 119) = 299.550$, $MSE = 1.346$, $p = .001$, $\eta_p^2 = .716$) and a marginally significant interaction between patients' skin color and traits' valence, $F(1, 119) = 3.860$, $MSE = .195$, $p = .052$, $\eta_p^2 = .031$. As in previous studies, participants judged patients more positively than negatively. Moreover, participants judged Black patients less negatively than White patients ($b = .056$, $SE = .028$, $p = .047$, $d = .37$) but did not differ between the two groups when judging positive traits ($b = .102$, $SE = .069$, $p = .143$, $d = .27$) (see the second panel of Table 1).

Correlates the ITB

We regressed the ITB effect on the D-IAT, racism and egalitarianism scores and explored the interaction between these variables (Table 2). We found a three-way marginal interaction between egalitarianism, explicit racism and implicit racial bias. Breaking down this interaction indicated that the pattern we found in IAT \times Racism interaction was significant in less egalitarian participants ($b = -.211$, $SE = .106$, $p = .046$), which did not occur in those more egalitarian ($b = .089$, $SE = .146$, $p = .543$) (see Figure S3 in supplementary material).

The ITB in Racism Profiles

The results of this study indicated that aversive racist participants exhibited an ITB effect that was significantly higher than zero ($b = .133$, $SE = .059$, $p = .024$, $d = .412$). This effect was also observed in non-prejudiced participants ($b = .122$, $SE = .055$, $p = .028$, $d = .402$). However, the effect was not significant among consistently prejudiced participants ($b = .111$, $SE = .066$, $p = .091$, $d = .308$) (see Figure 1). Further comparisons revealed that the ITB effect in aversive racists did not differ significantly from the other profiles pooled ($b = .016$, $SE = .071$, $p = .817$, $d = .042$). Contrast-based comparisons showed that the ITB effect in participants with an aversive racist profile did not significantly differ from that observed in consistently prejudiced ($b = .022$, $SE = .089$, $p = .807$, $d = .044$) or non-prejudiced participants ($b = .011$, $SE = .076$, $p = .885$, $d = .026$).

Discussion

Results from this study show that White medical trainees invested more time forming impressions of White than Black male patients from the national healthcare system. Moreover, participants judged Black patients less negatively than White patients. Importantly, we replicated previous findings as participants with an aversive racist profile exhibited the ITB effect. Also, we found that non-prejudiced participants showed the ITB effect, and this was not significantly different from that found among aversive racist participants. Although the previous studies and our current research provide valuable insights into the time invested in patients' impression formation, the experimental paradigm we used did not allow us to investigate other aspects of face perception that may be involved in the impression formation processes and potentially correlated with the ITB effect.

Previous evidence suggests that patterns of visual attention related to specific areas of interest, such as the eyes, mouth, and nose, as well as the proportion of fixations toward Black and White individuals, can predict intergroup biases (Bean et al., 2012; Friesen et al.,

2019; Hills & Pake, 2013). For instance, Kawakami et al. (2014) found that White individuals tend to focus more on the eyes of White (*vs.* Black) individuals across both free-viewing instructions and in the context of a recognition task. Although a recent re-analysis by Correll & Hudson (2020) cast doubt on such findings, subsequent investigations by Burgund (2021), Cassidy et al. (2019), and Friesen et al. (2019) provide additional evidence that the nature of visual attention in an interracial context varies based on race of both perceivers and targets. For example, Friesen et al. (2019) found that White participants spent more time looking at the eyes of White faces than Black faces when evaluating positive emotional expressions, and that attention to the eyes predicted biases in happiness ratings between true and false smiles on both White and Black faces.

In addition, race-based attentional biases exhibit different patterns as a function of individuals' motivation to appear non-prejudiced (Bean et al., 2012). Using the eye-tracking methodology, Bean et al. (2012) found that when individuals who were highly externally motivated to appear non-prejudiced were presented with images of Black and White male faces, they exhibited patterns of looking behavior consistent with a vigilance avoidance pattern. In other words, they initially looked toward Black faces and subsequently avoided them. In contrast, individuals low in external motivation demonstrated a largely indifferent-looking pattern. These findings suggest that the study of visual attention may contribute to our understanding of time investment biases in patient impression formation, as it may allow us to understand whether there are elements in the impression formation process for which medical trainees invest more time in one social group compared with another. In Study 4, we addressed such aspects by adapting the paradigm of impression formation to an eye-tracking procedure.

Study 4

In this study, we sought to replicate the ITB effect with White medical trainees while forming impressions of patients using an eye-tracking procedure. First, we analyzed whether an ITB effect emerged using a different experimental paradigm. Then, we explored how fixation on specific areas of patients' faces (e.g., eyes, mouth, nose, and whole face), as well as on positive and negative stimuli is associated with the ITB effect. Specifically, we explored whether participants would invest more time looking at the faces of White (*vs.* Black) patients. Previous studies by Friesen et al. (2019) have shown that White participants bias their eye gaze by looking more into the eyes of White people (a sign of more engaged interpersonal interaction), while fixating more on the nose and mouth of Black people (i.e., aspects of the face that signals Afrocentric features). Considering this, we also explored whether participants would look more at the nose and mouth of Black (*vs.* White) patients (Bean et al., 2012; Friesen et al., 2019). Furthermore, we predicted that positive or negative information associated with patients' faces would moderate these relationships. Specifically, racial bias might become more accessible to participants when making judgments about negative traits for Black patients, and such awareness, according to the aversive racism theory (Dovidio & Gaertner, 2004), could elicit an aversive response, prompting them to disengage from the task. Thus, it is likely that, when judging patients using negative traits, fixations on Black patients are expected to be avoided more than on White patients. Finally, we examined the relationship of these hypotheses with different racist profile expressions and participants' avoidance of forming prejudiced impressions of patients.

Method

Participants and Experimental Design

Fifty-eight Portuguese White medical students, mostly female (63.8%), aged between 18 and 29 years old ($M = 22.13$; $SD = 2.29$) took part in a study on forming impressions of

patients. They were in their first (10.3%), second (6.9%), third (20.7%), fourth (15.5%), fifth (10.3%), and sixth (36.2%) year of training. A sensitive power analysis indicated that this sample size had the power of .80 to detect an expected effect of $f = .37$ with $\alpha = .05$ in our research design. Participants were rewarded with €10 gift card.

Procedures and Material

We recruited White medical trainees from two Portuguese medical schools to participate in a face-to-face experimental study. The invitation was disseminated by student organizations at these institutions, as well as by researchers through the LinkedIn social platform. Upon confirming their medical student status and indicating the year of training, participants were first asked to form patient impressions, and then complete the implicit association test and the racism and egalitarianism measures.

We adapted the impression formation task used in Study 3 to the Eye Link software. Because in eye-tracking fixation points are pivotal to observing the most relevant areas of the participants' field of vision, the fixation cross randomly appeared in one of four locations around the screen (i.e., top middle, bottom middle, left middle, right middle) before displaying each patient face (i.e., as in previous studies, participants evaluated four Black and four White fictitious patients from the national healthcare system). Participants had to look at the fixation cross for 150ms before it disappeared and the patient's face appeared (see Bindemann et al., 2009, Hills et al., 2013a, 2013b). In addition, standardized areas of interest (i.e., patient's entire face, eyes, nose, mouth, and word stimuli) were set to measure participants' time investment and gaze fixations. The areas of interest were first defined in pixels and standardized across patients (see supplementary material for the areas of interest). We then converted the areas established in pixels to centimeters. The data presented in this article was standardized from milliseconds to seconds per square inch. The resulting quotient

was rescaled to vary from 0 to 10, in that the higher the value, the greater the quantity of time and number of gaze fixations in the areas of interest.

Measures obtained from the impression formation task in this study include time spent and gaze fixations on specific areas of patients' faces and word stimuli. Additionally, data was collected on the total time participants invested in forming first impressions of the patients, consistent with the approach taken in Studies 1-3. In accordance with previous studies, we also assessed trait judgments and participants' avoidance of forming prejudiced impressions was calculated from such judgments.

Implicit Racial Bias. As in the previous studies, we used *iatgen* to measure implicit pro-White bias (Carpenter et al., 2019; Santos et al., *in prep*). D-IAT scores for participants from this study varied from -.103 to 1.13 ($M = .599$; $SD = .285$). In this study, we also found an implicit pro-White racial bias ($t(57) = 15.975$, $p = .001$, $d = 4.19$).

Explicit Racism. Racial Beliefs Scale (Vala et al., 2012) was used to measure explicit racism as in the previous studies ($\alpha = .72$; $\omega = .73$).

Egalitarian Beliefs measure. We assessed participants' egalitarian beliefs as in Study 3 ($\alpha = .54$, $\omega = .63$) (Ho et al., 2015).

Results

Intergroup Time Bias

The main effect of patients' skin color was significant, such that participants invested more time in forming impressions of White than Black patients, $F(1, 57) = 4.227$, $MSE = .018$, $p = .044$, $\eta_p^2 = .069$ (see first panel of Table 1). Also, the main effect of the trait valence was significant, $F(1, 57) = 40.830$, $MSE = .027$, $p = .001$, $\eta_p^2 = .417$. Participants spent more time making judgements about positive traits than negative traits for the patients. Moreover, participants significantly invested more time forming first impressions of White than of Black patients regarding negative traits ($b = .058$, $SE = .018$, $p = .002$, $d = .834$), but this effect did

not reach significance when the traits were positive ($b = .016$, $SE = .025$, $p = .545$, $d = .158$).

However, the interaction between the patient's skin color and valence was not significant,

$F(1, 57) = 2.597$, $MSE = .010$, $p = .113$, $\eta_p^2 = .044$.

Trait Judgments

ANOVA analysis indicated a significant main effect of patients' skin color on trait judgments, $F(1, 57) = 10.595$, $MSE = .092$, $p = .002$, $\eta_p^2 = .157$, such that more traits were judged as characteristic of White than Black patients. The main effect of trait valence was also significant, $F(1, 57) = 190.921$, $MSE = 1.544$, $p = .001$, $\eta_p^2 = .770$: participants judged patients more positively than negatively overall. Unlike previous studies, we find a non-significant interaction between the patients' skin color and trait valence on trait judgments, $F(1, 57) = 1.757$, $MSE = .297$, $p = .190$, $\eta_p^2 = .030$ (see second panel of Table 1 for descriptive analysis). Pairwise analyses revealed that participants judged White patients more positively than Black patients ($b = .224$, $SE = .094$, $p = .021$, $d = .63$), whereas there was no significant difference regarding negative traits between White and Black patients ($b = .034$, $SE = .067$, $p = .608$, $d = .14$).

Correlates of the ITB

Consistent with Study 2, we found a significant association between the avoidance of forming prejudiced impressions and the ITB effect. Moreover, replicating Study 3's pattern of results, we found a marginal three-way interaction between implicit racial bias, explicit racism and egalitarianism. This interaction was driven by a marginal two-way interaction between implicit prejudice and explicit racism in more egalitarian individuals, indicating a stronger ITB effect on less explicitly racist individuals ($b = .286$, $SE = .158$, $p = .070$), in comparison with less egalitarian participants ($b = -.041$, $SE = .083$, $p = .626$) (see Figures S4 in supplementary materials).

The ITB in Racism Profiles

As predicted, results showed that aversive racist participants exhibited an ITB effect that significantly differed from zero ($b = .165$, $SE = .071$, $p = .021$, $d = .607$). For the other racial attitudes profiles, the effect was non-significant: consistently prejudiced ($b = -.015$, $SE = .083$, $p = .854$, $d = -.048$); and non-prejudiced profiles ($b = .001$, $SE = .083$, $p = .996$, $d = .001$) (see Figure 1). Additional analyses showed that the ITB effect in aversive racists marginally differed from the other profiles ($b = .173$, $SE = .099$, $p = .081$, $d = .458$). However, the differences between the ITB effect in individuals with an aversive racist profile and consistently prejudiced ($b = .180$, $SE = .111$, $p = .104$, $d = .426$) or non-prejudiced participants ($b = .165$, $SE = .118$, $p = .160$, $d = .368$) did not reach statistical significance.

Time Investment and Gaze Fixations in Areas of Interest

Time investment. Concerning the time invested by participants looking at patients' faces and word stimuli (i.e., traits), we found significant effects of the valence ($F(1, 57) = 28.258$, $MSE = .427$, $p = .001$, $\eta_p^2 = .335$) and the area of interest ($F(1, 57) = 10.149$, $MSE = 6.383$, $p = .002$, $\eta_p^2 = .153$): participants invested more time looking at faces and traits when the valence was positive (vs. negative), and invested more time looking at traits than at the patients' faces. Additionally, participants invested more time looking at the faces of White than Black patients when faces were associated with negative traits ($b = .172$, $SE = .072$, $p = .020$, $d = .30$). This was not the case with positive traits ($b = -.110$, $SE = .087$, $p = .208$, $d = -.17$). Considering the amount of time participants invested looking at the traits, the same pattern of results was found. Participants gazed longer at negative word stimuli associated with White patients than Black patients ($b = .236$, $SE = .088$, $p = .010$, $d = .35$). No significant differences were found for positive stimuli ($b = .099$, $SE = .144$, $p = .496$, $d = .10$). Mean values of response latencies are shown in Table 3.

In relation to the three specific patient face areas (i.e., eyes, nose and mouth), we also found significant effects of the valence ($F(1, 57) = 25.105, MSE = .378, p = .001, \eta_p^2 = .404$) and area of interest ($F(1, 57) = 74.092, MSE = 2.341, p = .001, \eta_p^2 = .667$). Participants fixated longer on positive than negative stimuli. They also invested more time looking at the patients' noses than their eyes ($b = 1.645, SE = .207, p = .001, d = 1.12$) and mouths ($b = 2.00, SE = .165, p = .001, d = 1.83$) (see Table 3). No other main or interaction effect was significant. The associations of these results with the different racist profiles were also not significant.

Gaze Fixations. Regarding the gaze fixations frequency in the patients' faces and traits, we also found significant effects of the valence ($F(1, 57) = 22.120, MSE = .629, p = .001, \eta_p^2 = .280$) and the area of interest ($F(1, 57) = 4.080, MSE = 9.555, p = .048, \eta_p^2 = .067$): participants gazed more frequently when the valence was positive (*vs.* negative) and more in the traits than the patients' faces. Of greater importance, the interaction between skin color, valence and area was significant ($F(1, 57) = 5.898, MSE = .175, p = .018, \eta_p^2 = .094$). When the traits associated with the patients were negative, participants gazed more frequently at the faces of White than Black patients ($b = .168, SE = .076, p = .032, d = .29$). When the information was positive, however, they gazed at the faces of Black patients more frequently than White patients, ($b = .290, SE = .063, p = .001, d = .61$). Means of gaze fixations are presented in Table 3.

Considering the gaze fixations in specific patients' facial areas (eyes, mouth and nose), the main effects of the valence of traits ($F(1, 57) = 28.886, MSE = .514, p = .001, \eta_p^2 = .336$) and the area of interest ($F(1, 57) = 41.253, MSE = 5.207, p = .001, \eta_p^2 = .596$) were significant. Participants gazed more times when the traits associated with the patients' faces were positive than negative. They also gazed more frequently at patients' noses than mouths ($b = 1.840, SE = .202, p = .001, d = 1.19$) and their eyes ($b = 1.373, SE = .247, p = .001, d =$

.73). The three-way interaction between the patients' skin color, valence of the traits and area of interest was significant, $F(1, 57) = 4.325$, $MSE = .163$, $p = .018$, $\eta_p^2 = .134$. Simple effects showed that when the traits were negative, participants gazed more frequently at the eyes of White than Black patients ($b = .182$, $SE = .062$, $p = .005$, $d = .38$). However, the opposite pattern of results was found for positive traits: participants gazed more frequently at the eyes of Black (vs. White) patients when positive traits was associated with them ($b = .152$, $SE = .047$, $p = .002$, $d = .42$) (see Table 3). Nevertheless, the relationship between these outcomes and racist profiles was not statistically significant.

Gaze Fixations and the ITB Effect

Next, we explored the relationship between the ITB effect and race-based differences in visual attention by examining gaze fixations on specific areas of patients' faces and word stimuli (i.e., traits). Our results demonstrate that the ITB effect is positively correlated with the frequency of gaze fixations on the faces of White patients when traits associated with them were either negative ($r = .436$, $p = .001$) or positive ($r = .326$, $p = .013$). In contrast, the correlation between the ITB effect and the frequency of gaze fixations on the face of Black patients was non-significant ($r = .159$, $p = .232$) when traits were negative, but significant when traits were positive ($r = .272$, $p = .039$).

Interestingly, we found a positive correlation between the ITB effect and the number of fixations on the eyes of White patients when traits associated with patients were negative ($r = .446$, $p = .001$) and positive ($r = .404$, $p = .002$). Although the correlation between the ITB effect and the frequency of fixations on the eyes of Black patients was only marginally significant when traits were negative ($r = .238$, $p = .072$), it was significant when traits were positive ($r = .405$, $p = .002$).

With regard to gaze fixations on word stimuli, when considering White patients, we found a marginally significant negative correlation between the ITB effect and the frequency

of fixations on positive traits ($r = -.240, p = .070$), but not negative traits ($r = -.212, p = .110$). Similarly, when considering Black patients, there was a negative correlation between the ITB effect and the frequency of fixations on negative traits ($r = -.307, p = .019$), but not positive traits ($r = -.176, p = .187$).⁶

⁶ The correlations between the ITB effect and the other areas of interest, such as the mouth and nose, were not significant.

Table 3

Area-standardized total fixation duration and the number of fixations to each area of interest with Standard Deviations (in Parentheses)

	Face		Stimuli		Eyes		Nose		Mouth	
	White	Black	White	Black	White	Black	White	Black	White	Black
Latencies										
Positive	3.02 (1.44)	3.13 (1.67)	3.48 (1.24)	3.37 (1.22)	2.00 (1.16)	2.01 (1.43)	3.55 (1.49)	3.66 (1.73)	1.55 (.727)	1.51 (.916)
Negative	2.44 (1.21)	2.27 (1.15)	3.65 (1.42)	3.39 (1.08)	1.58 (.865)	1.51 (.628)	3.55 (1.49)	3.08 (1.26)	1.40 (.638)	1.36 (.687)
Fixations										
Positive	3.70 (1.57)	3.99 (1.86)	4.06 (1.85)	4.12 (2.03)	1.23 (1.20)	1.39 (1.44)	2.74 (1.79)	2.75 (1.98)	.730 (.667)	.728 (.757)
Negative	3.25 (1.29)	3.08 (1.22)	4.08 (1.85)	4.07 (1.86)	1.07 (1.00)	.896 (.817)	2.32 (1.46)	2.25 (1.42)	.653 (.651)	.623 (.538)

Note. Data was standardized from milliseconds to seconds per square inch. After, it was rescaled to vary from 0 to 10. The higher the value, the greater the time and number of fixations in the areas of interest.

Discussion

Replicating previous studies, White medical trainees invested more time in forming impressions of White (*vs.* Black) male patients from the national healthcare system. Moreover, participants who exhibited an aversive racist profile demonstrated a significant ITB effect. Notably, these findings further demonstrate that participants invested more time assessing the information (*i.e.*, traits) associated with patients' faces than evaluating those faces themselves. In addition, more time was invested in assessing the faces of White (compared to Black) patients, especially when the information associated with them was negative. This was also reflected in the frequency of gaze fixations in the face and eyes of White (*vs.* Black) patients. In other words, when Black patients were associated with negative traits, participants invested less time in forming impressions, as well as they gazed lesser at them. Correlation analyses captured this pattern of results, as the ITB effect was associated with increased gaze fixations on White patients' faces and eyes, particularly when these patients were associated with negative traits. However, this effect occurred only when traits were positive for Black patients. Also, our study revealed a correlation between the ITB effect and participants' gaze fixations on negative traits that were paired with Black patients. Specifically, the more biased the participants' time in favor of White (*vs.* Black) patients, the more they tended to fixate on negative traits associated with Black patients.

Again, this pattern of associations of the ITB with gaze fixations is consistent with the aversive racism framework. When judging Black patients with negative traits, participants may become aware of the possibility of being racist or perceived as racist by others, both of which are aversive to them and lead to faster disengagement and lower visual attention to Black individuals in the negative valence domain. In fact, this possibility is also consistent with the association of the avoidance of forming prejudiced impressions with the ITB effect, which replicates findings from Study 2. That is, participants responded quicker, stating "no"

to negative trials for Black patients, potentially to show that they do not hold negative attitudes toward Black individuals.

An alternative, yet complementary, explanation for the results relies on the violations of expectations that participants might have toward social groups (Jussim et al., 1987; Nicholls & Rice, 2017). For instance, if individuals have aversive negative expectations of Black people, they may be more likely to fixate on them when they exhibit positive traits, possibly to confirm the authenticity of the positive trait. Conversely, if individuals have positive expectations of White people, they may be more inclined to fixate on them when they exhibit negative traits, possibly to validate the genuineness of the negative trait.

Given that participants in our study invested more time evaluating the information (i.e., traits) associated with patients than assessing their faces themselves, our findings point to experimental evidence for a phenomenon currently observed in the context of the doctor-patient relationship: healthcare providers focus more on clinical case protocols than on building relationships with patients; in other words, they invest less time in the doctor-patient interaction and observation of patients (Asan et al., 2014; Botrugno, 2021; Guimarães, 2018). This lesser time invested in observing Black patients, especially when contextual information is negative, is worrying as previous research has shown that healthcare providers typically determine whether patients look sick when forming first impressions about them (Balla et al., 2012; Beglinger et al., 2015; Bosner et al., 2014; Kostopoulou et al., 2016). However, although there is such evidence that physicians' initial clinical impressions of patients can be linked to subsequent diagnoses, and our previous studies have demonstrated that White medical trainees invest more time in forming impressions of White than Black patients, we have not yet examined the downstream consequences of the ITB effect on healthcare outcomes for patients. Additionally, one could argue that determining whether a trait matches a face is somewhat different from getting to know a patient, such as understanding the details

of their injury. In Study 5, we addressed these issues by testing the hypotheses that the ITB effect occurs in other clinical tasks beyond patient impression formation and that it is stronger in participants with an aversive racist profile (*vs.* consistently prejudiced and nonprejudiced). Moreover, we explored the consequences of the ITB on diagnostic accuracy, pain assessment and medication prescription.

Study 5

Accurately diagnosing medical conditions and recommending effective treatments requires physicians to exercise deliberate reasoning and diligence (Lighthall & Vazquez-Guillamet, 2015). Given the complexity of these tasks, it is crucial for doctors to dedicate sufficient time to analyzing clinical cases (Elia et al., 2016; Lighthall & Vazquez-Guillamet, 2015; Moulton et al., 2007) to achieve satisfactory results. However, if providers' investment of time in assessing clinical cases is influenced by the skin color of patients, it can lead to biased medical decisions, affecting the accuracy of diagnoses and subsequent treatment recommendations. This study investigated the impact of the ITB effect on healthcare outcomes. Specifically, we tested the hypothesis that White medical trainees invest more time evaluating a clinical case, diagnosing, assessing pain, and recommending medication for White than for Black patients (H1). Additionally, we explored whether the greater amount of time invested leads to greater diagnostic accuracy, different levels of pain assessment and more appropriate medication prescriptions for patients (H2). Based on our previous findings that medical trainees with an aversive racism profile consistently express the ITB effect while forming impressions of patients, we further expected that the ITB effect will be higher among those who strongly endorse egalitarian beliefs and are high in implicit bias towards Black individuals (H3), leading to better healthcare outcomes for White (*vs.* Black) patients.

Method

Participants

A total of 212 Portuguese medical trainees were invited to participate in a study on the quality of medically relevant tasks. Nineteen participants were removed because they did not meet the following inclusion criteria: self-identified as Portuguese, White, and enrolled in the fifth or sixth year of medical school. The last inclusion criterion ensured that the participant sample had a clinical background that roughly resembled that of newly graduated physicians in Portugal: in Portuguese medical schools, trainees in their fifth and sixth years are exposed to various hands-on learning experiences, including practical classes, patient simulation centers, and clinical internships. Our final sample consisted of 193 White individuals (69% male) between the ages of 21 and 34 ($M_{age} = 23.83$; $SD = 2.04$) who were in their fifth (39.1%) and sixth (60.9%) year of medical training. We used a between-subject design in which participants were randomly allocated to one of two conditions: Black Patient ($n = 97$); White Patient ($n = 96$). A sensitivity analysis indicated that this sample size has a power of .80 to detect an ITB effect of $f = .20$ or higher, and a power of .90 for detecting an indirect effect in a mediation analysis (Schoemann et al., 2017; Zhang & Yuan, 2018).

Procedures

Consistent with the methods used in Studies 2 and 3, data collection for this study was carried out online using the Qualtrics platform, and we adhered to the same participant recruitment procedures as previous studies. At the outset of the study, participants indicated their years in medical training and were provided with a cover story outlining the study's objectives and details. The cover story stated that the study aimed to evaluate the quality and relevance of clinical tasks for future medical studies. Participants were then instructed to evaluate a clinical scenario and were randomly assigned to a clinical case of either a White or Black patient. After evaluating the case, participants were presented with six potential

diagnostic hypotheses in random order, one at a time. The participant's task was to indicate whether each hypothesis was appropriate or not for the case. Subsequently, participants were asked to indicate the level of pain they believed the patient was experiencing and then to prescribe the amount of opioid analgesics they would prescribe per day for the patient. Participants were also asked to complete an implicit association task, followed by measures of support for egalitarian beliefs and information related to their sociodemographic background. The study took an average of 13 minutes to complete. Participants were debriefed about the study's objectives and the use of a cover story and were compensated with a €10 gift card. Similar to Studies 2 and 3, we also restricted participants to access the questionnaire solely from computers (Carpenter et al., 2019).

Clinical case selection and pre-test. We selected the clinical case from a Portuguese national evaluation exam that medical trainees are required to pass before beginning their specialization practices within a medical career. The case was later adapted by a specialist physician to represent the situation of a *migraine aura* and to preserve the exam's confidentiality. Specifically, we first conducted a focus group with six Portuguese physicians who evaluated the clinical case, suggested changes, and provided feedback on the clarity, objectivity, and attribution of the clinical situation to the patient's race or gender. Subsequently, we conducted a pre-test with 14 Portuguese physicians to determine whether the case portrayed symptoms commonly exhibited by specific ethnic or gender groups that could confound the study results. The pre-test findings confirmed the results from the focus group, indicating that the case was equally prevalent in White and Black patients and depicted a scenario frequently encountered in daily medical practice, with medium complexity. For further details on the pre-test, please refer to the supplementary materials.

Patient skin color manipulation. To manipulate patient skin color in the study, we presented participants with digitally blurred photos of a Black or a White male individual

(DeBruine & Jones, 2017), which were displayed alongside the clinical case. We informed participants that the patient's face had been blurred to ensure their privacy.

Measures

Time Investment. Similarly to previous studies, we used one of the features in Qualtrics to record participants' response time while they evaluated the clinical case, diagnosed the patient, assessed their pain level, and prescribed medication. Because healthcare outcomes were identified progressively as participants responded to the study's tasks, it was crucial to account for the time invested in each clinical task when predicting the outcomes of interest. To this end, we computed three indices that represented the duration of assessing, diagnosing, and prescribing medication as participants progressed through the study. The first index considered the time participants invested in assessing the clinical case and indicating diagnostic hypotheses ($\alpha = .698$) when predicting diagnostic accuracy. The second index considered the time spent assessing the clinical case, diagnosing the patient, and assessing the patient's pain level ($\alpha = .773$) in predicting patient pain levels. Finally, the third index considered the time invested in assessing, diagnosing, and prescribing medication ($\alpha = .716$) to predict the amount of opioids indicated for the patient. Outliers were treated following the indications of Tabachnick and Fidell (2001) and Ratcliff (1993) as in previous studies.

Diagnostic Hypotheses. Participants were presented with six potential diagnostic alternatives, three of which were correct, and three were incorrect.⁷ Participants were asked to indicate whether the diagnostic hypotheses were adequate or not in diagnosing the case. We created an accuracy diagnostic indicator by scoring the responses 1 if the participant answered all options correctly and 0 if they did not.

⁷ Four of these hypotheses were initially taken from the national evaluation exam that medical trainees must pass before starting their specialization. Out of these, only one hypothesis, namely migraine aura, was found to be correct, while the remaining three were related to retinal problems. To generate two more appropriate diagnostic hypotheses, we sought the assistance of two specialist doctors who developed two additional hypotheses using synonyms to refer to migraine aura.

Pain Assessment. We asked participants to indicate how much pain they believed the patient in the clinical case they evaluated was experiencing (0 ‘no pain’ – 10 ‘extreme pain’) (Hirsh et al., 2015).

Medication prescription. Participants were asked to indicate the amount of opioid analgesics they would prescribe per day in milligrams (ranging from 0 to 1000) to the patient presented in the clinical situation. However, given the pathophysiological role of opioids in migraine progression, they should be avoided in migraine patients (Casucci & Cevoli, 2013; Lipton et al., 2020). Therefore, based on the patient’s clinical case presented to participants, the prescription of opioids would be considered increasingly inappropriate with higher milligram amounts for medical treatment.

Implicit Association Task. Consistent with previous studies (Carpenter et al., 2019; Santos et al., *in prep*), we utilized iatgen to measure implicit pro-White bias. In general, participants’ D-IAT scores ranged from -.875 to 1.36 ($M = .584$, $SD = .350$), and we found an implicit pro-White racial bias in both the White patient ($t(87) = 16.481$, $p = .001$, $d = 1.567$) and Black patient conditions ($t(78) = 13.928$, $p = .001$, $d = 1.767$). The implicit racial bias expressed between experimental conditions did not differ significantly, $t(2, 164) = .027$, $p = .870$, $d = .001$.

Egalitarian Beliefs measure. To measure participants’ egalitarian beliefs, we followed the same procedures as in Studies 3 and 4 ($\alpha = .650$, $\omega = .638$) (Ho et al., 2015).

Results

Time Invested

We first investigated differences in the time invested in evaluating the clinical case, proposing diagnostic hypotheses, assessing patient pain, and prescribing medication to patients. A MANOVA results demonstrated a significant multivariate effect of the patient’s skin color, $F(4, 142) = 2.872$, $p = .025$, $\eta_p^2 = .075$. Follow-up ANOVA revealed that

participants invested more time assessing the clinical case ($F(1, 182) = 9.772$, $MSE = 148.838$, $p = .002$, $\eta_p^2 = .051$), identifying diagnostic hypotheses ($F(1, 178) = 4.823$, $MSE = 185.935$, $p = .029$, $\eta_p^2 = .026$), assessing patient pain ($F(1, 168) = 5.930$, $MSE = 61.796$, $p = .016$, $\eta_p^2 = .034$), and prescribing medication ($F(1, 167) = 11.123$, $MSE = 246.002$, $p = .001$, $\eta_p^2 = .062$) for the White (vs. Black) patient. Table 4 presents the descriptive statistics for the response latencies.

Diagnostic Accuracy, Pain Assessment and Medication Prescription

A MANOVA revealed a non-significant main effect of patient's skin color, $F(3,173) = 1.344$, $p = .262$, $\eta_p^2 = .023$. Additionally, follow-up ANOVAs showed no significant differences in diagnostic accuracy ($F(1, 190) = 1.886$, $MSE = .177$, $p = .171$, $\eta_p^2 = .010$), assessment of pain ($F(1, 175) = 1.358$, $MSE = 3.091$, $p = .245$, $\eta_p^2 = .008$), or opioid prescription ($F(1, 174) = .013$, $MSE = 35413.403$, $p = .910$, $\eta_p^2 = .014$) between White and Black patients (see the second panel of Table 4 for descriptive statistics).

Table 4

Means (M) and Standard Deviations (SD) of the Study Variables

Variables	White Patient	Black Patient
	<i>M(SD)</i>	<i>M(SD)</i>
Time Invested (seconds)		
Assessment of the Case	24.86 (14.23)	19.24 (9.74)
Diagnostic Hypotheses	24.65 (16.07)	20.19 (10.7)
Pain Assessment	17.43 (9.40)	14.49 (5.82)
Medication Prescription	26.20 (19.1)	18.15 (10.9)
Decision-Making		
Diagnostic Accuracy	.187 (.392)	.270 (.446)
Pain Assessment	6.73 (1.81)	6.42 (1.70)

Opioids Prescription (*mg*) 159.11 (188.98) 155.90 (187.33)

Mediation Analyses

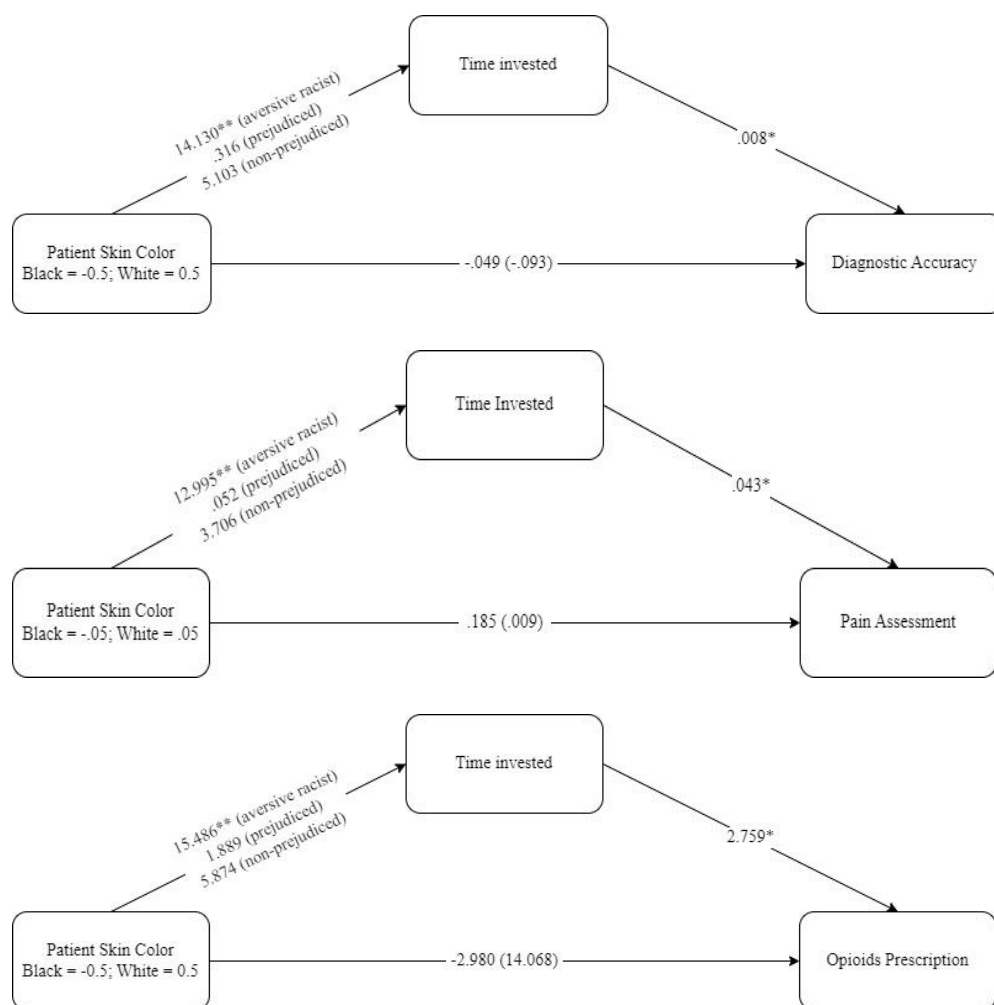
We examined whether time investment mediates the relationship between patients' skin color and healthcare outcomes by performing mediation and moderated mediation analyses using MPlus software (8th version; Muthén & Muthén, 2017) with bootstrapping of 5,000 simulations. Firstly, we examined the mediating role of the time investment in the influence of the manipulated patients' skin color (Black *vs.* White) on diagnostic accuracy. As hypothesized, the results showed a significant indirect effect ($b = .044$, $SE = .023$, 95% CI [.006; .081]) (see Table 5). These results indicate that participants invested more time evaluating the clinical case and indicating diagnosis hypotheses for the White patient, as compared to the Black patient, and the more time invested, the higher the diagnostic accuracy (see Figure 5S in supplementary materials for estimated parameters).

Additionally, mediated effects based on participants' racial attitudes profiles revealed that those who are high in egalitarian beliefs but still harbor implicit racial bias towards Black individuals (i.e., aversive racists) exhibited stronger ITB effect, leading to higher diagnostic accuracy for the White (*vs.* Black) patient ($b = .118$, $SE = .057$, 95% $CI = .024$; .212). This indirect effect was not significant for consistently prejudiced participants ($b = .003$, $SE = .030$, 95% $CI = -.047$; .052) or for non-prejudiced participants ($b = .043$, $SE = .050$, 95% $CI = -.040$; .125). Pairwise contrasts were conducted to compare the conditional indirect effects among participants with different racist profiles. Results revealed that the indirect effect for aversive racists was significantly higher ($b = .115$, $SE = .056$, 95% CI [.023; .207]) than that of consistently prejudiced, but did not significantly differ from that found among non-prejudiced participants ($b = .075$, $SE = .065$, 95% CI [-.031; .181]). Importantly, this different pattern of moderating effects was significant, as shown by the moderated mediation index (b

= .095, $SE = .053$, 95% $CI [.008; .183]$). Figure 2 presents the estimated parameters of the moderated mediation for each racist profile.

Figure 2

Unstandardized Estimated Parameters of Moderated Mediation Analyses in Predicting Diagnostic Accuracy, Pain Assessment and Opioids Prescription



Note. ** $p < .001$; * $p < .05$.

We observed the same pattern of results when predicting pain assessment. Specifically, participants invested more time performing the clinical tasks for the White (vs. Black) patient (i.e., case evaluation, diagnosis indication and pain assessment), resulting in a greater perception of pain for the White patient ($b = .211$, $SE = .098$, 95% $CI [.050; .373]$)

(see Table 5 for mediation effects and Figure 5S in supplementary materials for estimated parameters). Upon evaluating this indirect pathway through participant profiles, we found a stronger ITB effect in participants with an aversive racist profile, leading to higher pain perception in patients ($b = .558, SE = .279, 95\% CI [.099; 1.01]$), as compared to consistently prejudiced ($b = .002, SE = .143, 95\% CI [-.233; .237]$) and non-prejudiced participants ($b = .159, SE = .156, 95\% CI [-.097; .415]$) (see Figure 2 for estimated parameters). When comparing conditional indirect effects, we found that the indirect effect observed in the aversive racist profile was significantly stronger than that in consistently prejudiced participants ($b = .556, SE = .276, 95\% CI [.102; 1.00]$), but not different from that found in non-prejudiced individuals ($b = .399, SE = .314, 95\% CI [-.118; .916]$). These different mediation processes were confirmed by a significantly moderated mediation index ($b = .477, SE = .277, 95\% CI [.022; .932]$).

Finally, regarding the prescription of opioid medication to patients, we find a non-significant indirect effect of the ITB on the relationship between skin color and medication prescription ($b = -11.893, SE = 8.798, 95\% CI [-26.3; 2.58]$) (refer to Table 5 and Figure 5S). However, we conducted further analysis on the indirect effects based on participants' racial attitudes profiles and found that the ITB effect did mediate the relationship between patients' skin color and opioid prescription for individuals with an aversive racist profile ($b = -42.729, SE = 24.201, 95\% CI [-82.540; -2.918]$), but not with those who are consistently prejudiced ($b = -5.213, SE = 10.390, 95\% CI [-22.305; 11.878]$) or non-prejudiced ($b = -16.207, SE = 17.494, 95\% CI [-44.985; 12.571]$) (see Figure 2). Participants with an aversive racist profile invested more time evaluating the White patient compared to the Black patient, and as a result, fewer opioids were prescribed to the White patient. A comparison of conditional effects revealed that the indirect effect observed among individuals with an aversive racist profile did not differ from those who were consistently prejudiced ($b = -37.515, SE = 24.512,$

95% *CI* [-77.838; 2.807]) or non-prejudiced ($b = -26.522$, $SE = 23.384$, 95% *CI* [-64.987; 11.944]). In fact, we did not find a significantly moderated mediation index ($b = -32.018$, $SE = 21.856$, 95% *CI* [-67.971; 3.935]).

Table 5.

Effects' Decomposition of the Mediation Analyses

	Mediation Model		95% C.I.	
	Estimate	<i>SE</i>	Lower	Upper
Accuracy				
Total Effect	-.083	.061	-.183	.018
Direct Effect	-.126	.060	-.226	-.027
Indirect Effect: Color \Rightarrow Time \Rightarrow Accuracy	.044	.023	.006	.081
Pain Assessment				
Total Effect	.315	.260	-.113	.744
Direct Effect	.104	.245	-.299	.507
Indirect Effect: Color \Rightarrow Time \Rightarrow Pain	.211	.098	.050	.373
Medication Prescription				
Total Effect	2.98	28.2	-43.4	49.3
Direct Effect	14.8	31.6	-37.1	66.9
Indirect Effect: Color \Rightarrow Time \Rightarrow Medication	-11.8	8.79	-26.3	2.58

Note. The estimates reported in the analyses are unstandardized coefficients.

Discussion

In this study, we aimed to further investigate the impact of the ITB effect and its relation to aversive racism on healthcare outcomes. Results supported our hypotheses, demonstrating that White medical trainees invested more time in assessing the clinical case, identifying diagnostic hypotheses, assessing patient pain, and prescribing medication for the White (*vs.* Black) male patient, particularly when they had an aversive racist profile. Although we found non-significant differences in diagnostic accuracy, pain assessment, or opioid prescription between White and Black patients, our findings revealed indirect effects of time investment in the influence of the patient's skin color on healthcare outcomes. Participants invested more time evaluating and answering clinical tasks for the White patient, as compared to the Black patient, and the more time invested, the higher the diagnostic accuracy, pain perception, and lower opioid prescription. To our knowledge, this is the first experimental study to show that time investment bias, resulting from manipulated patient racial categorization, has a detrimental impact on patient healthcare outcomes.

In addition to replicating the findings of Hirsh et al. (2015) that showed that non-Black physicians take longer to rate the pain of White than Black patients (especially in conditions with high ambiguity), our study extends these findings by demonstrating that greater time investment leads to higher pain perception for White (*vs.* Black) patients. Furthermore, our findings suggest that the more time invested, the more accurate the diagnosis and treatment recommendation, with lower opioid prescriptions given by participants who exhibit an aversive racist profile. In fact, our results indicate that the ITB effect is present when participants make decisions regarding patients, resulting in biased medical decisions that can impact the accuracy of diagnoses and subsequent treatment recommendations. This provides further support that conceptualizations of disparities in care

should include both process (such as time) and outcome variables (such as diagnoses and treatment recommendations) (Hirsh et al., 2015).

It is noteworthy that the ITB effect was significant for negative traits in all studies related to the impression formation of patients, but it was absent for positive traits in Studies 2 and 4. Also, the ITB effect was significant when clinical information that is neutral in terms of valence (as opposed to traits laden with clear valence) was associated with patients. This raises the question of whether the ITB effect consistently varies with the valence of the stimuli associated with patients; that is, whether it is stronger or only specific to negative traits (vs. positive traits or valence-neutral clinical information). As previously noted, this hypothesis is consistent with the idea that when White participants evaluate Black patients with negative traits, racial bias may become more accessible. This awareness could potentially elicit an aversive response (Dovidio & Gaertner, 2004), leading to even faster disengagement while forming impressions.

Additionally, we found that participants' avoidance of forming prejudiced impressions predicted the ITB effect in Studies 2 and 4, while this relationship did not occur in Studies 1 and 3. Moreover, while in all five studies we found a significant ITB effect in the aversive racism condition, this effect varied across the different profiles analyzed. Specifically, Studies 1, 4, and 5 revealed significant differences in the ITB effect for aversive racists compared to consistently prejudiced and non-prejudiced individuals, whereas Studies 2 and 3 showed non-differences. Given that these specific aspects were not consistent across the studies, and considering the importance of examining whether the ITB varies based on the paradigm and cultural context employed in the studies, it is essential to meta-analyze the effect sizes we found in all studies to address their reliability. To address these issues, we conducted Study 6.

Study 6

In this meta-analysis, we aimed to assess the consistency of the impact of patients' skin color (White *vs.* Black) on the time investment in impression formation and clinical assessment across studies developed, as well as identify its potential moderators. We first conducted a meta-analysis considering 36 effect sizes, of which 12 were based on data from participants who exhibited an aversive racist profile, another 12 corresponded to the ITB results from participants with consistently prejudiced profile, and the remaining 12 were from non-prejudiced individuals (see Figure 3). Positive values in this analysis indicate that more time was invested in impression formation and clinical assessment for White patients than Black patients, while negative values signify the opposite. We used the meta-regression command in the R Package Meta, using Cohen's d as an indicator of effect size (Schwarzer, 2015; 2022). Using the restricted maximum likelihood estimation method, we obtained meta-analytical effects for both random and fixed-effects models. The estimated overall meta-analytical Cohen's $d = .28$, confidence interval (CI) = [.20; .37], indicates the overall effect size of the ITB across studies. However, the significant heterogeneity found in the random-effects model ($\tau^2 = .033$, $p = .001$) indicates that the estimated effect size is not consistent across studies, suggesting the possibility that the ITB effect may be moderated by certain variables within the studies.

To further examine the consistent variation in the ITB effect expression, we delved deeper to explore its potential moderators. Specifically, we examined whether the valence of information (positive *vs.* negative *vs.* clinical) associated with patients across studies, the social context (Brazil *vs.* Portugal), the type of paradigm (impression formation *vs.* clinical assessment), the avoidance of forming prejudiced impressions (measured in Studies 1-4), and the participants' racial attitudes profiles (aversive racist *vs.* consistently prejudiced *vs.* non-prejudiced) moderate the effect. Initially, we conducted a univariate analysis to estimate the

association of each moderator with the Cohen-*d* ITB. We then proceeded to the second step, where we included the variable that demonstrated a significant association with the ITB effect in the univariate analysis to estimate the multivariate effect (see Table 6).

The results revealed that only the valence of information associated with patients and participants' racial attitudes profiles were significantly associated with the ITB effect in the univariate analysis. This pattern of results was consistent when considering the multivariate effect. This indicates that, although the ITB effect occurs regardless of the valence of information and participants' racial attitudes profiles, it is stronger in the negative domain and particularly expressed by medical trainees with an aversive racist profile, i.e., those individuals who genuinely believe themselves to be egalitarian and not racist but still hold negative attitudes and beliefs towards Black people. These findings provide robust evidence for our hypothesis that time investment in the medical context is influenced by patients' skin color and individuals' racial attitudes.

Table 6*Estimated metanalytical effect of the ITB effect moderators*

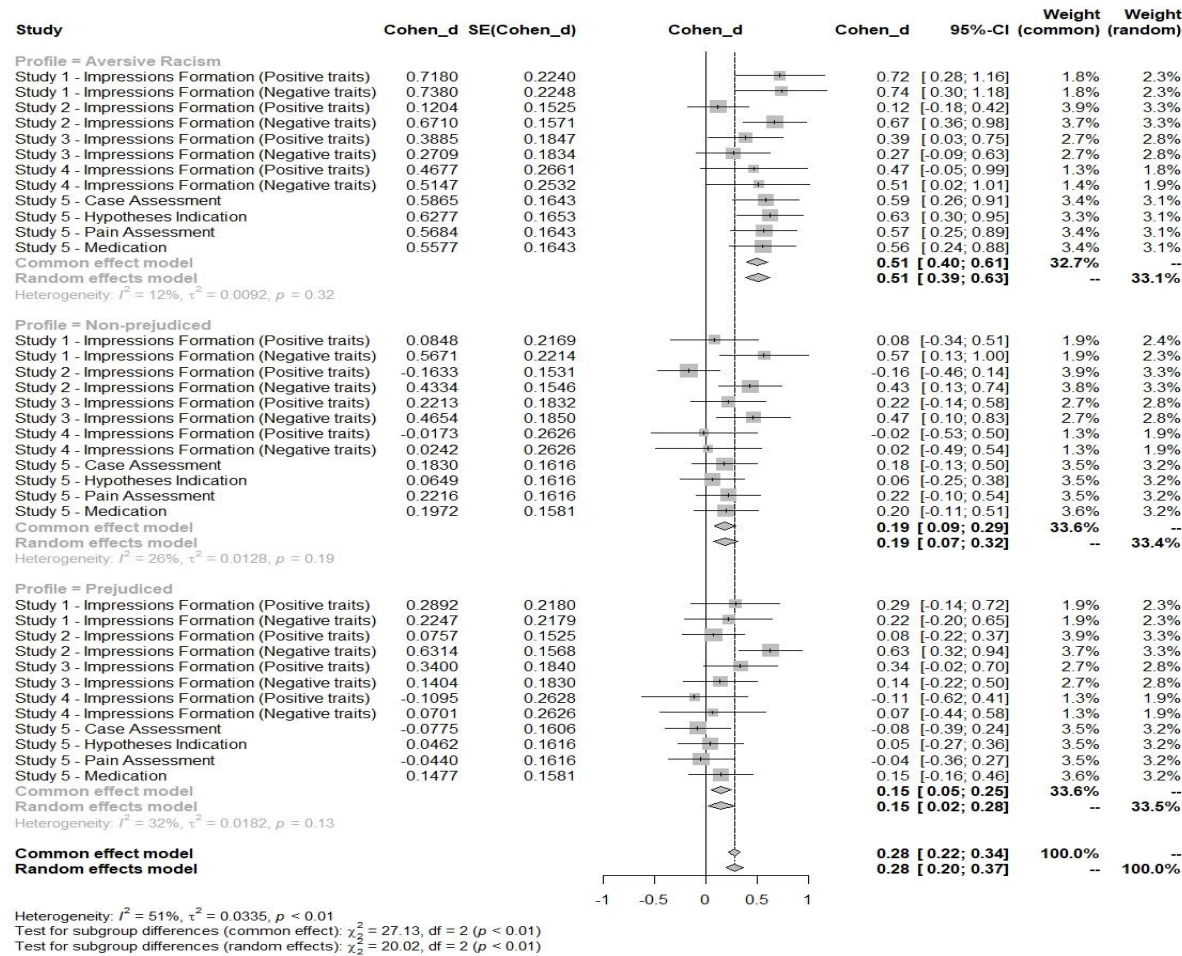
Moderators	Univariate Effects		Multivariate Effects	
	Estimate	95%CI	Estimate	95%CI
Intercept (ITB)	.284**	[-.199; .370]	.285**	[.222; .349]
Valence				
Positive (vs. Clinical information)	-.066	[-.262; .131]	-.076	[-.227; .075]
Negative (vs. Others)	.192*	[.016; .369]	.206*	[.067; .345]
Social Context (Portugal vs. Brazil)	-.177	[-.422; .069]		
Type of Paradigm (IFT vs. CAT)	.046	[-.132; .224]		
AFPI	.088	[-.025; .202]		
Attitudes Profile				
Non-prejudiced (vs. Prejudiced)	.041	[-.132; .214]	.039	[-.114; .193]
Aversive (vs. Others)	.338**	[.188; .488]	.335**	[.201; .469]

Note. ** $p < .001$; * $p < .05$. AFPI = Avoidance of Forming Prejudiced Impressions; IFT =

Impression Formation Task; CAT = Clinical Assessment Tasks.

Figure 3

Forest plot of meta-analytic results: aversive racist vs. consistently prejudiced vs. non-prejudiced profiles



Note. TE = Cohen-d of the ITB effect; seTE = standard error of the Cohen-d; CI = confidence interval.

General Discussion

Throughout five studies conducted in two countries with distinct cultural contexts (Brazil and Portugal), we found that White medical trainees invested more time in forming first impressions (Studies 1-4), assessing diagnostic hypotheses, perceiving pain, and making medication prescriptions (Study 5) for White than Black male patients. Additionally, we found that the ITB effect was most pronounced in forming first impressions when negative information was associated with patients (as opposed to positive traits or clinical information). Finally, the ITB effect was not consistently predicted by participants' avoidance of forming prejudiced impressions, but was stronger among individuals with an aversive racist profile (*vs.* consistently prejudiced *vs.* non-prejudiced), either in the impression formation or in other clinical tasks domains (Study 6).

Specifically, Study 1 provided preliminary evidence of an ITB effect in a Brazilian medical context, suggesting the existence of a discriminatory behavior in the time investment of White medical trainees. Importantly, this effect was stronger in participants with an aversive racist profile, suggesting that White aversive racist medical trainees invested less time forming impressions of Black patients and more of their time evaluating White patients. In Study 2, using a different set of stimuli in the Portuguese context, the results were replicated, demonstrating that, regardless of the cultural context, White participants invested more time forming impressions of White than Black patients. Also, results showed that participants' avoidance of forming prejudiced impressions was associated with the ITB effect. Because aversive racists consider themselves non-racists and egalitarians, in Study 3 we introduced a measure of egalitarianism to produce a combined pattern of high egalitarianism, low explicit racism and high implicit racial bias. The results supported our main prediction of an ITB effect in aversive racist participants. Although Studies 1, 2 and 3 bring a substantial

contribution to understanding bias in time invested in forming impressions of patients, the experimental paradigm used did not allow us to focus on important aspects of face perception, potentially implicated in impression formation processes and likely to correlate with the intergroup time bias. Thus, using an eye-tracking paradigm, Study 4 went further and examined time and gaze fixations on areas of interest such as patients' entire face, eyes, nose, mouth, and word stimuli. The results replicated the ITB effect and its association with participants' avoidance of forming prejudiced impressions and aversive racism, providing further insight into how the valence of traits, when paired with patients during the impression formation process, may relate to the ITB.

While findings from Studies 1-4 have shed light on the ITB effect in the medical context, we did not examine its downstream consequences on healthcare outcomes for patients. To address this gap, Study 5 involved a clinical assessment task to explore whether the ITB effect occurs during the evaluation of a clinical case, pain assessment, and medication prescribing tasks. Our results demonstrate that the time bias plays a mediating role in the relationship between patients' skin color and healthcare outcomes. Specifically, as a result of investing more time in the White (*vs.* Black) patient, medical trainees who express an aversive racist profile were more accurate in indicating diagnostic hypotheses, as well as perceived more pain and prescribed fewer opioids to the White (*vs.* Black) patient. Finally, meta-analyzed data (Study 6) demonstrate that the ITB effect occurs in patients' impression formation regardless of the valence of the information associated with them, the social context and task used, but it is stronger when the stimuli are negative and when participants do, indeed, express an aversive racist profile. Taken together, these results demonstrated the first experimental evidence that bias in time investment favoring White (*vs.* Black) patients is associated with aversive racism and impacts medical healthcare outcomes.

Theoretical Implications

The current findings provide new insights into the social value of time, its meaning, and its consequences for racialized relationships. Moreover, by demonstrating the ITB effect implications in the healthcare realm and its relationship with aversive racism, these results extend previous research on providers' racial bias in racially discordant, but also in concordant medical interactions. Regarding the value, meaning, and consequences of time in social relations, we note that studies developed from the social psychology of time theoretical framework have mainly focused on how people think about, organize, and perceive time (for review, see Younggreen & Silcox, 2020). In addition, previous research has sought to understand how these aspects influence the way people relate to themselves and others in their social environment (McGrath, 1988; Younggreen & Silcox, 2020). By considering bias in the investment of time in social interactions, the data from this research program advances discussions in this literature, since time is understood here as a resource that is used to favor ingroup (*vs.* outgroup) members (Tajfel & Turner, 1979). Furthermore, by shaping patients' assessment, these findings open up new possibilities for understanding the conditions under which time investment bias reflects aversive racist attitudes. Still, previous studies in the context of impression formation have shown that time can mean attention and motivation to form accurate impressions of a person (Brewer, 1988; Neuberg & Fiske, 1987). However, in intergroup relations, time may assume another meaning and reflect the social value of groups (Vala et al., 2012; Aguiar et al., 2008). Accordingly, in radicalized social relations, time investment bias can indicate a non-verbal discriminatory behavior.

When considering the ITB research line, this phenomenon has been demonstrated in racialized and minimal group contexts while individuals form impressions of others, regardless of the valence and stereotypicality of traits, homogenization phenomenon, and

internal and external motivation to control prejudice (Aguilar, 2008; Vala et al., 2012). The findings from our research program advance the understanding of the ITB in critical ways. First, our studies demonstrate that the ITB effect occurs in the healthcare context, both in the domain of impression formation and in the performance of clinical tasks, which opens up new possibilities for predicting that this phenomenon might be pervasive across various domains of social life where racialized social relations and relevant social comparison dimensions are present. Second, our study showed that the time bias favoring White over Black patients was observed even when negative, positive, or clinical information was associated with them. However, this phenomenon was stronger when negative information was associated with individuals. Since this effect emerged in the context of impression formation, where racial bias may become more accessible by the association of Black patients with negative traits, we drew upon the aversive racism framework to provide a theoretical explanation. Specifically, we suggest that this effect might be produced by aversive reactions to the idea of showing prejudice, leading participants to disengage even more quickly from Black patients compared to White ones. In fact, our findings show robust evidence that the ITB is more strongly expressed by those who express an aversive racist profile. Finally, by demonstrating the ITB in the context of clinical evaluation, we were able to identify its implications, including worse health outcomes for Black patients compared to White ones.

The present studies also represent an advance in previous research on provider-patient interactions, showing for the first time that White medical trainees systematically bias their time according to the patient's racial category, regardless of the cultural context that provides a higher or lower quality of healthcare for the population (i.e., Brazil vs. Portugal) (Araújo et al., 2018). These results corroborate previous findings from health inequalities research, which had already shown using correlational data that doctor-patient interactions tend to be

quicker with Black (*vs.* White) patients (i.e., particularly when providing treatment planning, health education, answering questions, and accessing patients' knowledge about health) (Penner et al., 2016; Penner et al., 2019). Importantly, they also examine in a novel way how future providers who have an aversive racist profile invest their time when placed in situations where they are asked to form impressions, diagnose, assess the pain, and recommend medication to patients from their social group and from a different one. We highlight this theoretical contribution as previous research on the influence of aversive racism in medical care has not addressed racially concordant interactions between physicians and patients. In other words, it has solely examined interactions between non-Black doctors and Black patients and has not accounted for the effect of patients' social groups (e.g., Black *vs.* White) on aversive racist doctors' conduct (Hagiwara et al., 2016; Penner et al., 2010).

Still, these findings are particularly relevant in the context of medical care and build upon prior research (Elia et al., 2016; Lighthall & Vazquez-Guillamet, 2015; Moulton et al., 2007), indicating that investing more time in clinical tasks can lead to better healthcare outcomes for patients. However, our results further showed that time investment in clinical tasks is influenced by the patient's skin color, which is associated with biased healthcare outcomes. On this matter, a study by Hirsh et al. (2015) found that non-Black physicians invested more time rating pain in White than Black patients. Similarly, our research program has replicated this pattern of results and taken a further step by systematically addressing the consequences of this discriminatory behavior in medical decision-making. Indeed, we discovered that the greater the time invested in rating pain, the higher the pain perceived in the patient (as well as better accuracy in diagnosis and medication prescription). These findings provide robust support for the notion that time investment bias has a significant impact on decision-making quality. Therefore, it is critical to understand and address this bias

to reduce health disparities. However, future research and interventions should also explore whether the ITB effect manifests in other settings and what its potential consequences are. Such investigations would provide a more comprehensive understanding of this bias and inform the development of more effective strategies to mitigate its impact, ultimately improving decision-making across diverse domains.

From an aversive racism perspective, it is stated that people genuinely endorse egalitarian values but nonconsciously hold negative attitudes and feelings toward Black individuals (Dovidio et al., 2017). This pattern explains, to some extent, the progressive decline of expressions of blatant discrimination in several countries with strong societal egalitarian values (França & Monteiro, 2013; Hodson et al., 2005). Instead, discrimination today is, to a large extent, subtler and indirect (Dovidio et al., 2017). The findings from this research program confirm this pattern of aversive racism, where a great proportion of the sample of (future) physicians endorse both egalitarian values and nonconscious negative feelings toward Black people. Notably, the results align with prior experiments on helping behavior (Gaertner, 1973). Specifically, Dovidio and Gaertner's (1986) reevaluation of Gaertner's (1973) help behavior study revealed that Democratic Party members tended to end phone calls with Black individuals more quickly than with White individuals, hinting at a possible manifestation of aversive racism. Although the underlying causes of this behavior are not yet fully explored, prior studies have suggested that intergroup anxiety may contribute to avoidance behaviors towards outgroup members (Stephan, 2014). By proposing that individuals' time investment may be unintentionally influenced by the perceived social value of their group membership, we provide further insights into why people might be more prone to disengage from interactions with Black individuals and devote more time to White individuals. Additionally, our research underscores the significance of the temporal dimension

of behavior in understanding the consequences of aversive racism in racialized social relations, particularly in clinical settings involving racially concordant and discordant interactions. The current studies, as framed within the theory of aversive racism, thus offer insight into socio-psychological dimensions of time investment in healthcare, presenting a theoretical explanation for a form of discrimination potentially relevant to explaining the persistence of racial inequalities in medical care. Regarding the operationalization of the racist aversive profile, to our knowledge, this is the first research program to demonstrate a qualified specification of this profile by introducing a measure of egalitarianism. Most research paths have operationalized the aversive profile with a combined measure of explicit and implicit racial prejudice (Dovidio, 2001; Dovidio et al., 2017). In Studies 3, 4 and 5, the results suggest that White medical trainees that score low on explicit racism, high in egalitarian values, and yet score high on implicit racial bias, are those who are more likely to invest more time in White patients.

Practical Implications for the Healthcare Context

The temporal dimension of the doctor-patient interaction is central to the findings presented here. The demonstrated existence of bias in the time invested in patients may have consequences for the quality of the doctor-patient relationship and critical consequences in medical decision-making and diagnostic processes. In this sense, these findings emphasize the importance of studying time investment bias as a key component of the inequalities previously documented in doctor-patient relationships. Moreover, early psychological research on racial/ethnic health disparities largely focused on measuring implicit attitudes (Hagiwara et al., 2020; Hamed et al., 2022). This research has primarily used the Implicit Association Test (IAT; Greenwald et al., 1998) to measure healthcare providers' implicit bias. Assuming that time is a social value and that individuals are motivated to invest this resource

in order to favor their ingroup members, the current study makes a significant contribution by proposing the assessment of an implicit form of discrimination in healthcare at the group-level.

Moreover, given that in the medical setting, egalitarian norms are often strongly enforced (Hagiwara et al., 2016; Penner et al., 2019), but physicians may hold implicit negative feelings towards and beliefs about Black individuals (Dovidio et al., 2016; Hagiwara et al., 2020), the aversive racism in the patient assessment context points to the need for research and interventions that consider time bias as a racial-based discriminatory behavior in the medical realm. We emphasize this because interventions to reduce disparities in minority healthcare have primarily focused on decreasing explicit or implicit racial biases and their relationship with clinical decision-making or recommendations (Penner et al., 2019).

However, an essential factor that underlies practical aspects of healthcare is often overlooked: healthcare professionals' time and effort invested in patient care procedures. Regarding this issue, Saucier et al. (2003), in a literature review that gathered over 31 studies developed between the 1970s and 2000s about aversive racism, found that as the time needed to help increased, and the difficulty and effort to help increased, the help Blacks received decreased relative to Whites in the same situations. Using this concept as an analogy to the medical realm and considering that some clinical tasks developed by physicians may be perceived as helping behaviors (as opposed to professional activities) (Dugdale et al., 1999; Saba et al., 1999; Valente et al., 1986; Wachspress et al., 2020), aversive racist providers may be less likely to "help" those who are perceived as different from themselves, such as Black patients. Therefore, we propose that future research and interventions consider the time and effort hypothesis, which suggests that when a clinical activity becomes more effortful or time-consuming and is perceived as a helping behavior, aversive racist physicians may be less

likely to provide resources (e.g., time) to patients from outgroups, leading to disparities in care.

Limitations and Further Directions

Notwithstanding the theoretical and practical implications of this research program's findings, our studies had some limitations. Firstly, they did not have actual relationships between patients and medical trainees in clinical or hospital settings. However, in non-laboratory contexts, it is difficult to measure the time invested and control for other variables that may interfere with forming impressions, assessing the pain, and indicating medication for patients. To bridge this gap, virtual reality and the possibility of "approaching" the relationship between "fictitious patients" and medical trainees could be used. Regarding this aspect, a study already conducted on the pain assessment of patients is highlighted. In this study, physicians interacted with avatars of patients expressing pain, and it took them longer to rate the pain of White than Black patients (Hirsh et al., 2015). Although this was a secondary finding in the Hirsh et al. (2015) study, it might be interpreted as a hint that using augmented virtual reality to validate the findings of this research program in encounters that are more realistic could be a viable technique.

Another limitation of the studies refers to the fact that our participants were medical trainees at different stages of their training. Although in Study 5, we specifically recruited participants who were in their fifth and sixth year of medical school as they have some practical experience in clinical care, this may limit the practical implications of the results presented here. However, this methodological procedure was useful to avoid confounding effects related to various medical specialities and clinical experiences. We acknowledge that such variables could potentially moderate the phenomenon identified in this study, and future research should explore these relationships. Additionally, further research can investigate

whether healthcare providers from different ethnic and racial backgrounds exhibit the ITB effect when assessing patients in cross-racial encounters. The broader cultural context within which healthcare providers operate may also play a crucial role in decision-making. For instance, in settings where White people are a numerical and symbolic majority, Whiteness may be normalized and rewarded in healthcare systems, potentially exacerbating the ITB effect and contributing to healthcare disparities for patients from non-White backgrounds.

Despite these potential limitations, we believe that the current studies contribute substantially by offering new insights into the meaning of time in social relations (advancing the social psychology of time theoretical framework), but also toward a greater understanding of racial disparities in healthcare. Further research, however, could extend the study of this time bias effect on other medical dimensions. For instance, it is necessary to experimentally investigate whether the ITB effect occurs and what its potential consequences are when healthcare providers communicate diagnoses to patients. Our central hypothesis regarding this novel research direction is that the ITB effect may act as a mechanism underlying the lower quality communication directed towards racially disadvantaged patients, which in turn, may result in reduced patients' trust in the care provided (ABIM Foundation, 2021) and consequently lead to lower medical compliance and other adverse healthcare outcomes.

Moreover, future studies in this research line should address racial attitudes of not only physicians but also patients may impact clinical interactions. Previous studies by Hagiwara et al. (2013) and Hagiwara et al. (2016) have highlighted that Black patients' racial perceptions and attitudes also affect how physicians and patients communicate when racially discordant interactions occur. Therefore, future studies should investigate whether patients' perceptions of racial discrimination interact with aversive racism in ways that prolong or shorten medical appointments. This would enable a more comprehensive understanding of the factors that

influence time investment bias and, consequently, healthcare disparities when non-Black physicians and Black patients interact.

Given the need to develop strategies to reduce racial disparities in healthcare (Madeira et al., 2022a; Madeira et al., 2022b; Williams & Cooper, 2019), future research could investigate whether manipulating perceptions of time (e.g., by framing time as scarce in clinical practice versus necessary for good clinical practice) affects the amount of actual time invested in assessing patients, and in turn, influences the quality of clinical recommendations offered to outgroup patients compared to ingroup patients. Such studies should also evaluate providers' implicit and explicit racial biases (Sabin et al., 2008). Suppose the results show that the extent of implicit racial bias among these professionals does not differ between groups that have received different primers of time, but that the actual time invested in doctors' appointments, as a function of time manipulation, is a predictor of the quantity and quality of clinical recommendations indicated for patients. In that case, this could provide evidence for interventions focusing on time perception in medical care and consultation length rather than on decreasing physicians' implicit biases to enhance clinical recommendations and physician-patient communication. Additionally, testing whether aversion is a potential underlying mechanism of the ITB effect in the medical context, as well as patients' status or educational background (Aubé et al., 2019; Rougier et al., 2021) as moderators of the effect, could be future research topics from this research line.

Beyond investigating the impact of ITB in the healthcare context, future studies should also explore this discriminatory behavior and estimate its implicit consequences in other crucial social domains, such as legal decision-making. In this context, time investment bias may influence the quality of decisions made for individuals from different social groups and potentially impact sentencing. Additionally, in the education setting, the ITB effect may

manifest as professors explaining and solving doubts of students from one social group more than another, potentially leading to disparities in academic performance. Moreover, considering that the time individuals invest in social media is used as an implicit indicator of their interest in topics, being used for adjusting the content presented to users (Claypool et al., 2001a; Claypool et al., 2001b; Kim & Kim, 2017; Waheed et al., 2017), and taking into account the ITB findings that show a bias in the investment of time when individuals evaluate content associated with ingroup (*vs.* outgroup) members (Aguiar et al., 2008; Vala et al., 2012), future studies could investigate whether the way social media algorithms are built promotes or at least amplifies individuals' lack of contact with outgroup members, potentially increasing polarization and discriminatory behaviors among social groups on a macro level.

Conclusions

Drawing upon theories from the social psychology of time (McGrath, 1988; Vala et al., 2012; Younggreen & Silcox, 2020), intergroup relations (Tajfel & Turner, 1979; Dovidio et al., 2016), and contemporary research on implicit and explicit racial biases in the medical context (Hagiwara et al., 2013; Penner et al., 2019), we developed a theoretical framework and proposed that time is a valuable resource utilized in the medical context to favor ingroup members over outgroup members, particularly by those who exhibit an aversive racism profile. The pattern of findings provided robust experimental evidence that White medical trainees exhibit discriminatory behavior when allocating their time, investing more of it in White patients as opposed to Black patients. This time bias has significant consequences for healthcare decision-making and may adversely affect the quality of care provided to socially devalued racialized groups.

**CHAPTER 3 - DOES TIME INVESTMENT DISCRIMINATION MEDIATE THE
EFFECT OF PATIENTS' SKIN COLOR ON MEDICAL DECISION-MAKING?**

Abstract⁸

There is robust evidence that structural racial bias persists in social relations, despite social pressure imposed by the anti-racism norm. This bias leads to the disproportionate allocation of scarce and valuable resources, such as time, a phenomenon known as the Intergroup Time Bias (ITB) effect. However, this time bias may not only represent a behavior that unobtrusively favors White individuals, but also has major implications for racial inequalities in crucial domains of social life, especially those that demand accuracy in managing complex medical situations. In this research, we tested the hypothesis that White providers ($N = 210$) invest more time diagnosing and referring clinical interventions for White than Black patients. Moreover, we examined these time bias consequences by investigating whether the ITB effect underlies diagnostic accuracy and clinical recommendation prescriptions. The results showed that participants invested more time examining a White (vs. Black) patient case. Such time bias mediated the influence of a patient's skin color on diagnostic accuracy, and the quantity and quality of recommendations prescribed. That is, participants invested more time in assessing and stating clinical interventions for the White patient. The more time invested, the higher the diagnostic accuracy and the quantity and quality of recommendations provided to this patient. These findings provide experimental evidence of biased time investment during patient assessments, demonstrating its impact on both diagnostic accuracy and clinical recommendations' quality.

Keywords: Intergroup Relations; Healthcare Disparities; Intergroup Time Bias; Discriminatory Behavior.

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In the high-pressure environment of healthcare, time is an invaluable resource (Yahanda & Mozersky, 2020). Every second matters, particularly in the critical process of medical decision-making, which can significantly impact a patient's health trajectory (Elia et al., 2016; Lighthall & Vazquez-Guillamet, 2015; Moulton et al., 2007). However, what if the investment of time were not equitably distributed among patients from different social groups, reflecting a deeply rooted and often overlooked form of intergroup discrimination? How might this disparity in time allocation affect healthcare outcomes for patients?

The societal value attributed to distinct social groups critically influences the extent of time individuals are willing to invest in evaluating their members (Aguiar et al., 2008; Vala et al., 2012). Specifically, when individuals devote more of their time to one social group over another, it indicates the existence of a time investment bias, mirroring the social values associated with these groups within a broader context (Do Bú et al., 2022; Vala et al., 2012). This phenomenon, known as the Intergroup Time Bias (ITB) effect, highlights the motivation of individuals to invest more time in their ingroup as opposed to outgroup members (Vala et al., 2012), which can have far-reaching implications across various aspects of social life. In this study we focus on the ITB effect, aiming to investigate the pervasive nature of time investment bias in the medical field and its potential impact on diagnostic accuracy and clinical recommendations provided to Black and White patients.

The Intergroup Time Bias Effect on Clinical Interactions

Time is a socially valuable and scarce resource that individuals invest in goods and activities that hold the most significance for them (McGrath, 1988). Among these priorities, investing time in social interactions plays a pivotal role in shaping human experiences. In fact, as we engage in daily social relationships, we dedicate substantial time and effort to nurture and strengthen our relationships with those around us (Hall, 2019; Hamermesh, 2019).

Previous research has shown, for example, that the quality of our social interactions is linked to the time we commit to them (Hall, 2019; Hamermesh, 2019; Harvey & Pentland, 2002; Hays, 1985). Consequently, the time devoted to socializing can profoundly influence our experiences and connections within society, as the more valuable people are to us, the more time it is worthwhile investing in and devoting to them (Vala et al., 2012).

In social relationships, despite the existence of anti-racism norms, White individuals continue to be valued more than Black individuals, as evidenced by several contemporary racism theoretical models (Bratt, 2022; Dovidio et al., 2016; Pereira et al., 2018; Ramos et al., 2019; Roberts & Rizzo, 2021). Research indicates that the manifestation of this pro-White bias has shifted towards more subtle discriminatory behaviors, as opposed to blatant ones (Dovidio & Gaertner, 2002). Instances of these subtle biases include the tendency for individuals to invest more time in evaluating White individuals compared to Black individuals during the process of impression formation (Aguiar et al., 2008; Lima, 2003; Vala et al., 2012). Lima (2003) observed that the activation of competition or meritocracy norms, rather than equality norms, led White individuals to invest less time forming impressions of Black (*vs.* White) individuals, connecting this phenomenon to prevailing social norms. In a similar vein, Aguiar et al. (2008) found that White Portuguese individuals dedicated more time to forming impressions of White Portuguese children as opposed to Gypsy children. Vala et al. (2012) further corroborated these findings, showing that White individuals consistently invested more time in forming impressions of White than Black targets. Interestingly, this time bias was observed not just in situations with explicit racial undertones, but also in scenarios where participants were subjected to minimal group manipulation. These findings highlight the socio-psychological meaning of time investment as it reflects the social value of different groups within society. As a result, time investment bias offers a means of assessing

an often-overlooked form of intergroup discrimination. However, the unequal investment of time in White versus Black people, for example, not only subtly favors the former social group but can also have significant implications for racial inequalities in critical domains of social life, particularly in those that require precision or accuracy in managing complex medical situations, such as the assessment of clinical cases and the determination of clinical recommendations for patients.

In the context of medical care, time is crucial in fostering the doctor-patient relationship and shaping effective clinical care practices (Dugdale et al., 1999; Yahanda & Mozersky, 2020). Prior studies have shown that this resource significantly affects patients' perceptions of care quality (Dugdale et al., 1999; Lin et al., 2001; Linzer et al., 2009; Mawardi et al., 1979) and trust within the physician-patient relationship (Skirbekk et al., 2011). In addition, time has a significant impact on collaborative clinical prescribing practices (Yahanda & Mozersky, 2020). Moreover, time plays a vital role in the diagnostic process, as determining a diagnosis can vary greatly in duration, ranging from a brief period to several months (Committee on Diagnostic Error in Health Care, 2015). Given this framework, it is widely acknowledged within the medical community that time is a valuable and limited resource (Yahanda & Mozersky, 2020). Consequently, a thorough analysis of time allocation for patients from diverse social backgrounds (e.g., Black vs. White patients) may unveil underlying discriminatory practices that profoundly impact the overall quality of healthcare provided.

The literature extensively recognizes healthcare disparities between Black and White individuals (Hamed et al., 2022; Penner et al., 2019; Williams et al., 2019). These disparities stem from a multifaceted interplay of economic and political factors (Braveman, 2006) as well as psychological mechanisms that can result in racial biases among healthcare providers

(Dovidio et al., 2016). Such biases may manifest in decision-making processes and nonverbal and verbal interactions with patients (FitzGerald & Hurst, 2017; Madeira et al., 2022a; Penner et al., 2019). However, while extensive research reports racial discrimination in treatments offered to patients (Penner et al., 2019; Williams et al., 2019), little attention has been given to how time investment impacts treatment recommendations, despite observational research suggesting that patient skin color is related to the amount of time physicians invest in communicating with them (Gross et al., 1998; Mende-Siedlecki et al., 2022; Oliver et al., 2001; Waitzkin, 1985).

In addition, Black patients are less likely than White patients to receive treatment aimed at preventing, curing, or improving their health conditions, across various disease categories (Madeira et al., 2022a; Madeira et al., 2022b; Major et al., 2018; Williams & Rucker, 2000; Williams et al., 2019). Underlying such discrimination, researchers have intensely investigated the role of physicians' implicit racial biases (Hagiwara et al., 2020). Specifically, a recent systematic review of the association between implicit racial bias and clinical decision-making concluded that physicians have an implicit preference to treat White versus Black patients, but this does not appear to explicitly influence their clinical decisions (Dehon et al., 2017). Another study found that implicit categorization of patients into racial groups (i.e., Black vs. White) influenced physician judgment in that Black patients received a less severe diagnosis and were less likely to be referred to a specialist than White patients. This, however, was only when physicians were under high time pressure (Stepanikova, 2012). These findings suggest that time (or the lack of it) invested in clinical decisions might be related to implicit processes that underpin healthcare disparities among different social groups.

Building on the ITB effect, recent studies have provided preliminary evidence that White physicians have been found to invest less time when attending to Black patients compared to White and Brown patients during consultations (Pimentel, 2018). This bias has also been observed in the process of forming first impressions (Do Bú et al., 2022) and assessing patients' pain (Do Bú et al., 2022; Hirsh et al., 2015). This is even stronger when the provider has an aversive racist profile, i.e., in those individuals who highly endorse egalitarianism, self-define as non-racist, but nurture implicit pro-White bias (Do Bú et al., 2022). Nonetheless, although there is some evidence of higher time investment for White than Black patients, to our knowledge, no study has experimentally confirmed that this disparity takes place during the process of determining clinical recommendations for patients. Furthermore, the impact of time investment bias on the relationship between patient skin color and the quality of clinical recommendations has yet to be investigated.

Based on the complex nature of medical diagnosis and the need for a thorough analysis of clinical cases, it is reasonable to assume that physicians who invest more time in the patient assessment are more likely to arrive at accurate diagnoses and provide appropriate clinical recommendations (Elia et al., 2016; Lighthall & Vazquez-Guillamet, 2015; Moulton et al., 2007). However, considering the findings on the ITB effect, which suggest that the allocation of time towards patient evaluation could be influenced by the patient's skin color, it is possible to hypothesize that such effect may impact the accuracy of diagnoses and subsequent medical procedures. Aiming to examine these assumptions, the current research unfolds the role of time investment bias in medical decision-making proposing to test the following hypotheses:

H1: White medical trainees invest more time assessing and indicating clinical recommendations to White than Black patients (i.e., ITB effect);

H2: The patient's skin color influences diagnostic accuracy, as well as the quantity and quality of clinical recommendations. In other words, when the patient is White (vs. Black), the diagnostic accuracy and the quantity and quality of recommendations will be higher;

H3: Finally, the ITB effect on assessing patients should mediate the impact of the patient's skin color on diagnostic accuracy, quantity and quality of clinical recommendations. As a result, more time will be invested in the clinical assessment when the patient is White (vs. Black), and the greater this pro-White bias in time investment, the higher the accuracy and quantity and quality of clinical recommendations toward the White (vs. Black) patient.

Method

Participants

Two hundred eighty-two Portuguese medical trainees were invited to take part in an online study on the quality of materials to be used in the medical setting. Following the exclusion of participants who did not meet the inclusion criteria (i.e., being Portuguese, self-declare as White, a fifth or sixth-year medical student, and completing 100% of the questionnaire), 210 participants were eligible and were randomly allocated to one of two between-subject experimental conditions (i.e., White vs. Black patient). Most participants were female (71.4%) and in their sixth year of medical training (54.8%), with ages ranging from 21 to 36 ($M = 23.95$; $SD = 2.38$). It is important to note that our sample consisted only of fifth and sixth-year medical trainees because in Portugal, during these years of the course, students are already actively engaged in hands-on learning experiences such as practical classes, patient simulation centers, and clinical internships. A Sensitive Power Analysis indicated that this sample size had a power of .91 for the detection of an indirect effect in a mediation analysis (Schoemann et al., 2017).

Data Collection and Experimental Procedure

Data collection was performed online through the Qualtrics platform. For participant recruitment, we contacted all universities in Portugal that have medical schools and asked them to distribute the questionnaire to their students. In addition, we spread the questionnaire on social networks such as LinkedIn, Facebook, Instagram, and WhatsApp. At the beginning of the study, participants were given a cover story outlining the objectives and details of the study. The cover story stated, “The aim of this study is to evaluate the quality and relevance of clinical tasks that will be applied in a future medical study. You will be evaluating a clinical situation and indicating whether diagnostic hypotheses apply to the symptoms presented. Additionally, we will ask you to suggest clinical recommendations that you may propose considering the situation presented.” After, participants were randomly assigned to evaluate a clinical case of either a White or Black patient. The manipulation of patient skin color was achieved by presenting participants with digitally blurred photographs of Black and White individuals together with the clinical case (DeBruine & Jones, 2017). Following the case, participants were presented with four possible diagnostic hypotheses (one at a time). The diagnostic hypotheses order presentation was random, and the participant’s task was to indicate whether the hypothesis was adequate or not for the case. Then, participants were asked to suggest clinical recommendations they deemed essential for the case, such as clinical and lab exams, medication, and health promotion behaviors, through an open-ended question. Participants also answered questions related to their sociodemographic characterization and year of medical training. Lastly, participants were fully debriefed about the objectives of the study and the use of a cover story.

Clinical case selection and pre-test. We used a clinical case of a migraine aura from a Portuguese national exam for medical trainees, which was modified to maintain the

confidentiality of the exam. A focus group of Portuguese physicians initially evaluated the case, and it was later pre-tested with another group of physicians to ensure it did not depict symptoms commonly exhibited by specific ethnic or gender groups. This was done to effectively control potential confounding factors and ensure that the case was appropriate for our study. The findings revealed that the case was not biased, and it was a frequently encountered scenario in daily medical practice, with medium complexity (see supplementary material).

Ethical concerns. The study's procedures were approved by the Ethics Committee of the Institute of Social Sciences from the University of Lisbon (number: blinded information) and followed all ethical principles for human research. The dataset and supplementary material used in the research can be accessed at the OSF repository platform:

https://osf.io/6vmhu/?view_only=d3d4518aabe24e088ce0afc51633ba81.

Measures

Time Investment. As participants assessed the clinical case, answered the diagnostic task, and indicated recommendations for the patient, Qualtrics recorded the time in seconds they spent on each task. Considering that the diagnostic accuracy and clinical recommendations were determined by the participant's progress through the study's tasks, it was important to take into account the time invested in each clinical task when predicting these outcomes. To achieve this, we calculated two indices. The first accounted for time invested in assessing the clinical case and indicating diagnostic hypotheses when predicting diagnostic accuracy, and the second index for the time participants devoted in evaluating the clinical case, indicating the diagnostic hypothesis, and suggesting clinical recommendations when predicting the quantity and quality of clinical recommendations.

Diagnostic Hypotheses. Participants were presented with four diagnostic hypotheses about the case (two of which were correct and two incorrect) and were asked to indicate whether they were adequate or not in diagnosing it. From the participants' answers, we first determined whether they correctly identified all the diagnostic alternatives (responses were coded with 1 if all options were correctly identified and 0 if they were not). Additionally, we borrowed signal detection theory (SDT) analysis strategies to evaluate the participants' response patterns. Specifically, we analyzed the hits (i.e., the diagnostic hypothesis was correct and the participant indicated that it was correct), misses (i.e., the diagnostic hypothesis was correct but the participant indicated that it was incorrect), false alarms (i.e., the diagnostic hypothesis was incorrect but the participant indicated that it was correct), and correct rejections (i.e., the diagnostic hypothesis was incorrect and the participant indicated that it was incorrect) when evaluating the likely diagnostic hypotheses (see supplementary material in the OSF to the detailed procedure) (Adbi, 2009).

Clinical Recommendations Indicators. We evaluated clinical recommendations through two indicators: a) the total number of clinical recommendations prescribed by participants (i.e., the indication of clinical and lab exams, medicine, and health promotion and prevention behaviors) and b) the quality of these recommendations. The latter was determined by an inter-rater agreement, with a team of seven raters using a four-point scale to evaluate the quality of each action. Raters categorized the quality of each action on a four-point scale. Level 0 = the participant prescribed nothing; Level 1 = the participant prescribed only medications, without investigating through exams the etiology of the symptoms presented by the patient; Level 2 = the participant only prescribed exams, without prescribing medication to relieve the patient's pain, showing motivation to investigate the reason for the symptoms, but an absence of concern for decreasing the patient's suffering; and finally, Level 3 = the

participant prescribed clinical examination(s), medication to relieve the patient's pain, and health behaviors that would improve the patient's quality of life. The raters first evaluated responses individually, then in pairs to reach a consensus, and finally as a group. The indicators were then validated by a physician. All raters and physician were blinded to the experimental conditions.

Subjective Time. To explore whether the time objectively invested by participants in the development of the tasks was accurately perceived, before asking sociodemographic questions, we asked participants how much time (in seconds) they believed they had used to assess the clinical case, assign hypotheses, and indicate clinical recommendations. The values indicated by participants in these questions were our measure of subjective time invested. In other words, the perceptual time that participants believed they had invested in performing the patient's clinical assessment.

Data analysis

Descriptive analyses (Mean and Standard Deviation) were performed for all study variables, as well as Pearson (scalar) and Spearman (ordinal variables) correlations. Also, we used Student's t-test, MANOVA, repeated measures ANOVA, and mediation analyses (Hayes, 2022). Outliers in reaction time measurements were treated following the indications of Tabachnick and Fidell (2001) and Ratcliff (1993) by excluding time latencies that were two standard deviations above and below the mean, which is consistent with a standard of 95% confidence intervals of $p < .05$. The number of outlier response times per variable is available in the supplementary material for further examination.

Results

Time Invested

First, we examined the differences in the time invested in assessing the clinical case, indicating diagnostic hypotheses, and assigning clinical recommendations. The results of the MANOVA showed a reliable multivariate effect of patient skin color, $F(3, 182) = 3.766, p = .012, \eta_p^2 = .059$. Follow-up ANOVAs revealed that while the difference in time invested in assessing the clinical case for White and Black patients was not sufficient to reach statistical significance ($F(1, 199) = 3.475, p = .064, \eta_p^2 = .017$), participants did invest more time identifying diagnostic hypotheses for White patients ($F(1, 203) = 4.489, p = .035, \eta_p^2 = .022$) and indicating recommendations for White patients ($F(1, 198) = 7.920, p = .005, \eta_p^2 = .039$). Descriptive statistics for the response latencies are presented in Table 1.

Table 1

Means and Standard Deviations of the Study Variables

Variables	White Patient	Black Patient
	<i>M(SD)</i>	<i>M(SD)</i>
Actual Invested Time (seconds)		
Evaluating the case	24.14 (10.46)	21.68 (7.80)
Hypotheses	21.51 (12.83)	18.32 (7.67)
Recommendations	90.29 (75.23)	65.34 (43.97)
Perceived Time (seconds)		
Evaluating the case	37.09 (17.36)	39.71 (23.25)
Hypotheses	32.70 (30.70)	30.11 (25.45)
Recommendations	80.00 (77.94)	64.02 (54.48)
SDT Parameters		

Hits	1.49 (.644)	1.56 (.574)
Misses	.198 (.600)	.434 (.574)
False Alarms	.882 (.747)	.838 (.738)
Correct Rejections	1.12 (.747)	1.16 (.738)
<hr/>		
Medical Decisions		
<hr/>		
Recommendations	3.98 (3.23)	3.01 (2.72)
Recommendations Quality	2.14 (.761)	1.96 (.781)

Note. SDT = Signal Detection Theory.

Diagnostic Hypotheses

We first examined whether participants correctly guessed the entire diagnostic hypothesis identification task, i.e., whether they correctly diagnosed the clinical case. Differences of the number of correct answers when the patient was Black ($M = .25$; $SD = .044$) and White ($M = .23$; $SD = .425$) were not significant, $t(2, 208) = .307$, $p = .758$, $d = .042$). However, MANOVA results showed a multivariate significant effect of the patient's skin color on the SDT indicators of diagnostic accuracy, $F(4, 208) = 12.990$, $p = .001$, $\eta_p^2 = .159$. Indeed, follow-up ANOVAs indicated that although there were no significant differences in the number of hits ($F(1, 209) = .686$, $p = .408$, $\eta_p^2 = .003$), false alarms ($F(1, 209) = .188$, $p = .665$, $\eta_p^2 = .001$), and correct rejections ($F(1, 209) = .188$, $p = .665$, $\eta_p^2 = .001$) to Black and White patients, we did find a significant difference in the number of misses. Participants indicated that the correct diagnostic hypotheses presented to them were incorrect more often when the patient was Black than White, $F(1, 209) = 8.434$, $p = .004$, $\eta_p^2 = .039$ (Table 1).

Quantity and Quality of Clinical Recommendations

With regard to the quantity and quality of clinical recommendations, we found a significant multivariate effect of patient skin color, $F(2, 208) = 3.372, p = .036, \eta_p^2 = .032$. Follow-up ANOVAs demonstrated that participants significantly indicated more clinical recommendations for the White patient than the Black patient, $F(1, 209) = 5.472, p = .020, \eta_p^2 = .026$. However, the quality of these recommendations was not significantly different between the White and the Black patient ($F(1, 209) = 3.001, p = .085, \eta_p^2 = .014$) (Table 1).

Mediation Analyses

Table 2 presents the bivariate correlations among the study variables. To test our hypotheses that the ITB effect mediates the relationship between patient skin color and diagnostic accuracy, as well as the quantity and quality of clinical recommendations, we performed mediation analyses (Model 4; Hayes, 2022) with bootstrapping of 5000 simulations. When considering the overall level of participants' correctness in stating diagnostic hypotheses, we found no mediating effect of time invested in the influence of patient skin color on the correctness of diagnostic stating ($b = .096; SE = .076; 95\% CI [-.019; .276]$). However, we found a significant indirect effect of the ITB effect on the influence of patient skin color on correct rejections ($b = .048; SE = .025; 95\% CI [.006; .106]$) (Figure 1). This indicates that participants invested a greater amount of time in the evaluation of the clinical case of the White than the Black patient; and the greater this amount of time, the higher the accuracy in diagnosis as measured by refusing incorrect diagnosis. The indirect effect for hits ($b = -.007; SE = .015; 95\% CI [-.041; .023]$) was non-significant (see supplementary material for details).⁹

⁹ This analysis only considers hits (success in establishing that the diagnostic hypotheses were correct when they actually were) and correct rejections (success in identifying that incorrect diagnostic hypotheses were, in fact, wrong). Analyses of misses and false alarms can be found in supplementary materials.

Importantly, we also found the indirect effect of time invested in the influence of patient skin color on the number of clinical recommendations ($b = .258$; $SE = .418$; 95% CI [.027; .611]). This means that when the patient was White (*vs.* Black), more time was invested in the clinical assessment of the case; and the more time invested, the higher the quantity of clinical recommendations indicated for the White patient (Figure 1). Finally, we found the indirect effect of the ITB effect on the influence of patient skin on the quality of clinical recommendations ($b = .085$; $SE = .035$; 95% CI [.017; .154]). That is, when the patient was White, more time was invested in the clinical evaluation of the case; and the more time invested, the greater the quality of clinical recommendations indicated for the White patient (Figure 1).

Subjective Time

MANOVA results showed a non-reliable multivariate effect of the patients' skin color on the subjective time invested in the tasks, $F(3, 186) = 1.543$, $p = .205$, $\eta_p^2 = .024$. Follow-up ANOVA also indicated non-significant differences regarding the clinical case evaluation ($F(1, 199) = .823$, $p = .365$, $\eta_p^2 = .004$), the hypotheses assignment ($F(1, 199) = .417$, $p = .519$, $\eta_p^2 = .002$), and the indication of clinical recommendations, $F(1, 199) = 2.776$, $p = .097$, $\eta_p^2 = .009$ (Table 1).

Actual Time Invested vs. Subjective Time

In an exploratory way, we compared the Actual Time Invested (ATI) by participants in the clinical case evaluation and Subjective Time Invested (STI). Repeated measures ANOVA results showed a reliable effect of how time was measured (ATI *vs.* STI), $F(2, 208) = 12.682$; $p = .001$, $\eta_p^2 = .057$. Participants perceived they invested more time in the case assessment (TS; $M = 135.956$ s; $SE = 6.18$) than they actually did (TI; $M = 114.907$ s; $SE = 4.654$). Moreover, we found that participants accurately determined time invested in

evaluating the clinical case of the White patient, as there were no significant differences between ATI ($M = 129.824s$; $SE=80.632$) and STI ($M = 142.973s$; $SE=97.635$) ($b = -13.149$; $SE = 8.117$; $p = .110$; $d = .146$); but for the Black patient they reported investing more STI ($M = 128.939s$; $SE=79.18$) than ATI ($M = 99.99s$; $SE = 48.22$) ($b = -28.949$; $SE = 8.595$; $p = .001$; $d = .441$), suggesting an overcompensation bias effect in subjective time investment. Nevertheless, the interaction between Time and patient skin color was non-significant, $F(2, 208) = 1.786$; $p = .183$, $\eta_p^2 = .009$.

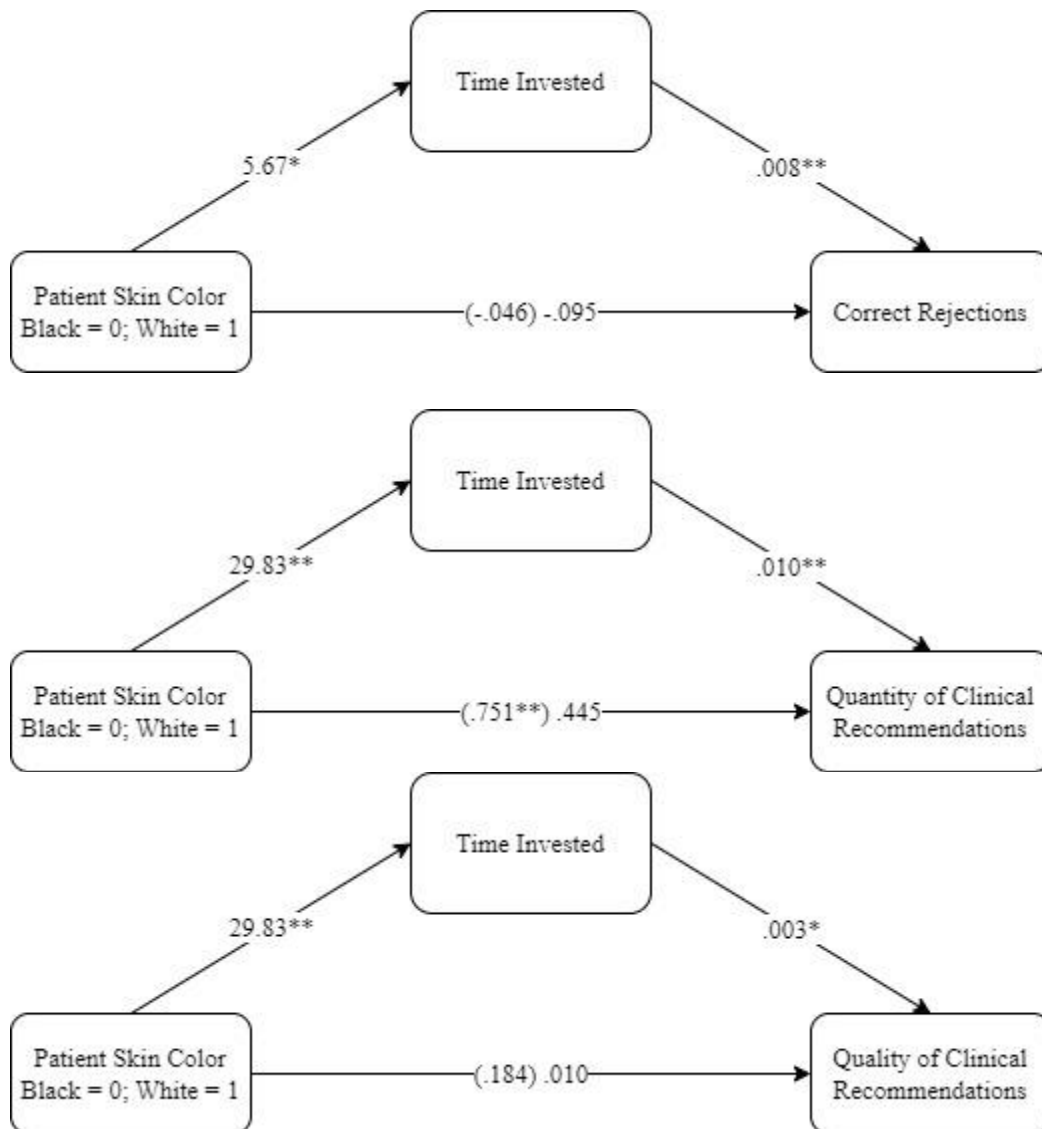
Table 2*Correlations between the variables in each experimental condition*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Assessing (ATI)	-	.325**	.203	.219*	.017	.102	.314*	.131	.075	-.075	.168	-.168	.094	.134
2. Hypotheses (ATI)	.298**	-	.221*	.009	.0142	.146	.345**	.158	-.165	.165	.137	-.137	-.084	.200*
3. Interventions (ATI)	.097	.196*	-	.089	.270*	.741**	.958**	.549**	.050	-.050	.086	-.086	.526**	.322**
4. Assessing (ST)	.209*	.102	-.053	-	.564**	.362**	.061	.654**	-.155	.155	-.156	.156	.070	.112
5. Hypotheses (ST)	.393**	.308**	.116	.353**	-	.482**	.237*	.792**	-.072	.072	-.131	.131	.126	.191
6. Interventions (ST)	.086	.082	.682**	.247*	.367**	-	.609**	.871**	.001	-.001	-.040	.040	.426**	.371**
7. Total Time (ATI)	.215*	.352**	.975**	-.056	.166	.546**	-	.462**	.014	-.014	.124	-.124	.347**	.289**
8. Total Time (ST)	.207*	.154	.484**	.470**	.599**	.931**	.427**	-	-.052	.052	-.115	.115	.290**	.313**
9. Hits	.034	-.104	.122	.078	.118	.218*	.065	.184*	-	1.00**	.167	-.167	.110	.006
10. Misses	-.043	.203*	-.106	-.033	.005	-.171	-.053	-.114	-.679**	-	-.167	.167	-.110	-.006
11. Correct Rejections	.107	.149	.060	.165	.002	.054	.092	.100	.312**	-.255**	-	-1.00**	-.104	-.095
12. False Alarms	-.107	-.149	-.060	-.165	-.002	-.054	-.092	-.100	-.312**	.255**	1.00**	-	.104	.095
13. Recommendations	.154	-.119	.514**	-.159	.041	.323**	.277**	.114	.133	-.061	-.071	.071	-	.532**
14. Interventions Quality	.028	-.211*	.347**	-.182	-.090	.263**	.241*	.102	.075	-.063	-.062	.062	.561**	-

Note. ** $p < .001$; * $p < .05$; Actual Time Invested (ATI); Subjective Time (ST). The values in the upper half of the table refer to the Black patient condition, while the values in the lower section relate to the White patient condition.

Figure 1

Unstandardized estimated regression parameters representing the influence of a patient's skin color on participants' decision-making, mediated by time invested in assessing the patient's clinical case



Note. ** $p = .001$; * $p < .05$. To predict correct rejections, we used an index of time invested in assessing the clinical case and indicating diagnostic hypotheses. To predict the quantity and quality of clinical recommendations, we used an index of time invested in assessing, assigning hypotheses, and recommending clinical interventions.

Discussion

We experimentally examined whether White medical trainees bias their time when assessing a clinical case, stating diagnoses, and indicating clinical recommendations for White and Black patients. Additionally, we examined whether the Intergroup Time Bias effect influences the provision of clinical recommendations, potentially favoring White patients over Black patients. As predicted, the results showed that participants invested more time in indicating diagnostic hypotheses and prescribing clinical recommendations for White than for Black patients. This bias in time investment mediated the influence of patient skin color on diagnostic accuracy and the quantity and quality of medical recommendations. That is, participants invested more time assessing the clinical case when the patient was White than when Black, and the greater this time bias, the higher the diagnostic accuracy (expressed in correct rejections), and quantity and quality of clinical recommendations provided to the White patient. Thus, considering time as a valuable and scarce resource in the doctor-patient relationship, this study provides experimental evidence that, when clinically assessing patients, White medical trainees dedicate more time to White patients, which is related to their clinical performance.

Theoretical and Research Implications

The findings from this research have thought-provoking implications for three theoretical perspectives: the literature on social psychology of time; healthcare disparities in racialized social relations; and the behavioral effects of implicit bias. Regarding the social psychology of time, prior research demonstrates how individuals organize themselves, perceive time, and how these factors affect their relationships with themselves and society (Youngreen & Silcox, 2020). Building on recent studies by Do Bú et al. (2022) and Vala et al. (2012), we highlight that the bias in time investment towards ingroup versus outgroup

members reflects a discriminatory behavior linked to the social value of groups in society. Specifically, prior research on the ITB effect has demonstrated that when considering the impression formation of targets, individuals invest more of their time evaluating ingroup than outgroup individuals (Aguiar et al., 2008). This study's findings broaden ITB's applicability by demonstrating that it can be found in areas other than impression formation with potentially negative implications for outgroup members. Furthermore, by building on motivational aspects for allocating time resources (Tajfel & Turner, 1979; Vala et al., 2012) and demonstrating the ITB effect and its consequences in the healthcare context, our findings not only confirm previous research on bias in healthcare outcomes based on patient skin color, but goes further by demonstrating how time investment bias may affect such healthcare outcomes when racially discordant medical interactions occur.

The present study thus provides new insight into the prior research on the behavioral effects of implicit bias. That is, although prior research has demonstrated that physicians hold implicit biases, there is still little and inconsistent empirical evidence of this bias in the actual deliberative provision of clinical treatment to patients (Dehon et al., 2017; Green et al., 2007; Stepanikova, 2012). Our results extend previous research by showing that the time providers invest evaluating patients matters and affects the healthcare outcomes of Black and White patients. Moreover, while earlier studies have shown that White providers invest more time forming impressions and rating the levels of pain of White than Black patients (Do Bú et al., 2022; Hirsh et al., 2015; Mende-Siedlecki et al., 2022), our findings further demonstrate that this time bias has implications for the care provided. Consequently, the ITB effect plays a substantial role in healthcare provision in hierarchized racial relations, which presumably occurs in conjunction with other biases. Future research should investigate, for example, to what extent different biases are related to the ITB in the medical realm (e.g., implicit racial

biases, gender bias, patients' economic status; Centola et al., 2021; Schulman et al., 1999; Williams et al., 2016).

The results from this study further open a new research line on a theoretically important and still unexplored subjective meaning of time in the medical realm. Specifically, the findings demonstrated that White medical trainees were more accurate when estimating the time they invested in the clinical evaluation of White than of Black patients. Specifically, while we found an overestimation of time used for both patients, when the patient was Black, the perceived time differed significantly from the actual time invested. Regarding this aspect, it is known that aversive racists respond more positively to Black than White individuals to prevent having race-based motives imputed to them and avoid having their self-image questioned (Dovidio & Gaertner, 2004). Future research may investigate whether the increased amount of time subjectively attributed to the Black patient is related to the participants' motivation not to appear prejudiced. Another hypothesis is that these participants felt that the time invested was higher because of the discomfort: i.e., the negative experience that the interracial relationship with the Black patient imposed on them (Dovidio & Gaertner, 2004). We highlight that, as results from the time expansion effect have shown that White individuals with high intergroup anxiety (Moskowitz et al., 2015) and those with strong external motivations for controlling prejudice and its expression (Kenrick et al., 2016; Moskowitz et al., 2017) are particularly likely to perceive time-slowness when evaluating Black faces compared to White ones. This could lead medical trainees to erroneously assume that enough time was invested in the Black patient's assessment and hasten the conclusion of such assessment compared to the White patient.

Limitations and Further Directions

Despite its theoretical and practical contributions, this study bore a few limitations. First, as our study was conducted in a controlled environment using a fictional clinical scenario, the generalizability of our findings to real-world doctor-patient interactions may be limited. Future studies could aim to replicate our findings in more naturalistic settings to provide a more ecological assessment of the ITB's impact on healthcare decision-making. Second, while our sample consisted of medical trainees in their fifth and sixth years of training, future research could aim to replicate our study across a more diverse range of healthcare professionals to better understand the impact of the ITB on healthcare decision-making across different specialities and levels of experience. Third, our study focused on the ITB effect when considering interactions between White medical trainees and White and Black patients. However, future studies could investigate this effect in other cross-racial and ethnic encounters, as well as explore the influence of broader cultural contexts and healthcare systems in which healthcare providers operate. Finally, understanding the mechanisms underlying the ITB is essential to better comprehend the insidious consequences of racial bias in the medical context, particularly in contexts with the salience of different social norms (Pereira et al., 2009). Studies conducted by Do Bú et al. (2022) demonstrated that, while forming first impressions of patients, assessing their pain, and indicating opioids, aversive racist providers are the ones who invest the most time in White (*vs.* Black) patients. It is therefore critical that future studies investigate whether aversion, one of the emotions that underlies the aversive racism expression (Dovidio et al., 2016; Dovidio & Fiske, 2010), is on the basis for the lower investment of time in Black patients.

Addressing the pressing issue of racial inequalities in healthcare (Madeira et al., 2022a; Madeira et al., 2022b; Williams & Cooper, 2019) requires inventive interventions

aimed at minimizing biases among healthcare providers. Based on our study's findings, future research could explore the implementation of time perception modification exercises in medical training programs as a potent strategy for addressing biased time allocation. Our study revealed that participants not only spent more time with White patients compared to Black patients but also inaccurately perceived that they spent more time with Black patients than they actually did, indicating a potential bias in time allocation. Virtual reality technology could be employed to adjust the pacing of clinical scenarios, generating a sense of urgency or decelerating time to help medical trainees grasp the impact of time perception on patient interactions and clinical decision-making. Such exercises could encourage more deliberate decision-making, ultimately improving healthcare outcomes for both ingroup and outgroup patients. Besides incorporating these exercises into training programs, future research should also examine professionals' time perceptions across various medical specialities. While quickness in clinical practice is often viewed as a marker of high-quality medical practice, particularly in diagnostic indications in critical emergency hospital contexts (Lass-Flörl, 2019; Skvarc & Arsenijevic, 2020; Vallverdú-Cartié et al., 2011), the perception of time scarcity associated with it may prompt healthcare providers to consistently allocate more time to ingroup members, thereby perpetuating health disparities. As a result, investigating the potential of manipulating healthcare professionals' perception of time to enhance healthcare outcomes for socially undervalued patients is of vital importance.

Conclusion

While acknowledging the limitations of our study, we developed a theoretical framework and hypothesized that time, a valuable resource in the medical context, is utilized to favor ingroup members over outgroup members during medical decision-making processes. Our results generally supported our predictions, providing experimental evidence that

patients' race has an impact on the duration of time allocated for their clinical evaluation. Specifically, we found that White medical trainees invested more time assessing a clinical case of a White patient compared to a Black patient, and this time bias influenced the providers' decisions about the patient's illness.

**CHAPTER 4 – PHYSICAL EXAMINATION AVOIDANCE AS A PSYCHOLOGICAL
MECHANISM OF THE INTERGROUP TIME BIAS EFFECT IN THE MEDICAL
CONTEXT**

Abstract ¹⁰

Previous studies have identified an unobtrusive yet pervasive discriminatory behavior in time investment among social groups. This behavior is known as the Intergroup Time Bias (ITB), wherein individuals spend more time evaluating ingroup members than outgroup members. For instance, it has been observed that White individuals invest more time evaluating other White individuals than they do when evaluating Black ones. This effect has been found in simulated medical contexts, in that ITB played a crucial role in biased diagnoses and promoting high-quality patient care for White male patients (*vs.* Black), making it a relevant factor in understanding interracial disparities within this domain. However, the specific process through which the ITB effect occurs remains unstudied. This study ($N = 99$) investigates the ITB effect on medical decision-making and proposes physical examination avoidance as an underlying mechanism of this effect, especially for those individuals who express an aversive racist profile. We also investigated whether the ITB effect mediates the influence of patients' skin color on the quality of clinical recommendations and communication provided to patients. Although our findings did not support the mediating role of physical examination avoidance, we found that White medical trainees invested more time diagnosing and composing messages for White than Black patients, resulting in higher diagnostic accuracy and greater clinical communication quality, particularly for participants with high implicit but low explicit racial biases. These results extend previous findings and offer the first experimental evidence of time investment bias in patient communication processes.

Keywords: intergroup time bias, physical examination avoidance; healthcare disparities.

¹⁰ This paper is submitted to the *Group Processes & Intergroup Relations Journal*. Authors: Emerson Araújo Do Bú, Cicero Roberto Pereira, Jorge Vala, & Nao Hagiwara.

Consider a scenario where White and Black fictitious male patients, presenting identical symptoms related to a specific health condition, are examined by White medical trainees. As these trainees engage with the case, diagnosing and formulating clinical recommendations, a discernible behavioral pattern surfaces. They invest more time in evaluating White patients, indicating diagnostic hypotheses, and suggesting clinical recommendations, as compared to their Black counterparts. This discrepancy results in a higher degree of diagnostic accuracy and superior clinical recommendations for White patients, especially when providers support egalitarian beliefs, stating to be non-prejudiced while retaining nonconscious biases and attitudes towards Black individuals.

This observation is far from speculative. Studies have established that individuals tend to spend more time evaluating White as compared to Black individuals while forming first impressions in intergroup settings, a bias termed as Intergroup Time Bias (ITB) (Aguiar et al., 2008; Lima, 2003; Vala et al., 2012). For instance, Lima (2003) showed that White individuals spent less time forming impressions of Black individuals when competition or meritocracy norms were prioritized over equality norms. This suggests the influence of societal norms on this bias. Aguiar et al. (2008) and Vala et al. (2012) found similar patterns of bias. Notably, this bias was observed in scenarios with explicit racial implications as well as those involving minimal group manipulation.

In the medical context, the ITB has been observed in recent studies (Do Bú et al, 2022a; Do Bú et al., 2022b). This unobtrusive yet pervasive discriminatory behavior arises from the motivation to invest more time evaluating individuals from one's own group (ingroup) compared to those from different groups (outgroup), leading to poorer outcomes for the latter (Do Bú et al, 2022a; Do Bú et al., 2022b; Vala et al., 2012). However, the mediating process of the ITB effect, specifically the mechanism by which racial categorization of

patients influences healthcare providers' time investment, remains empirically unexplored.

This study addresses this gap by focusing on the relationship between physical examination avoidance and the ITB effect. Drawing on the aversive racism framework, which suggests that egalitarian individuals who nonconsciously harbor negative feelings and beliefs may perceive Black individuals as aversive stimuli during interracial interactions (Gaertner, 1973; Dovidio et al., 2002; Dovidio et al., 2017), we propose that aversive racist providers may exhibit avoidance behaviors towards Black patients. This avoidance could lead to decreased time investment and less thorough evaluations of Black patients' health concerns, potentially resulting in overlooked diagnoses and inferior clinical recommendations. Furthermore, we explore whether the ITB effect extends to the communication aspect of medical care by examining its potential impact on quality indicators for patient-provider communication.

Aversive Racism, Physical Examination Avoidance and the ITB Effect

Aversive racism theory (Gaertner & Dovidio, 1986) posits that in societies where prejudiced attitudes are discouraged, overt forms of discrimination are less likely to occur. However, covert forms of bias may persist driven by the conflicting values and feelings experienced by White individuals, who may hold egalitarian values but still feel an aversive affect around Black people (Dovidio & Gaertner, 2004). Indeed, the theory posits that both the interracial situation, involving interaction with a Black individual, and the mere idea of harboring prejudice are aversive for individuals with an aversive racist profile (Gaertner & Dovidio, 2005).

Research conducted by Kunstman and Plant (2008) in this domain has yielded noteworthy findings. For instance, in emergency scenarios, White individuals were observed to provide faster and higher-quality assistance to White targets compared to Black targets due

to a stronger aversion to helping situations involving Black individuals. Recent evidence from McManus et al. (2019) further supports that aversive affect predicts racial discrimination in helping behaviors. Furthermore, when examining attitudes within a political context, Nail and colleagues (2003) found that liberals (who are often associated with supporting egalitarian beliefs but may still harbor negative sentiments towards Black individuals) displayed greater physiological arousal when touched by an African American experimenter compared to a European American experimenter, as opposed to conservatives.

Within the realm of medical care, research has demonstrated that individuals with low explicit but high implicit racial biases elicit fewer positive responses and lower levels of trust from Black patients (Penner et al., 2010; Penner et al., 2013). Furthermore, physicians with an aversive racist profile exhibit heightened negative affect and, more crucially, demonstrate reduced engagement during clinical appointments with Black patients who have shared experiences of prior discrimination incidents in their lives. These findings lead us to rationale that if, as predicted by the theory of aversive racism, Black individuals elicit aversive responses in contexts where egalitarian norms are expected to prevail, such as the medical setting, it is likely that Black patients may be perceived as aversive stimuli by White physicians. If this indeed occurs, it is also probable that physicians may exhibit avoidant behaviors towards these patients, for instance, by avoiding thorough physical examinations (Dovidio & Gaertner, 2000, 2004; Gaertner & Dovidio, 1986; Pearson et al., 2009). Consequently, this could result in shorter consultations and less accurate healthcare outcomes.

The physical examination of patients has historically been considered the gold standard in healthcare for detecting and screening diseases before they manifest significant symptoms (Garibaldi & Olson, 2018; Costanzo & Verghese, 2018). However, its efficacy has been questioned since the 1970s, leading medical associations to endorse a more targeted

approach to health screenings (Reiser, 1978; Campbell & Dodds, 2009; Walker et al., 1990). The expression of aversive racism can impact physical examination in several ways. Firstly, it can affect the thoroughness and accuracy of the examination itself. Healthcare professionals may nonconsciously interpret, for example, that the Black individual is experiencing less pain, as studies have shown that healthcare professionals may underestimate or downplay the reported pain levels of certain minority groups (Do Bú et al., 2022b; Hoffman et al., 2016; Rufino, 2013). This can result in inadequate assessment of the patient's symptoms and body examination, leading to incomplete assessments or missed diagnoses.

This avoidance behavior could shed light on the ITB mechanism in medical scenarios. Specifically, previous experimental research (Do Bú et al., 2022a; 2022b) discovered that White medical trainees dedicated more time to forming first impressions, evaluating clinical cases, proposing diagnoses and medications, as well as assessing the pain levels of White patients compared to Black patients. This effect, while present in participants traditionally considered prejudiced (expressing high levels of both implicit and explicit bias) as well as non-prejudiced individuals (expressing low levels of both implicit and explicit bias), was particularly more pronounced among those demonstrating an aversive racist profile. In essence, medical students who exhibited high levels of implicit bias but genuinely endorsed egalitarian beliefs and self-identified as non-racist were those who displayed the most significant time investment bias favoring fictional White patients over Black male patients.

In this study, we will concentrate on the relationship between the willingness of White healthcare providers to conduct comprehensive physical examinations of Black patients and the time invested in patients' clinical assessments. We hypothesize that for aversive racist providers, Black patients may elicit avoidance behaviors, leading these individuals to shy away from performing thorough physical examinations on these patients. This avoidance may

result in less time investment and less comprehensive evaluations of Black (*vs.* White) patients' health concerns (i.e., the ITB effect). Moreover, considering research into the implications of the ITB effect on the quality of healthcare outcomes for patients (Do Bú et al., 2022a; Do Bú et al., 2022b), which discovered that the more time invested in White patients compared to Black patients, the better the quality of healthcare for White (*vs.* Black) patients, we intend to investigate whether the ITB is also associated with the quality of communication provided to patients. These assumptions have led us to derive the following hypotheses:

Hypothesis 1: We expect to replicate the Intergroup Time Bias (ITB) effect in a medical context by testing whether White medical trainees invest more time in diagnosing and prescribing clinical recommendations for White patients than for Black patients. This hypothesis aligns with previous findings indicating differential time investment based on racial categorization in clinical evaluations.

Hypothesis 2: We predict the ITB effect on medical communication with patients. Specifically, we will examine whether medical trainees, when composing an email to communicate diagnoses and clinical recommendations, invest more time in White than Black patients. This hypothesis broadens our investigation into the communication aspect of medical care.

Hypothesis 3: Participants' avoidance towards patients should mediate the influence of patient's skin color on the time spent with them, particularly among individuals displaying an aversive racist profile. This hypothesis explores the role of avoidance behaviors in the relationship between skin color and time investment.

Hypothesis 4: We predict an association between ITB, diagnostic accuracy, clinical recommendations and patient communication, according to White medical trainees racial attitudes profiles. Specifically, we propose that the ITB effect mediates the relationship

between the patients' skin color and healthcare outcomes. That is, when the patient is White, as opposed to Black, there will be a higher investment of time, leading to improved diagnostic accuracy, higher quantity and quality of clinical recommendations, as well as greater communication indicators. This effect will be especially prominent among participants expressing an aversive racist profile, in comparison to traditionally prejudiced and non-prejudiced participants.

Method

Participants

We recruited 205 medical trainees from Portugal to participate in a study aimed at evaluating the quality of medically relevant tasks. Participants had to meet specific criteria, including self-identifying as White Portuguese and being in their fifth or sixth year of medical school. Additionally, they were required to complete 100% of the study and not have participated in a similar study before. After applying these criteria, we excluded 106 participants for the following reasons: 5 participants did not identify as White, 8 self-reported not being in their fifth or sixth year of medical school, 49 had previously participated in studies on similar topics, 39 started but did not complete the study, and 5 were not Portuguese. This resulted in a final sample of 99 White individuals who were included in our main analysis. Among them, 65.7% were male, and their ages ranged between 21 and 34 years old ($M = 24.20$; $SD = 2.78$). Most of the participants were in their fifth year (57.6%), with the remaining 42.4% in their sixth year of medical training. We employed a between-subject design and randomly assigned participants to either the Black Patient ($n = 45$) or the White Patient ($n = 54$) condition. To ensure the robustness of our findings, we conducted a sensitivity analysis, which demonstrated that our sample size had a power of .80 to detect an ITB effect of $f = .28$ or higher, but only a power of .70 for detecting an indirect effect in a

mediation analysis (Schoemann et al., 2017; Zhang & Yuan, 2018).

Unexpectedly, a considerable number of participants ($n = 49$) had taken part in a previous study using the same materials and tasks. Instead of excluding these individuals, we conducted exploratory analyses to examine potential differences in data patterns between this group and those who were new to the study. The pattern of results obtained was inconclusive. Further details can be found in the supplementary material.

Procedures

We invited fifth and sixth-year medical students to participate in a study examining the quality of research materials within a medical context. To recruit participants, we initially contacted all Portuguese universities with medical programs and requested the distribution of the study link. We also leveraged social media platforms like LinkedIn to reach out to medical students and invite their participation in the study. The study was hosted on the Qualtrics platform, and participants were required to complete the study using a desktop or laptop computer.

In the first phase of the study, after being informed that they were participating in a study focused on the quality of research materials, participants were assigned to evaluate a patient who was either White or Black. The patient's skin color was manipulated using a blurred photograph of a White or Black man (DeBruine & Jones, 2017). The clinical case, centered on migraine aura, had been pre-tested for the Portuguese context by Do Bú et al. (2022a). Following this evaluation, participants responded to a measure of physical examination avoidance. They were then presented with six diagnostic hypotheses (one at a time) and asked to provide clinical recommendations they deemed necessary for the patient's situation, such as lab exams, clinical exams, medication, and health-related behaviors. Subsequently, participants were asked to compose an email for the patient in the clinical

situation, including the diagnosis or diagnostic hypotheses, as well as any necessary clinical recommendations. Finally, participants completed the Implicit Association Task (Carpenter et al., 2019; Greenwald et al., 2003; Santos et al., in prep) and answered a racism scale (Vala et al., 2012, Study 2). Upon completion of the study, participants were debriefed about the research objectives and received €5 as compensation for their participation.

Ethical concerns. The study was conducted in accordance with ethical principles for human research and received approval from the Ethics Committee of the Institute of Social Sciences at the University of Lisbon. The dataset and supplementary materials used in this study are available on the Open Science Framework repository platform at the following link: https://osf.io/n24my/?view_only=6f6cd8f7f54941979683a95dbf543d65

Measures

Time Investment. To capture participants' response time during the study's tasks, we utilized one of the Qualtrics features. This allowed us to measure response time (in seconds) as participants indicated diagnostic hypotheses for the presented case, prescribed clinical recommendations and composed an email to convey the diagnosis and recommendations to the patient. We followed the guidelines of Tabachnick and Fidell (2001) and Ratcliff (1993) and excluded time latencies that were two standard deviations above and below the mean to remove outliers in response time measurements. This approach was consistent with a standard of 95% confidence intervals of $p < .05$.

Physical Examination Avoidance. In an effort to establish a measure avoidance, we initially pretested various experimental paradigms (please refer to supplementary materials for access to the different pretested paradigms). In one of the pretests, we identified a correlation between increased avoidance of physical examinations for Black patients and a higher expression of the ITB effect. Following such evidence, we developed the measure of physical

examination avoidance for patients to determine whether this variable mediates the effect of patients' skin color on the time invested in their care. The measure consists of three items, answered on a scale of 1 (not at all) to 10 (totally) (i.e., considering the case you just evaluated, to formulate a possible diagnosis, to what extent do you consider: ... a clinical examination that includes physical contact to be necessary (reverse); ... performing a clinical examination involving touching the patient's body in the case being evaluated to be critical (reverse); ... a clinical examination that includes direct contact with the patient's body to be unnecessary). These items loaded in a single factor providing empirical evidence of its one-dimensionality (principal-axis factoring: eigenvalue = 2.243; 74.76% of the variance; loadings per items: necessary physical exam = .897; critical physical exam = .662; unnecessary physical exam = -.811). In this study, the measurement exhibits good internal consistency ($\alpha = .824$; $\omega = .828$).

Diagnostic Accuracy. To evaluate the accuracy of participants in diagnosing the case, we presented them with six diagnostic hypotheses, of which three were considered appropriate and three were not (Do Bú et al., 2022b). Participants were given instructions to evaluate each hypothesis for adequacy. Subsequently, we coded the responses to determine whether all diagnostic alternatives were accurately identified, with a code of 1 indicating all options correctly identified and 0 indicating incorrect identification.

Clinical Recommendations Indicators. We followed the procedures outlined by Do Bú et al. (2022b) to evaluate the quality of clinical recommendations prescribed by participants, with four female master's students in psychology serving as raters. Two indicators were used to assess the quality of clinical recommendations: the total number of clinical recommendations prescribed by the participants, including clinical and lab exams, medications, and health promotion and prevention behaviors, and the quality of these

recommendations. Specifically, the raters used a four-point scale to evaluate the quality of each recommendation. The four levels were: (0) no recommendation provided to the patient; (1) medication was prescribed to the patient without investigating the presented symptoms; (2) exams were prescribed without medication to alleviate the patient's pain, indicating a motivation to investigate the cause of the disease but a lack of concern for the patient's suffering; and (3) clinical examinations were prescribed, in association with medication to alleviate the patient's pain, and health behaviors to improve the patient's quality of life. The raters evaluated responses individually, then in pairs to reach a consensus, and finally as a group (see supplementary material on the OSF platform for details). The indicators were validated by a physician who was blinded to the experimental conditions, as were all raters.

Communication Indicators. To establish quality indicators for the emails written by participants to patients, we developed a judge-based analysis. The same judges who performed the analyses regarding the quality of clinical recommendations collaborated in this phase of the study. The analysis procedures followed these steps: a) after completing the analyses related to the quality of recommendations, the raters were informed of a new analysis process, this time related to the participants' messages to the patients in clinical situations; b) a meeting was held to establish and discuss the issues that the judges should address during the material analysis process, specifically, number of words used to write the e-mail, email clarity (1 – not clear at all; 10 – totally clear), writing cordiality (1 – no cordiality expressed; 10 – totally cordial), appointment scheduling indication (yes = 1; no = 0), overall writing effort (1 – no effort put in the writing; 10 – total effort put in the writing), and email quality. To determine email quality, the raters first established whether the emails contained indications of diagnoses, medications, and health-related behaviors (i.e., yes = 1; no = 0). Similar to the evaluation of recommendation quality, the raters were instructed to use a

four-point scale to assess the quality. The four levels were: (0) no message was written to the patient; (1) only indicated: hypothesis/or diagnosis/or treatment/or examination; (2) indicated hypothesis and: treatment/or examination/or behavior; (3) indicated hypothesis, treatment, and: examinations/or behaviors; examinations and behaviors. The raters evaluated responses individually, and then in pairs to reach a consensus (see supplementary material on the OSF platform). Any doubts were resolved by a third rater. All raters were blinded to the experimental conditions.

Implicit Racial Bias. We carried out an examination of implicit racial bias using the Implicit Association Test (IAT) as proposed by Greenwald et al. (2003). Specifically, we employed the *iatgen* (an IAT survey-software) as described by Carpenter et al. (2019). *Iatgen* is an R package that enables researchers to develop online IATs for implementation through Qualtrics. Given that *iatgen* initially offered the IAT instructions in English while our participants were native Portuguese speakers, we translated these instructions with the help of an R feature, as detailed by Santos et al. (*in prep*). The calculated D-IAT scores ranged from -0.67 to 1.35 ($M = .578$; $SD = .386$). We found an implicit pro-White racial bias in both experimental conditions: White patient ($t(52) = 10.173$, $p = .001$, $d = 1.625$); and, Black patient ($t(42) = 10.654$, $p = .001$, $d = 1.397$). Further analysis of implicit racial bias between the experimental conditions did not reveal a significant difference, $t(2, 92) = .571$, $p = .410$, $d = .170$.

Explicit Racism. To evaluate explicit racism, we utilized the Racial Beliefs Scale, developed by Vala et al. (2012). This instrument is designed to measure beliefs concerning the biological nature of differences between groups. This study's reliability score was of $\alpha = .817$ and $\omega = .819$. The version we employed consisted of seven items, scored from 1 (total disagreement) to 7 (total agreement). Statements such as "The mixture of different human

groups may weaken the biological evolution of the human species” and “The human species is divided into racial groups that are very different from each other” are included in this scale. A higher score on this scale indicates stronger explicit racism.

Results

Time Investment

We conducted an initial examination of the time participants invested in indicating diagnostic hypotheses, providing clinical recommendations, and composing emails to convey diagnoses and clinical recommendations to patients. The results of the analyses of variance (ANOVAs) revealed a significant difference in the time invested in indicating diagnostic hypotheses for White and Black patients, $F(1, 95) = 6.870, p = .010, \eta_p^2 = .067$, as well as in composing the email, $F(1, 93) = 3.971, p = .049, \eta_p^2 = .041$. Participants invested more time in the White compared to the Black patients in both tasks. While there was a trend towards greater time investment in clinical recommendations for White compared to Black patients, the difference was not statistically significant, $F(1, 93) = 1.924, p = .169, \eta_p^2 = .020$. Descriptive statistics for the time expended on each task, stratified by the patient’s skin color, are provided in Table 1.

Physical Examination Avoidance

Subsequently, we evaluated the extent to which participants avoided physical examination of both White and Black patients. The means and standard deviations for each of these measures are presented in Table 1. We observed no significant difference in the degree of physical examination avoidance between the two patient groups ($F(1, 97) = .186, p = .667, \eta_p^2 = .002$) (see Table 1).

Diagnostic Accuracy and Quantity and Quality of Clinical Recommendations

We then examined diagnostic accuracy along with multiple indicators of the quality of

the clinical recommendations prescribed and email messages composed by participants to convey diagnoses and clinical recommendations to patients (see Table 1). We observed no significant difference in diagnostic accuracy and clinical recommendation indicators revealed no significant differences between the two patients, except for lab exam indication.

Specifically, lab exams were significantly more likely to be prescribed for White than Black patients ($F(1, 97) = 5.550, p = .020, \eta_p^2 = .054$). We found no significant differences in the number of medications indicated ($F(1, 97) = .068, p = .795, \eta_p^2 = .001$), as well as clinical examinations ($F(1, 97) = .164, p = .686, \eta_p^2 = .002$), healthcare-related behaviors ($F(1, 97) = .377, p = .540, \eta_p^2 = .004$), the total quantity of clinical recommendations ($F(1, 97) = 1.647, p = .202, \eta_p^2 = .017$), and the quality of clinical recommendations ($F(1, 97) = .401, p = 0.528, \eta_p^2 = .004$).

Communication Indicators

Finally, we examined communication indicators related to various aspects of the message delivered to the patient (see Table 1). ANOVA analysis showed a significant difference in the inclusion of lab exams in the message for White patients compared to Black patients ($F(1, 97) = 7.947, p = .006, \eta_p^2 = .076$). However, no statistically significant differences were found in other communication indicators, such as the number of words used in writing the email ($F(1, 97) = 2.931, p = .090, \eta_p^2 = .029$), indicating diagnosis ($F(1, 97) = 1.335, p = .251, \eta_p^2 = .014$), medication ($F(1, 97) = .221, p = .639, \eta_p^2 = .002$), health-related behaviors ($F(1, 97) = .395, p = .531, \eta_p^2 = .004$), or appointment scheduling ($F(1, 97) = .591, p = .444, \eta_p^2 = .006$). Additionally, there were no statistically significant differences in the understanding of procedures ($F(1, 96) = 1.124, p = .292, \eta_p^2 = .012$), clarity of the email ($F(1, 96) = 1.817, p = .181, \eta_p^2 = .019$), cordiality of the email ($F(1, 97) = 1.053, p = .307, \eta_p^2 = .011$), effort put into the writing of the message ($F(1, 97) = 1.510, p = .222, \eta_p^2 = .015$), or the

quality of the message ($F(1, 97) = .205, p = .141, \eta_p^2 = .022$) elaborated for White and Black patients.

Table 1

Means and Standard Deviations of the Study Variables (n = 99)

Variables	White Patient <i>M(SD)</i>	Black Patient <i>M(SD)</i>	<i>t-Student</i>	<i>d</i>
Invested Time (seconds)				
Hypotheses Indication	32.94 (23.70)	22.57 (12.29)	2.748*	.560
Clinical Recommendations	94.26 (85.51)	70.78 (77.74)	1.387	.456
Communication	213.39 (178.55)	146.16 (145.15)	1.993*	.410
Avoidance				
Physical Examination Avoidance	5.53 (2.93)	5.27 (3.13)	.431	.087
Diagnostic Accuracy				
Accuracy	.444 (.501)	.311 (.468)	1.357	.274
Recommendations Indicators				
Lab Exams Indicated	.434 (.574)	.198 (.600)	2.356*	.476
Medication Indicated	1.49 (.644)	1.56 (.574)	.261	.053
Clinical Exams Indicated	.882 (.747)	.838 (.738)	.405	.082
Health-related behaviors Indicated	1.12 (.747)	1.16 (.738)	.614	.124
Total Number of Recommendations	3.70 (3.11)	2.93 (2.80)	1.283	.259
Quality of Recommendations	2.28 (.860)	2.16 (1.07)	.633	.128
Communication Indicators				
Number of Words	65.25 (49.18)	46.04 (55.46)	1.712	.346

Diagnosis Indication	.648 (.482)	.533 (.504)	1.155	.233
Lab Exams Indication	.314 (.468)	.088 (.287)	2.819*	.569
Medication Indication	.333 (.475)	.288 (.458)	.471	.095
Health-related Exams Indication	.277 (.452)	.222 (.420)	.628	.127
Appointment Indication	.314 (.468)	.244 (.434)	.769	.155
Clarity in Communication	5.90 (3.38)	4.93 (3.76)	1.348	.273
Cordiality in Communication	5.93 (3.56)	5.16 (3.90)	1.026	.207
Procedures Understanding	5.40 (3.39)	4.64 (3.63)	1.060	.215
Effort in Communication	5.48 (3.42)	4.62 (3.52)	1.229	.248
Quality of Communication	1.61 (1.22)	1.24 (1.23)	1.485	.300

Note. * $p < .05$.

Mediation Analyses

Table 2 displays the bivariate correlations among the variables under study. To examine the hypotheses regarding the mediating role of physical examination avoidance in the relationship between patients' skin color and time invested in their care, mediation analyses were conducted using Model 4 (Hayes, 2022) with bootstrapping of 5000 simulations. The results did not reveal a significant indirect effect ($b = -9.747$, $SE = 56.212$, $95\% CI [-145.397; 101.989]$). Additionally, further analysis based on participants' racial attitude profiles (Model 11; Hayes, 2022) showed no reliable moderated mediating effect of avoidance between skin color and time invested ($b = 33.095$, $SE = 247.952$, $95\% CI [-623.180; 445.952]$). Detailed estimated parameters can be found in the supplementary material.

Complementary Analyses

Building upon previous studies by Do Bú et al. (2022a) and Do Bú et al. (2022b), we conducted additional exploratory analyses to investigate whether the time invested in patients related to the effect of patients' skin color on various aspects of clinical recommendations and communication quality. These analyses also considered the racial attitude profiles of participants.

The results indicated that the time invested in the patient mediated the effect of patients' skin color on diagnostic accuracy ($b = 2.862$, $SE = 2.008$, $95\% CI [-.278; 7.957]$), the number of words used in the email ($b = 153.176$, $SE = 68.813$, $95\% CI [17.153; 287.782]$), clarity of communication ($b = 10.351$, $SE = 4.370$, $95\% CI [1.563; 18.484]$), cordiality ($b = 11.285$, $SE = 5.052$, $95\% CI [1.106; 20.932]$), effort in writing the email ($b = 10.987$, $SE = 4.900$, $95\% CI [.842; 20.051]$), understanding of clinical procedures ($b = 10.786$, $SE = 4.654$, $95\% CI [1.644; 19.961]$), and overall quality of communication ($b = 3.490$, $SE = 1.527$, $95\% CI [.383; 6.374]$). However, no significant indirect effects were observed for the quantity ($b = 6.128$, $SE = 3.527$, $95\% CI [-.328; 13.674]$) and quality ($b = 1.407$, $SE = .802$, $95\% CI [-.128; 3.058]$) of clinical recommendations. Please refer to Table 3 for the effects decomposition and the supplementary material on the OSF platform for detailed estimated parameters.

Further analysis based on participants' attitude profiles revealed that those expressing an aversive racist profile demonstrated a stronger bias in time investment towards the White patient, leading to higher diagnostic accuracy ($b = 5.193$, $SE = 4.57$, $95\% CI [.156; 18.086]$), a greater number of clinical recommendations ($b = 20.783$, $SE = 7.445$, $95\% CI [4.847; 34.067]$), and higher quality of clinical recommendations ($b = 4.379$, $SE = 1.543$, $95\% CI [1.046; 7.183]$) (see Figure 1). The same pattern of results was observed in the analyses that considered communication indicators. Specifically, aversive racists who invested more time

in the White (*vs.* Black) patients used a higher number of words when writing the email to the patient ($b = 365.279$, $SE = 141.479$, 95% CI [47.126; 609.227]). Moreover, the more time used in such a patient (*vs.* Black patient), the greater was the clarity of the message ($b = 22.833$, $SE = 9.131$, 95% CI [1.485; 37.811]); the cordiality in writing ($b = 26.724$, $SE = 10.777$, 95% CI [3.101; 45.391]); the understanding of clinical procedures ($b = 23.967$, $SE = 9.95$, 95% CI [1.885; 40.814]); and, finally, the overall quality of communication ($b = 8.252$, $SE = 3.480$, 95% CI [.924; 14.495]). No significant indirect effects were found for participants with traditional prejudiced or non-prejudiced profiles. Detailed estimated parameters can be found in Figure 2 and results for each profile can be found on the OSF platform.

Table 2*Correlations between the variables in each experimental condition*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. TDH	-	.318*	.160	.294	.172	-.049	.193	.078	-.021	-.302*	.139	.123	.130	.205	.145	.027
2. TCR	.450*	-	.633**	.841**	.192	.011	.041	.115	.622**	.408**	.520**	.510**	.463**	.484**	.523**	.469**
3. TC	.365**	.403**	-	.949**	.041	-.027	.122	.030	.528**	.480**	.864**	.845**	.866**	.829**	.870**	.809**
4. TT	.448**	.692**	.927**	-	.129	-.002	.073	.084	.583**	.463**	.807**	.787**	.786**	.771**	.811**	.746**
5. PEA	-.013	-.257	-.114	-.182	-	-.024	-.002	.202	-.116	-.172	.070	-.088	-.109	-.059	-.060	-.135
6. D-IAT	.046	.248	-.176	-.008	-.005	-	-.147	-.106	.043	.224	-.078	-.020	.041	-.007	-.024	.026
7. RAC	-.080	-.349*	-.334*	-.375**	.120	-.194	-	-.160	.077	-.083	.079	.035	.052	.084	.046	.160
8. ACC	.313*	.220	.245	.289*	-.296	.097	-.140	-	.033	.083	-.003	-.014	-.015	-.040	.004	-.096
9. TNCR	.529**	.736**	.400**	.486**	-.135	.152	-.284**	.171	-	.558**	.607**	.504**	.489**	.509**	.527**	.499**
10. QR	.221	.482**	.360**	.444**	-.160	.005	-.327*	.059	.507**	-	.510**	.559**	.535**	.503**	.556**	.526**
11. NW	.364**	.229	.799**	.621**	.061	-.240	-.166	.114	.438**	.313*	-	.814**	.819**	.782**	.859**	.761**
12. CC	.332**	.201	.582**	.507**	-.124	-.194	-.118	.195	.308*	.345*	.612**	-	.953**	.960**	.980**	.861**
13. CoC	.351**	.307*	.684**	.623**	-.044	-.124	-.149	.294*	.390**	.316*	.703**	.887**	-	-.970**	.966**	.855**
14. PU	.425**	.331*	.632**	.593**	-.117	-.056	-.142	.243	.405**	.316*	.623**	.944*	.934**	-	.955**	.847**
15. EC	.392**	.322*	.748**	.675**	-.019	-.163	-.179	.170	.438**	.385**	.859**	.854**	.893*	.875**	-	.853**
16. QC	.334*	.323*	.609**	.579**	-.089	-.106	-.355**	.257	.258	.377**	.599**	.720**	.728**	.715**	.765**	-

Note. ** $p < .001$; * $p < .05$; TDH = Time invested in indicating Diagnostic Hypotheses; TCR = Time invested in indicating Clinical Recommendations; TC = Time invested in Communicating; TT = Total Time invested in clinical tasks; PEA= Physical Examination Avoidance; RAC = Racism; ACC = Accuracy; TNCR = Total Number of Clinical Recommendations prescribed; QR = Quality of Clinical Recommendations; NW = Number of Words; CC = Clarity of Communication; CoC = Cordiality of Communication; PUC = Procedures Understanding; PEC = Effort in Communicating; QC = Quality of Communication. The values in the upper half of the table refer to the Black patient condition, while the values in the lower section relate to the White patient condition.

Figure 1

Unstandardized Estimated Parameters of Moderated Mediation Analyses in Predicting Diagnostic Accuracy and the Quantity and Quality of Clinical Recommendations

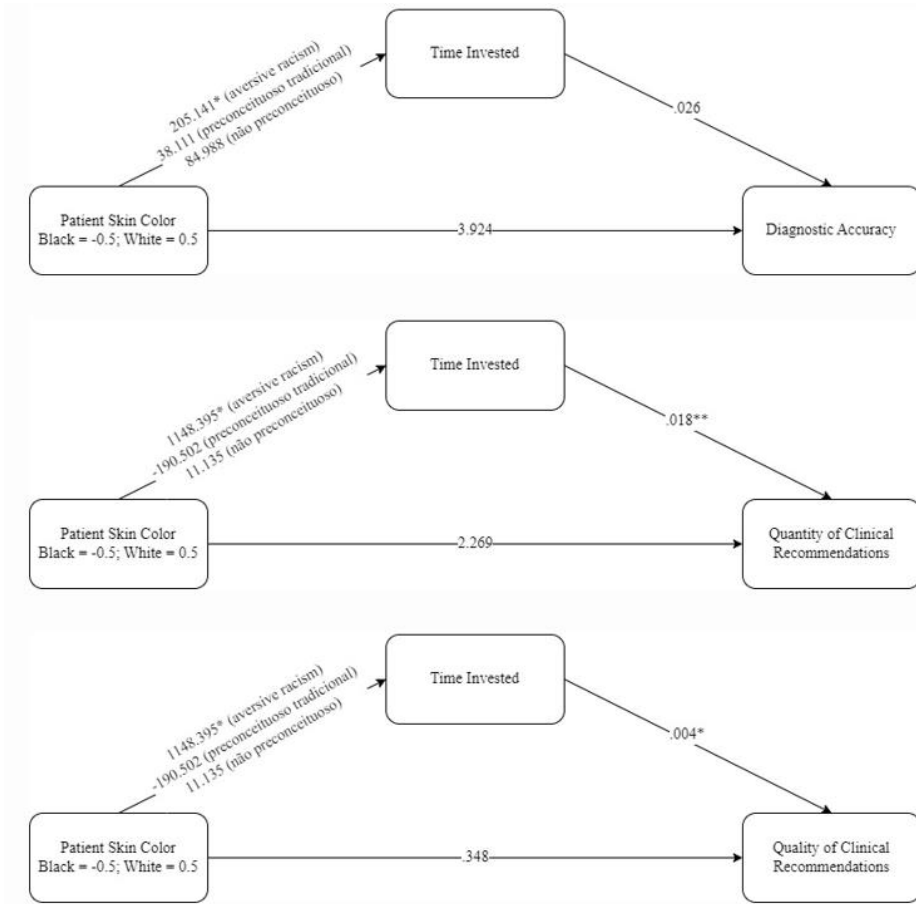


Figure 2

Unstandardized Estimated Parameters of Moderated Mediation Analyses in Predicting Number of Words, Clarity, Cordiality, Effort in Communication, Procedures Understanding and Quality of Communication

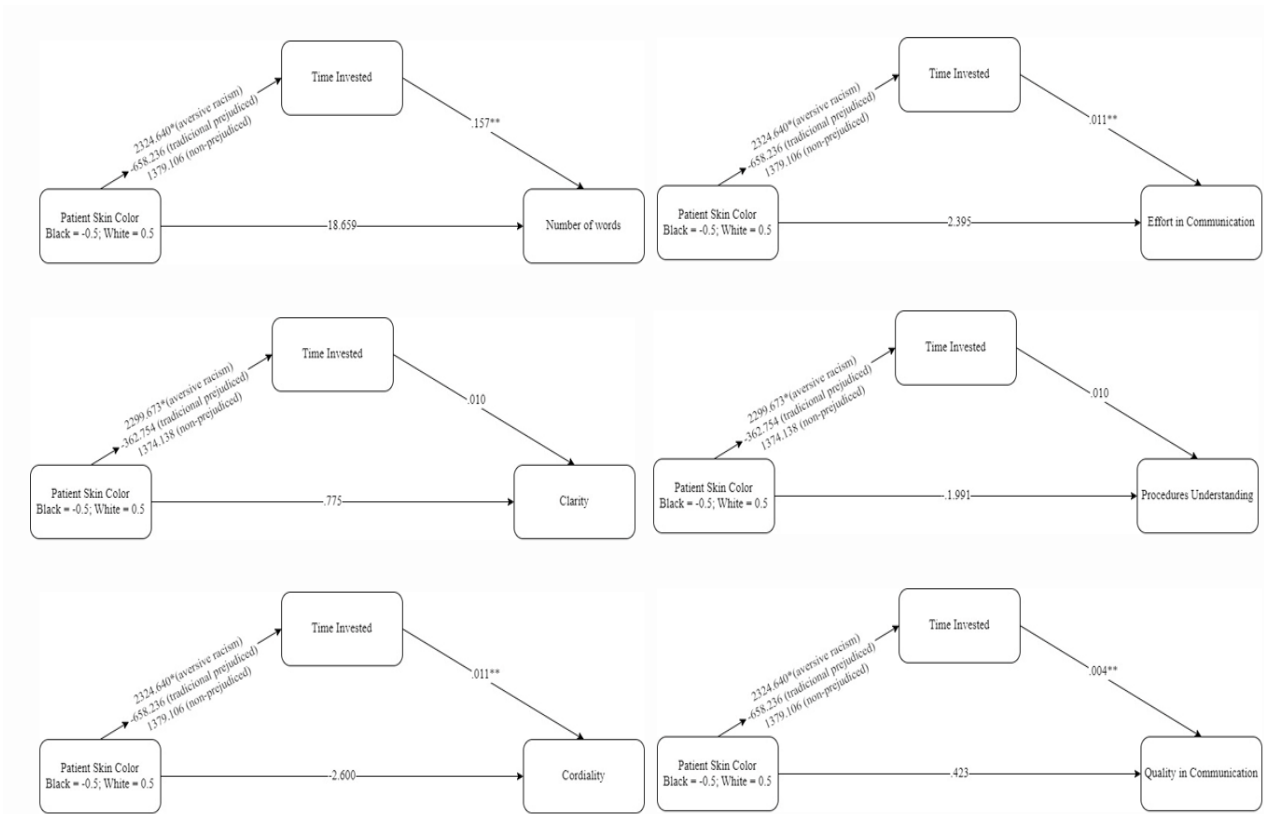


Table 3*Effects' Decomposition of the Mediation Analyses*

	Mediation Model		95% C.I.	
	Estimate	SE	Lower	Upper
Diagnostic Accuracy				
Total Effect	1.333	.982	-.616	3.283
Direct Effect	4.197	4.520	-4.663	13.05
Indirect Effect: Color \Rightarrow Time \Rightarrow Accuracy	2.862	2.011	.294	8.170
Quantity of Clinical Recommendations				
Total Effect	8.649	4.917	-1.115	18.41
Direct Effect	2.520	3.554	-4.538	9.579
Indirect Effect: Color \Rightarrow Time \Rightarrow Quantity	6.128	3.635	-.578	13.93
Quality of Clinical Recommendations				
Total Effect	1.529	1.989	-2.421	5.480
Direct Effect	.121	1.862	-3.577	3.820
Indirect Effect: Color \Rightarrow Time \Rightarrow Quality	1.407	.787	-.126	3.021
Number of Words in Communication				
Total Effect	176.5	103.3	-28.64	381.8

Direct Effect	23.41	76.40	-128.3	175.1
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Indirect Effect: Color \Rightarrow Time \Rightarrow Words	153.1	68.39	15.77	284.7
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Clarity of Communication

Total Effect	11.57	7.309	-2.939	26.09
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Direct Effect	1.226	5.854	-10.40	12.85
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Indirect Effect: Color \Rightarrow Time \Rightarrow Clarity	10.35	4.411	1.537	18.76
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Cordiality in Communication

Total Effect	9.271	7.657	-5.935	24.47
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Direct Effect	-2.014	5.690	-13.31	9.287
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Indirect Effect: Color \Rightarrow Time \Rightarrow Cordiality	11.28	5.104	1.191	21.15
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Procedures Understanding

Total Effect	9.270	7.168	-4.966	23.50
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Direct Effect	-1.516	5.490	-12.42	9.390
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Indirect Effect: Color \Rightarrow Time \Rightarrow PU	10.78	4.622	1.413	19.63
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Effort in Communication

Total Effect	9.083	7.049	-4.916	23.08
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Direct Effect	-1.904	4.945	-11.72	7.917
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Indirect Effect: Color \Rightarrow Time \Rightarrow Effort	10.98	4.923	1.137	20.28
<hr/>				
Quality of Communication				
<hr/>				
Total Effect	4.060	2.523	-.950	9.072
Direct Effect	.570	1.976	-3.353	4.495
Indirect Effect: Color \Rightarrow Time \Rightarrow QC	3.490	1.549	.343	6.404
<hr/>				

Note. PU = Procedures Understanding; QC = Quality of Communication. The estimates reported in the analyses are unstandardized coefficients.

Discussion

In this study, we aimed to replicate the Intergroup Time Bias (ITB) effect within the context of diagnosis and treatment recommendations for both White and Black patients. Additionally, we sought to examine this effect on the communication between healthcare providers and patients. Moreover, we aimed to explore whether physical examination avoidance mediated the relationship between patients' skin color and the time invested in their care, particularly when participants exhibited an aversive racist profile. White medical trainees invested more time in indicating diagnostic hypotheses and communicating diagnoses and clinical recommendations for White patients compared to Black patients. Mediation analyses revealed no reliable indirect effect of physical examination avoidance on the relationship between patients' skin color and time invested in their care, regardless of the participants' racial attitudes profile. However, we also investigated the ITB association with the quality of clinical recommendations and communication for patients, based on the racial attitude profiles of White medical trainees. Our findings corroborate previous results by Do Bú et al. (2022a), which showed that participants with an aversive racist profile demonstrated

a greater time investment bias toward White (vs. Black) patients, leading to a higher quantity and quality of clinical recommendations and communication. In summary, our study not only replicates previous findings on the ITB effect in the medical context, but also offers the first experimental evidence of a more pronounced time investment bias in patient communication processes. This bias is associated with the quality indicators of these communication processes, shedding light on potential areas for improvement within the medical field.

We interpreted these results based on previous theoretical and empirical evidence that some individuals who self-perceive as non-racist but may still hold implicit negative attitudes toward black individuals (Dovidio et al., 2017; Pereira et al., 2018; Hagiwara et al., 2016). When these individuals interacted with Black patients, they may have experienced aversive reactions, leading to biased time-performing evaluations of patients. This time bias aligns with the behavior predicted by the aversive racism theory (Gaertner & Dovidio, 2005), suggesting that typical aversive racist individuals who consider themselves egalitarian and non-prejudiced still exhibit discriminatory behaviors in interracial settings. The observed time discrimination, as captured by the ITB, reflects a pattern of implicit bias and has significant negative consequences for Black patients within our simulated healthcare environment. However, it is crucial to underscore that the lack of a mediating effect from avoidance behavior restricts our interpretation's breadth. While the time bias corroborates the aversive racism theory, it also indicates the possible presence of other contributing factors to disparities in time allocation.

Theoretical and Research Implications

This study presents significant contributions to the understanding of the social psychology of time, particularly in the investigation of Intergroup Time Bias. By examining time as a resource used to favor socially valued groups (i.e., White people over Black ones),

our findings replicate previous research by demonstrating that White medical trainees allocate more time to White patients than to Black patients. Importantly, to the best of our knowledge, this is the first study to explore the underlying mechanisms of ITB in the medical context. Specifically, we hypothesized that avoidance behavior would mediate the relationship between a patient's skin color and the time invested in their care. Although we did not find supporting evidence for our hypothesis, we acknowledge potential limitations in the next section and propose avenues for future research to further explore this proposed relationship.

The results of this study also hold significant implications for understanding and addressing time investment bias in medical settings. Building on prior research exploring the effects of time investment bias on diagnostic accuracy and clinical recommendations (Do Bú et al., 2022a; Do Bú et al., 2022b), the study extends the discussion by illustrating how this bias may also influence provider-patient communication. This evidence underscores the necessity for future research to examine the role of time investment in clinical tasks (Do Bú et al., 2022a; Hirsh et al., 2015) as a potential avenue for enhancing the quality of healthcare provided to patients.

Furthermore, this study offers support for the theoretical foundation of time investment bias in medical contexts, previously highlighted by Do Bú et al. (2022a). The aversive racism framework suggests that discrimination against Black individuals stems from aversive racists experiencing aversion to both the Black target (i.e., the interracial interaction) and the possibility of perceiving themselves as prejudiced individuals (Gaertner & Dovidio, 2005). Our research replicated previous findings as White medical trainees invested devoted more time to White patients than Black patients, particularly if they exhibited an aversive racist profile.

Limitations and Further Directions

While this study has made significant theoretical and practical contributions, it is important to acknowledge its limitations. First, our investigation focused on the relationship between fictitious patients and future White providers in a simulated social-psychological frame, which may not fully capture the complexities of real-world clinical interactions. Future research should aim to replicate these findings using experimental paradigms that involve actual patients, providing more robust and ecologically valid evidence. Second, the sample consisted of medical trainees. It is important to test whether this effect is consistently found across different medical specialities and other clinical cases. Specifically, investigating the relationship between the perception of time scarcity and the quality of care provided to different racial and social groups, particularly in critical emergency hospital settings (*vs.* general clinical contexts), could be a topic of future research. This will help to understand whether a perceived lack of time exacerbates disparities in time investment while providers offer healthcare services to patients. Additionally, future research should explore the role of contextual factors, such as workload, in shaping professionals' time investment in decisions (Penner et al., 2019). Third, conducting additional studies to investigate the occurrence of the ITB effect among physicians and patients from diverse ethnic backgrounds and nationalities would be valuable. Exploring factors that may influence physicians' time investment in patients, such as differences in perceptions of patients' health insurance or level of education, could provide insights into potential cultural and systemic factors that contribute to disparities in time investment and, consequently, in the quality of healthcare offered.

Ultimately, understanding the mechanisms underlying time investment bias is crucial for comprehending its insidious consequences in the medical context. In our study, we aimed to investigate whether physical examination avoidance mediated the relationship between

patients' skin color and the time invested in patients across different clinical tasks. However, we did not find evidence supporting this mediation. There are several possible explanations for this finding. One key factor is that the physical examination avoidance measure was a subjective evaluation, not a behavioral response, and as such, may not have accurately captured avoidance behaviors. Future research could explore, in real-world settings, whether physicians with an aversive racist profile conduct more physical examinations on White than Black patients and the duration of these examinations. This could help determine if there is a physical examination avoidance when providing healthcare to Black target and if this behavior is a mechanism through which reduced time investment occurs in the assessment and decision-making processes for Black (*vs.* White) patients. Another factor that may have influenced our non-significant findings is the study's sample size. As previously indicated, the current number of participants is underpowered to detect the proposed relationships, which may have contributed to our non-significant results. Alternatively, it is possible that aversive-based behaviors are not the mechanism through which time investment bias occurs in this context. According to the aversive racism literature, two other psychological mechanisms worth investigating in relation to time investment bias are intergroup discomfort and anxiety (Dovidio & Gaertner, 2004; Gaertner & Dovidio, 2005). Social categorization may activate these processes, which could be responsible for the reduced time investment. By examining these potential mechanisms, future research can offer a more comprehensive understanding of time investment bias and its implications in the medical context.

Conclusion

This study expanded on the theory and experimental evidence regarding the Intergroup Time Bias effect and its application in the medical field. As predicted, White medical trainees exhibited greater investment of time towards White patients, thereby

impacting the quality of clinical recommendations and communication, particularly when they displayed an aversive racist profile. Although we did not find support for avoidance as a mediator of the ITB effect, future research should explore other potential mechanisms, such as intergroup discomfort and anxiety, in order to gain a more comprehensive understanding of the bias in time allocation and its implications within the medical context. It is crucial to comprehend the underlying mechanisms of time investment bias to fully grasp its hidden consequences in the medical field.

This dissertation unveils our central hypothesis positing that Intergroup Time Bias (ITB) is an unobtrusive discriminatory behavior expressed by aversive racist individuals, thereby eliciting consequential effects on critical behaviors towards individuals deemed to belong to outgroups. We conducted a research program designed to test specific predictions derived from this main hypothesis in simulated healthcare settings. We specifically investigated whether the ITB permeates the healthcare context among White medical trainees, resulting in their biased investment of time towards clinical assessment and decision-making processes that favor White patients over Black patients. We further hypothesized that the emergence of ITB could ultimately compromise the quality of medical care provided to patients. Most significantly, we propose the hypothesis that the ITB effect is associated with aversive racism. We scrutinized this hypothesis in two distinct manners. Initially, we explored whether this time investment bias is particularly expressed among individuals who genuinely support egalitarian beliefs, state to be non-racists, yet harbor negative attitudes and beliefs towards Black individuals. Subsequently, we evaluated whether avoidance, particularly avoidance of physical examination of patients, serves as a fundamental mechanism through which patients' skin color influences the time invested in their care, especially among individuals displaying an aversive racist profile. To achieve this, we conducted a series of 16 studies, including seven experimental studies, one meta-analysis, and eight pre-tests of materials and paradigms. These studies were organized into three empirical chapters, which are presented following a theoretical chapter.

Chapter 1 lays a comprehensive groundwork for understanding the socio-psychological underpinnings of the ITB, unearthing the pivotal factors driving this phenomenon and the implications of time investment bias to social intergroup dynamics. First, we explored the field of time study in psychology and social psychology, emphasizing

its significance within different theoretical frameworks and research paradigms. We subsequently delved into the diverse interpretations of time and their specific relevance to understanding the ITB. Our attention then turned to the inseparability of time from the behaviors exhibited by individuals within clearly defined social-psychological contexts. Specifically, we defined the time individuals invest in people belonging to socially valued ingroups compared to devalued outgroups as an unobtrusive form of intergroup discrimination. In this theoretical framework, we went further by proposing an innovative sociopsychological interpretation of some insidious racial discrimination in healthcare provision, a sector notorious for the study of asymmetric intergroup relationships. This critical evaluation underlined the necessity of investigating the ITB effect within the medical domain. We then probe the potential repercussions of ITB in healthcare, hypothesizing its influence on patient-provider interactions and eventual health outcomes. Wrapping up the chapter, we established a theoretical connection between the ITB effect and aversive racism in a medical context, also proposing that avoidance behaviors may be a driving mechanism for this effect. Consequently, the first chapter paves the way for an in-depth understanding of ITB, its implications, and its roots in healthcare.

In Chapter 2, we empirically investigate the manifestation of ITB in the process of impression formation of patients, diagnosis, pain evaluation, and medication prescription. Specifically, the first study provided preliminary evidence of ITB within a Brazilian medical setting, pinpointing a discriminatory time investment by White medical trainees, especially when they exhibit an aversive racist profile. A subsequent study echoes these results with a different set of stimuli and a distinct social context, specifically in Portugal. In line with the aversive racism theory, which indicates that individuals who consider themselves non-racist and egalitarian but still harbor nonconscious negative attitudes towards Black individuals

exhibit an aversive racist profile, the third study within this chapter replicates the pattern of more time invested in White patients while forming impressions, especially when White medical trainees are high in egalitarianism, low in explicit racism, and high in implicit racial bias. While Studies 1-3 significantly enhanced our understanding of a time bias in impression formation, they did not allow us to focus on critical aspects of face perception involved in this process and possibly linked with ITB. Accordingly, Study 4 adopted an eye-tracking paradigm to examine gaze fixations and time spent on essential facial features and word stimuli, providing deeper insight into the ITB in the process of impression formation. Overall, our findings align with previous studies, demonstrating that participants spend more time forming impressions of White patients compared to Black patients. Additionally, the ITB effect was linked to increased fixation of gaze on the faces and eyes of White patients, particularly when these patients were associated with negative traits. However, this effect only occurred when traits were positive for Black patients. Furthermore, our study showed a correlation between the ITB effect and participants' fixation on negative traits associated with Black patients. Specifically, the more time participants invested in favor of White patients over Black patients, the more they tended to focus on negative traits associated with Black patients.

Despite Studies 1-4 illuminating our comprehension of the ITB effect in the medical field, they did not probe its downstream implications on patient healthcare outcomes. To bridge this research gap, Study 5 aimed to provide the first evidence of the pervasive nature of the ITB effect in other clinical tasks, including patient case evaluations, pain assessments, and medication prescribing practices. The results of our study reveal that time bias acts as a mediator between patients' skin color and healthcare outcomes. Specifically, medical trainees exhibiting an aversive racist profile demonstrate higher accuracy in proposing diagnostic

hypotheses, perceive higher levels of pain, and prescribe fewer opioids to White patients in comparison to Black patients. These outcomes are a direct consequence of investing more time in the care of White (*vs.* Black) patients. Meta-analyzed data (Study 6) in this chapter confirmed that the ITB effect is present in patients' impression formation, regardless of the valence of associated information, social context, and task used. However, the effect is stronger with negative stimuli and when participants indeed express an aversive racist profile. Altogether, these findings provide the first experimental evidence linking time investment bias favoring White patients to aversive racism and its impact on healthcare outcomes.

Chapter 3 delved further into the association of ITB with diagnostic indications and clinical recommendations for patients. In this chapter, we presented results from another experimental study to examine if White medical trainees exhibit time bias when evaluating clinical cases, indicating diagnosis, and suggesting clinical recommendations for White and Black patients. Furthermore, we analyzed if the ITB effect impacts clinical recommendations in a way that favors White patients over Black patients. As predicted, participants dedicated more time to indicate diagnostic hypotheses and prescribing clinical recommendations for White patients. This bias was associated with higher diagnostic accuracy and quantity and quality of medical recommendations for White (*vs.* Black) patients. Thus, this study provided additional experimental evidence that White medical trainees tend to allocate more time to White patients during clinical tasks, thereby influencing their clinical performance.

In Chapter 4, we aimed to replicate the ITB effect in diagnosis and treatment recommendations contexts and explore its pervasiveness on provider-patient communication. More importantly, we sought to examine if avoidance of physical examination mediates the relationship between patients' skin color and the time invested in their care, especially among participants exhibiting an aversive racist profile. Mediation and moderated mediation analyses

revealed no significant indirect effect of physical examination avoidance on the relationship between patients' skin color and time invested in their care, regardless of participants' racial attitudes profile. However, we investigated the ITB association with diagnostic accuracy, as well as the quality of clinical recommendations and communication, based on the racial attitude profiles of White medical trainees. Our results replicated the findings from Chapter 2 and Chapter 3, where participants with an aversive racist profile displayed a time investment bias towards White patients, leading to better clinical recommendations and communication. Overall, our study did not provide evidence in support of our hypothesis that the avoidance of physical examination mediates the ITB effect among individuals with an aversive racist profile. However, we not only reaffirmed previous findings on the ITB effect in a medical context but also offered the first experimental evidence of time investment bias in patient communication processes. This bias, combined with the quality of communication processes, highlights potential areas for improvement within the medical field.

In synthesis, the results from these studies indicated that White medical trainees consistently invest more time in forming first impressions, indicating diagnostic hypotheses, and prescribing clinical recommendations for White patients compared to Black patients in a simulated medical environment. Additionally, we find preliminary evidence of this effect in the context of pain assessment, medication prescription, and communication. Our studies reveal that this effect is stronger in individuals who exhibit an aversive racist profile, characterized by nonconscious negative feelings and stereotypes about Black people while claiming to uphold egalitarian beliefs and identify as non-racists. While we did not observe direct main effects of patients' skin color on healthcare outcomes for patients, our findings revealed a significant impact of biased time investment as a mediating mechanism through which a patient's skin color impacts various aspects of the healthcare process. Specifically,

we identified that the differential allocation of time by healthcare providers, based on patients' skin color, has implications for diagnostic accuracy, pain assessment, medication prescription, as well as the quality and quantity of clinical recommendations and communication. Therefore, as participants invest more time in the care of White patients at the expense of Black patients, the health outcomes for the patient, particularly among those who exhibit aversive racism tendencies, tend to improve.

Theoretical and Practical Implications

By investigating the intricate dynamics of time biases, this research program provides innovative insights into the social psychology of time and its implications for the study of intergroup relations. Moreover, it expands upon the existing body of literature surrounding the ITB effect, revealing its pervasiveness in healthcare contexts and its association with aversive racism. Essentially, the findings of this research program pave the way for a deeper understanding of the complex interplay between time, social identity, aversive racism, and healthcare disparities. In the following sections, we explore specific contributions of this research to *the Social Psychology of Time*, *the ITB Effect Literature*, the relationship between *ITB and Aversive Racism*, as well as the broader *implications for the study of healthcare disparities*.

The Social Psychology of Time

Although the concept of time has been a subject of concern in Psychology for many years (Israeli, 1935a, 1995b), research in the field of social psychology of time has primarily focused on the subjective evaluation of time through the study of human perception (McGrath, 1988; Youngren & Silcox, 2020). Objective observations of time, on the other hand, have often been used as indicators of subjective socio-cognitive construal, such as attention, motivation, prejudice, and other related factors (Brewer, 1988; Fiske & Neuberg,

1990; Fazio, 1995; Stroop, 1936). The current research program represents a significant contribution to unravelling the significance of time within the realm of human behavior in society, providing insights into the literature on the social psychology of time. More specifically, our conceptualization of time as a behavior that is influenced by racialized intergroup relations, and its differential impact on groups of varying social value, shed light on its role as an unobtrusive discriminatory behavior that favors ingroup members over outgroup members. Thus, in the context of intergroup relations, our research offers crucial insights by highlighting how time allocation can reflect the social value assigned to different groups. This understanding suggests that biases in time investment, particularly in the context of racialized social relations, can serve as an indicator of non-verbal unobtrusive discriminatory behavior, thereby adding a new layer of complexity to our understanding of the social psychology of time.

The ITB Effect Literature

The data obtained from this research program represents a significant leap forward in the understanding of the ITB effect, expanding its literature considerably. In previous studies, the ITB phenomenon has been observed primarily within racialized and minimal group contexts during the process of impression formation (Aguilar, 2008; Lima, 2003; Vala et al., 2012). Our research program has explored the effect in this realm but also in other evaluative clinical tasks, extending the application of the ITB effect into the healthcare domain. We have unambiguously demonstrated that White medical trainees invest their time disproportionately towards White (over Black) patients across various clinical tasks, thereby revealing ITB's pervasiveness in a critical sector of social life. Moreover, our research uncovered that this bias is not only present but is in fact amplified when negative information is associated with Black patients relative to when the information is positive or clinical. Additionally, the effect was

found to be associated with aversive racism. Specifically, our findings consistently display that aversive racists exhibit a stronger ITB effect, compared to traditionally prejudiced and non-prejudiced individuals, leading to disparities in healthcare outcomes. That is, while previous studies developed in the impression formation context (Vala et al., 2012) have solely theorized on the downstream consequences of the ITB effect, the studies described in this dissertation have shown that the ITB effect is associated with diagnostic accuracy and the quality of clinical recommendations and communication provided to White (vs. Black) patients.

The ITB and Aversive Racism

This research program also intends to contribute to the aversive racism literature by demonstrating that individuals with an aversive racist profile are more likely to express the ITB effect. Aversive racism is characterized by a duality between the explicit endorsement of egalitarian values and the nonconscious holding of negative racial attitudes (Dovidio & Gaertner, 2004). The conflict generated between these two value-based systems often leads aversive racists to avoid or disengage from interactions with outgroup members to reduce cognitive dissonance (Pearson et al., 2009). Historically, when theorizing about aversive racism, Dovidio and Gaertner (2004) highlighted a specific study conducted by Gaertner (1973) that shed light on the behavioral manifestations of individuals with an aversive racist profile when interacting with Black individuals compared to White individuals. In this study, Gaertner found that while liberal individuals did not discriminate between Black and White individuals when asked for help over a phone call, however, they interacted less with Black individuals, often ending the call prematurely. To the best of our knowledge, this is the only evidence in which the duration of interracial communication was observed to be shorter when the individuals involved were considered to hold both egalitarian beliefs and nonconscious

negative attitudes towards Black individuals. However, in this context, only the individuals' political affiliation was taken into account to characterize their racial attitudes. In the context of our study, we found that White medical trainees who exhibit high egalitarianism and low racism, but harbor high implicit racial bias, indeed invest less time with Black patients than with White ones. That is, considering all theorized dimensions of aversive racism expression, this research program offers additional experimental evidence that individuals who indeed express an aversive racist profile invest less time with Black (vs. White) individuals. Furthermore, the fact that they spend more time with White individuals results in better care indicators for these patients in comparison with Black ones. These findings not only affirm that aversive racism might influence the ITB effect, but also highlight the significant role of aversive racism in perpetuating racial disparities within the healthcare sector.

Moreover, we proposed that physical examination avoidance could mediate the ITB effect, especially when individuals expressed an aversive racist profile. While our study did not find evidence supporting this mediation, this could be due to a variety of factors. The attitudinal measure we employed might not have accurately represented actual behaviors. Indeed, we were unable to study avoidance behavior as theorized but rather evaluated the perceived necessity of physical examination involving touch. Furthermore, our sample size may have been underpowered to detect the proposed relationships. Future studies could investigate this mechanism in real-world settings, examining whether physicians with aversive racist profiles conduct fewer or shorter physical examinations on outgroup patients. Other potential psychological mechanisms worth investigating include intergroup discomfort and anxiety (Dovidio & Gaertner, 2004; Gaertner & Dovidio, 2005), which might be activated by social categorization and could contribute to the reduced time investment in outgroup patients. Understanding the mechanisms underlying time investment bias is paramount to

fully comprehend its insidious consequences in the medical context and to develop effective strategies to mitigate its impact.

The Intergroup Time Bias Effect and Healthcare Disparities

This research program provides contributions to the investigation of healthcare disparities within the Portuguese and international contexts (Bernardes et al., 2021; Bernardes & Lima, 2010; Diniz et al., 2020; Hagiwara et al., 2016; Madeira et al., 2022a; Madeira et al., 2022b; Penner et al., 2010; Pimentel, 2018; Rufino, 2013; Teixeira, 2014). In fact, our research marks a significant contribution to the literature on healthcare disparities by demonstrating further support for the assumption that time bias is a mechanism through which such disparities occur (Hirsh et al., 2015). In this respect, our research program provides a theoretical explanation for a phenomenon previously lacking theorization. We found that White medical trainees systematically biased their time based on the patient's racial category, a finding that was consistent across different cultural contexts and clinical tasks. These findings align with previous research on health inequalities, which had shown that doctor-patient interactions tend to be quicker with Black (*vs.* White) patients, particularly in areas such as treatment planning, health education, and answering questions (Gross et al., 1998; Oliver et al., 2001). However, our research took a step further by examining how future providers who have an aversive racist profile invest their time in clinical situations involving patients from their social group and from a different one. In doing so, we highlight how time investment in clinical tasks can significantly impact healthcare outcomes, and how this investment is influenced by the patient's skin color. Given these findings, it is crucial to understand and address this bias to reduce health disparities, with future research and interventions needed to explore the ITB effect in other settings and its potential consequences.

Limitations and Further Directions

Our research provides significant contributions to the understanding of the Intergroup Time Bias by theorizing on the meaning of time, and for its application to understand concrete social psychological issues within a medical context. However, a series of limitations should be addressed to further advance the comprehension of this phenomenon and inform more effective strategies for mitigating this bias.

One significant limitation of our study is that our participant population consisted exclusively of medical students. Although medical students offer a valuable perspective, they may not have the same depth of practical experience or clinical acumen as established physicians. The absence of real-world patient interaction and varied clinical experience may have influenced our findings. Future research could, therefore, seek to involve practicing physicians as participants. This would allow a more complex exploration of how the variables of medical specialty, years of practice, and accumulated experience might act as potential moderators in the ITB effect.

Another limitation was the absence of real interactions between physicians and patients. This was primarily due to the challenge of adequately segregating the time invested in various clinical tasks. However, this lack of actual interaction could limit the external validity of our results. Future studies could consider utilizing innovative methodologies such as virtual reality technologies to simulate realistic yet controlled patient-physician interactions. Alternatively, researchers might consider the direct observation of actual patient-physician encounters to evaluate the potential impact of time allocation on perceived quality of care.

Our current research did not thoroughly consider the role of the patient's gender and social status in time investment decisions. Future research should, therefore, consider these

social variables as potential influences on ITB. This might involve examining whether these groups are particularly disadvantaged in terms of time allocation and how this impacts their clinical outcomes.

We also did not consider clinical scenarios stereotypical of different social groups. This is an important avenue for future research, as it may reveal whether the ITB is more pronounced when a condition is perceived as stereotypical of a particular social group. By manipulating the patient's presented condition and their social group (Madeira et al., 2022a), researchers could gain insights into how stereotypes may influence the ITB effect.

Our study did not manipulate time, a factor that could significantly impact healthcare outcomes. An alternative approach for future studies could be manipulating the time pressure experienced during clinical evaluations. Time scarcity may become more salient under conditions of time pressure, which could potentially amplify the ITB effect and, consequently, decrease the quality of care offered to Black (*vs.* White) patients. Future studies could, therefore, manipulate time pressure conditions to understand how these might exacerbate the relationship between the ITB effect and healthcare outcomes. This could include creating scenarios where physicians are under varying degrees of time pressure and examining how this influences their allocation of time across different social groups, as well as the ensuing consequences.

Our study also found an intriguing discrepancy in time perceptions: participants not only spent more time with White patients compared to Black patients, but they also inaccurately perceived that they spent more time with Black patients than they did. This could indicate a form of bias in time perception (Kenrick et al., 2016; Moskowitz et al., 2015, Moskowitz et al., 2017), which future studies should investigate. One potential approach could be to implement time perception modification exercises in medical training programs to

address this bias. Employing virtual reality technology to adjust the pacing of clinical scenarios could allow trainees to develop a more accurate understanding of time management in patient care. Furthermore, the potential influence of time perception biases across various medical specialties should also be investigated.

One potential mechanism for the observed ITB effect is the perception of clinical tasks as helping behaviors, as opposed to professional practices (Dugdale et al., 1999; Saba et al., 1999; Saucier et al., 2003; Valente et al., 1986; Wachspress et al., 2020). This perception may contribute to a form of aversive racism in patient assessment, leading physicians to be less willing to ‘help’ those perceived as different from themselves, such as outgroup patients. As a result, outgroup patients may receive less time and effort in clinical tasks. This perception of tasks as helping behaviors could be more pronounced when tasks are perceived as more time-consuming or effortful. Future research could investigate this “time and effort hypothesis” by examining whether physicians with aversive racist profiles are less likely to allocate resources, such as time, to outgroup patients. This line of research could contribute to a better understanding of the underlying mechanisms of healthcare disparities.

Despite these limitations, our research offers valuable insights into the ITB effect within the realm of healthcare. These insights serve as a crucial first step in the development of strategies aimed at addressing and reducing health disparities. By examining the influence of the ITB effect on healthcare outcomes, our studies provide a foundation for the formulation of interventions and approaches that can effectively mitigate disparities in healthcare. Moving forward, it is essential for future research to build upon these findings and delve deeper into the design and implementation of targeted interventions.

Final Considerations

In this dissertation, we explored, through a series of studies, the Intergroup Time Bias (ITB) as an unobtrusive discriminatory behavior exhibited by aversive racists in the healthcare context. Overall, this research program offers a new perspective on the manifestation of racial bias in the healthcare context through the introduction of the ITB. This form of bias, we argue, is prevalent among White medical trainees and manifests in a disproportionate allocation of time for White patients compared to their Black counterparts. We suggest that this bias is particularly prominent among individuals who consciously endorse egalitarian beliefs, yet subconsciously harbor negative biases towards Black individuals - a phenomenon known as aversive racism. We further postulate that this ITB significantly impacts the quality of patient care. It affects the accuracy of diagnoses and the comprehensiveness of clinical recommendations and patient communication. Therefore, the ITB can be seen as an unobtrusive, yet insidious discriminatory behavior exhibited by aversive racists, leading to potential disparities in the quality of medical care patients receive based on their race.

The research program contributes to the social psychology of time by highlighting the significance of time allocation as an indicator of discriminatory behavior in intergroup relations. It expands the literature on the ITB effect by demonstrating its pervasiveness in the healthcare domain and its association with aversive racism. Furthermore, it offers theoretical explanations for the ITB phenomenon and provides insights into potential mediating mechanisms. Additionally, the research program contributes to the understanding of healthcare disparities by linking time bias to disparities in healthcare outcomes. Overall, this research program deepens our understanding of the ITB effect and its implications in healthcare. It emphasizes the importance of addressing time bias and aversive racism to

promote equitable and high-quality healthcare for all patients, regardless of their racial background.

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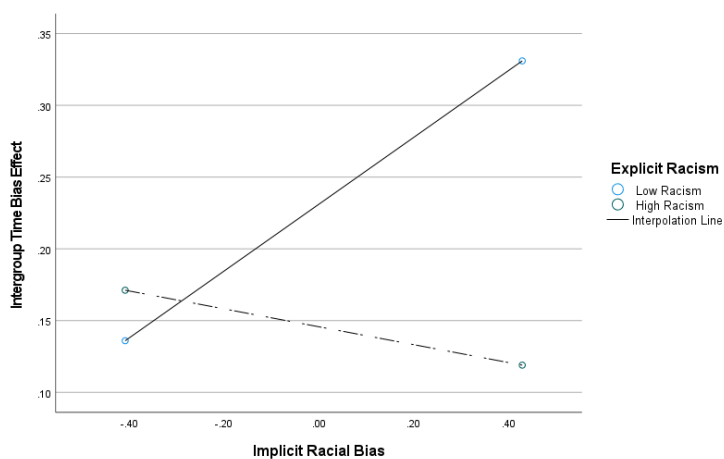
Appendix A - Supplementary Information Text – Chapter 2

In the current research program, our aim was to analyze whether there is an ITB effect in medical trainees' time investment when forming first impressions and clinically assessing patients, and to examine the relationship between this effect and aversive racism. This document contains graphs and supplementary information from the research program developed. Data and materials from the studies can be found online (https://osf.io/7jf8z/?view_only=de1e61eeba614075909173f61564bab1).

Study 1

Figure S1

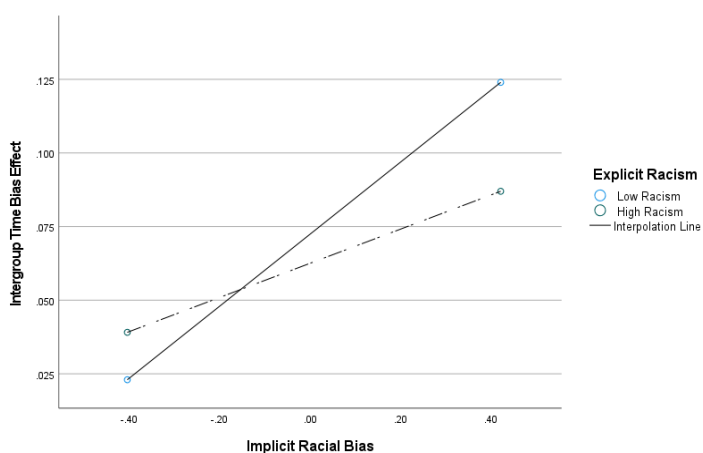
Correlates of the ITB



Study 2

Figure S2

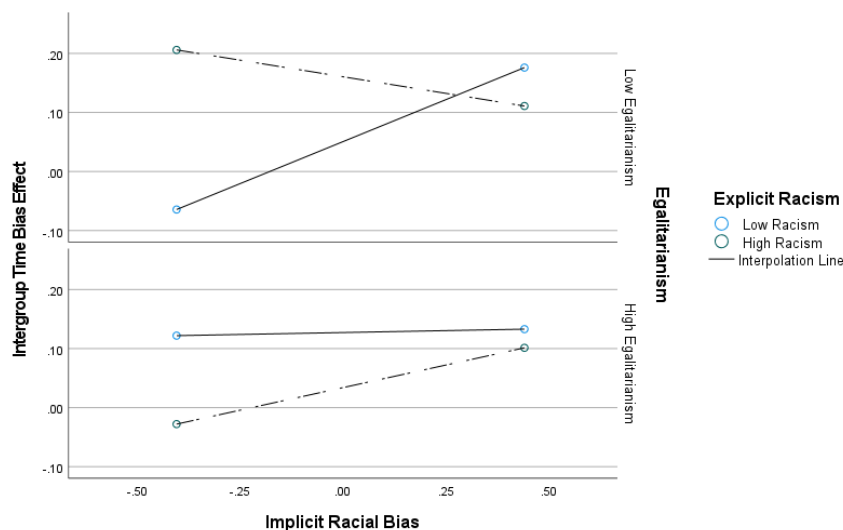
Correlates of the ITB



Study 3

Figure S3

Correlates of the ITB

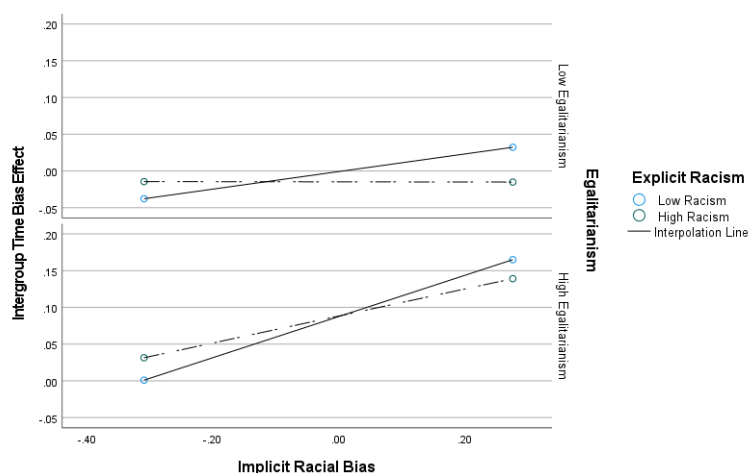


Study 4

Procedures and Material

Impression Formation Task

We adapted the impression formation task used in Study 3 to the Eye Link software. Because in eye-tracking fixation points are pivotal to observing the most relevant areas of the participants' field of vision, we presented the fixation cross appeared in one of four locations around the screen (top middle, bottom middle, left middle, right middle) before displaying each patient face. Participants had to look at it for 150ms before the fixation cross disappeared and the face appeared (see Bindemann et al., 2009; Hills & Pake, 2013). In addition, standardized areas of interest (i.e., patients' entire face, eyes, nose, mouth, word stimuli) were set to measure participants' time investment and gaze fixations. The areas of interest were first defined in pixels, i.e., face (144826), stimuli (40216), eyes (11550), nose (5335.25), and mouth (8906.42). Then, we converted the areas in pixels to centimeters. The data presented in this article was standardized from milliseconds to seconds per square inch. The resulting quotient was rescaled to vary from 0 to 10, in that the higher the value, the greater the quantity of time and number of fixations in the areas of interest.

Figure S4*Correlates of the ITB***Study 5***Clinical case*

The clinical case was selected from a Portuguese national evaluation exam that medical trainees must pass before beginning their specialization. A specialist later adapted it to represent the situation of a migraine aura. To improve the material, we held a focus group with six Portuguese physicians, who evaluated the clinical case and suggested changes, as well as indicating the level of clarity, objectivity, and attribution of the clinical situation to the patients' race or gender. Following this, the case was pre-tested for racial and gender stereotyping with a sample of 14 physicians to confirm the focus group findings. We also inquired about the frequency with which the case appeared in the daily work routine, as well as the case's complexity. The findings confirmed previous focus group findings that the case is not racially or gender stereotyped, that it frequently occurs in daily medical routines, and that it is of medium complexity.

Final Clinical Case with Blurred Target Photos

Situação clínica



Paciente de 35 anos de idade, refere episódios de alteração visual recorrente desde há 3 meses. Nota um brilho intenso que surge no centro do hemisfério visual direito e que progride ao longo de 10 minutos para a periferia, deixando-o praticamente sem visão. Os sintomas desaparecem em 30 minutos e fica com uma cefaleia orbitária esquerda, náuseas e intolerância à luz e ao ruído, até adormecer. Já teve quatro episódios.

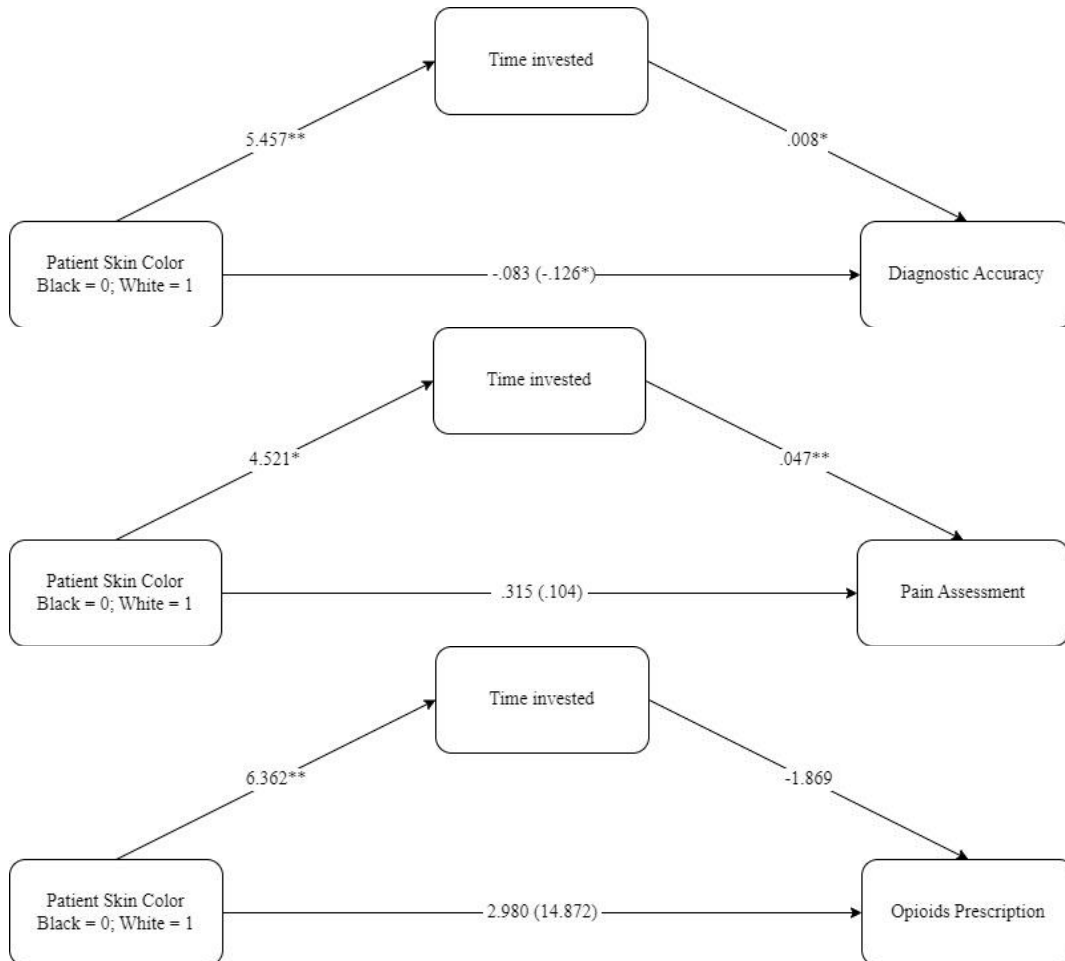
Situação clínica



Paciente de 35 anos de idade, refere episódios de alteração visual recorrente desde há 3 meses. Nota um brilho intenso que surge no centro do hemisfério visual direito e que progride ao longo de 10 minutos para a periferia, deixando-o praticamente sem visão. Os sintomas desaparecem em 30 minutos e fica com uma cefaleia orbitária esquerda, náuseas e intolerância à luz e ao ruído, até adormecer. Já teve quatro episódios.

Figure 5S

Unstandardized Estimated Parameters of Mediation Analyses in Predicting Diagnostic Accuracy, Pain Assessment and Opioids Prescription



Note. ** $p < .001$; * $p < .05$. To predict diagnostic accuracy, the time invested index accounted for the amount of time participants invested in assessing the clinical case and indicating diagnostic hypotheses. For patient assessment, the index considered the time participants spent assessing the clinical case, diagnosing the patient, and evaluating the patient's pain level. Finally, to predict opioid prescription, the index took into account the time participants invested in assessing the clinical case, diagnosing the patient, and indicating medication.

Appendix B - Supplementary Information Text – Chapter 3

Signal Detection Theory

As described in the main text, participants were given four diagnostic hypotheses about the clinical case they had just evaluated, of which two were correct and two were incorrect. The participant's task was to indicate whether the supplied case-diagnosis hypothesis was right or false. In order to investigate the reaction pattern of the participants to this task, we borrowed signal detection theory (SDT) analysis strategies. We analyzed hits (i.e., the diagnostic hypothesis was correct and the participant indicated that it was correct), misses (i.e., the diagnostic hypothesis was correct but the participant indicated that it was incorrect), false alarms (i.e., the diagnostic hypothesis was incorrect but the participant indicated that it was correct), and correct rejections (i.e., the diagnostic hypothesis was incorrect and the participant indicated that it was incorrect) (Abdi, 2010). Because the number of observations in the task is small (medical trainees only responded to four diagnostic hypotheses that could be true or false), we did not use the parameters d and c , which are usually analyzed when evaluating the proportions of hits and misses, as well as correct rejections and misses (Abdi, 2010). However, considering that there were different possibilities of success in the medical decision task, mean values of hits, false alarms, correct rejections, and misses were used separately to evaluate the accuracy of the medical diagnosis towards the clinical case presented. The dataset and supplementary material used in the research can be accessed at the OSF repository platform:

https://osf.io/6vmhu/?view_only=d3d4518aabe24e088ce0afc51633ba81.

Outliers

Following the Tabachnick and Fidell (2001), and Ratcliff (1993) indications for the outliers' treatment when measuring reaction times, we excluded time latencies that were two standard deviations above and below the mean - considering that this exclusion is the most consistent with the standard used at 95% implied confidence intervals of $p < 0.05$. Find below the number of values considered outliers in each variable:

Actual Time Invested in Reading: 10.

Actual Time Invested in Indicating Hypotheses: 6.

Actual Time Invested in Prescribing Clinical Interventions: 11.

Perceptual Time Invested in Reading: 9.

Perceptual Time Invested in Indicating Hypotheses: 8.

Perceptual Time Invested in Prescribing Clinical Interventions: 9.

Appendix C - Supplementary Information Text – Chapter 4

The dataset and supplementary materials used in this study are available on the Open Science Framework repository platform at the following link:

https://osf.io/n24my/?view_only=6f6cd8f7f54941979683a95dbf543d65

Indirect Effects According to Attitudes Profiles

Diagnostic Accuracy – Traditional Prejudiced Profile ($b = .964$, $SE = 3.073$, 95% $CI [-5.560; 7.325]$) | Non-prejudiced Profile ($b = 2.151$, $SE = 2.717$, 95% $CI [-3.339; 7.936]$).

Quantity of Clinical Recommendations – Traditional Prejudiced Profile ($b = -3.447$, $SE = 6.855$, 95% $CI [-20.076; 7.490]$) | Non-prejudiced Profile ($b = .201$, $SE = 9.820$, 95% $CI [-22.937; 16.626]$).

Quality of Clinical Recommendations – Traditional Prejudiced Profile ($b = -.726$, $SE = 1.444$, 95% $CI [-4.114; 1.592]$) | Non-prejudiced Profile ($b = .042$, $SE = 2.097$, 95% $CI [-4.263; 4.105]$).

Number of Words Used in Communication – Traditional Prejudiced Profile ($b = -103.431$, $SE = 153.159$, 95% $CI [-421.129; 180.411]$) | Non-prejudiced Profile ($b = 216.704$, $SE = 195.647$, 95% $CI [-170.091; 609.312]$).

Clarity of Communication – Traditional Prejudiced Profile ($b = -3.601$, $SE = 9.453$, 95% $CI [-24.532; 13.918]$) | Non-prejudiced Profile ($b = 13.644$, $SE = 12.009$, 95% $CI [-10.547; 36.955]$).

Cordiality of Communication – Traditional Prejudiced Profile ($b = -7.567$, $SE = 10.985$, 95% $CI [-31.302; 12.963]$) | Non-prejudiced Profile ($b = 15.854$, $SE = 13.924$, 95% $CI [-13.618; 41.178]$).

Procedures Understanding – Traditional Prejudiced Profile ($b = -3.780$, $SE = 9.935$, 95% $CI [-23.950; 15.707]$) | Non-prejudiced Profile ($b = 14.321$, $SE = 12.419$, 95% $CI [-11.897; 37.042]$).

Effort in Communication – Traditional Prejudiced Profile ($b = -7.405$, $SE = 11.020$, 95% $CI [-30.078; 13.702]$) | Non-prejudiced Profile ($b = 15.515$, $SE = 13.561$, 95% $CI [-11.916; 41.304]$).

Quality of Communication – Traditional Prejudiced Profile ($b = -2.336$, $SE = 3.482$, 95% $CI [-9.892; 3.808]$) | Non-prejudiced Profile ($b = 4.896$, $SE = 4.261$, 95% $CI [-3.731; 12.782]$).

Pre-tests

In the research outlined in this section, we aimed to measure aversion towards Black and White patients and investigate whether it played a mediating role in the Intergroup Time Bias (ITB) effect within the medical context. Our hypothesis was predicated on the assumption that if aversion towards Black individuals mediated the ITB effect, participants would display a higher level of aversion to Black targets compared to White targets. This, in turn, would impact the ITB effect. This hypothesis was rooted in the aversive racism framework, a theoretical model that scrutinizes the aversive reactions of White individuals who consciously profess non-prejudiced beliefs but unconsciously harbor negative sentiments towards Black people (Dovidio et al., 2017; Dovidio & Gaertner, 2004). The theory of aversive racism contends that individuals are socialized in an environment laden with ambivalence, one that nurtures both prejudiced and egalitarian values. This results in

individuals internalizing both prejudiced and non-prejudiced belief systems and behaving in ways that minimize the discomfort arising from the conflict between these opposing belief systems (Dovidio et al., 2017; Dovidio & Gaertner, 2004).

This line of thinking is supported by a pioneering study by Gaertner (1973), which demonstrated that White liberal participants terminated phone calls more swiftly when interacting with Black callers compared to White callers seeking assistance. Likewise, additional research showed that White individuals concluded interviews more quickly when the interviewee exhibited stigmatized traits associated with Black individuals (Kleck et al., 1966). Consequently, it is plausible to suggest that aversive affect propels individuals to allocate less time to Black (as opposed to White) targets due to their subconscious negative beliefs and sentiments about Black people.

Despite these observations, the hypothesis regarding aversion towards Black individuals has remained largely unverified empirically. In the ensuing studies, we aimed to devise a measure of aversion towards Black and White individuals and analyze its correlation with the ITB effect.

Pre-test 1 and Pre-test 2

In Pre-tests 1 and 2, we propose that when subliminally primed with Black (*vs.* White) targets, White individuals may perceive aversive words as more negative, leading to an amplified aversion towards the Black target compared to the White target. Furthermore, an increased aversion towards aversive words associated with Black targets could result in less time spent forming an impression of Black targets (compared to the White target) in a subsequent task. In essence, we hypothesize that when exposed to a Black (*vs.* White) target, participants will exhibit a greater aversion towards words with an aversive content, and the higher this aversion, the less time will be invested in forming an impression of the Black (*vs.* White) targets.

Design

We utilized a within-subjects experimental design for this study. The independent variable was the race of the target (Black *vs.* White), while the dependent variable was the latency response in forming impressions of Black and White patients. The mediating variable was the degree of aversion felt towards Black and White targets, measured through an adaptation of the Emotional Modified Stroop task.

Procedure

Initially, participants completed an Emotional Modified Stroop (EMS) task, followed by an evaluative impression formation task. In the EMS task, participants were subliminally exposed to target images of Black and White men (and a control condition in which they were exposed to images of cups of water) on a screen for 16 ms (one frame). Subsequently, they were presented with one of eight target words in red, yellow, green, and blue. Four of these words were aversive (aversive block), while the remaining four were neutral (neutral block). The order of presentation for each target image and the word blocks was randomized. The participants' task was to identify the colors of the words as rapidly and accurately as possible using a response box.

The EMS task provided an interference measure, determined by response time and accuracy when identifying the word's color during the task. This measure indicated the extent to which participants were affected by the subliminal White and Black targets in the aversive and neutral conditions and served as a proxy to gauge participants' level of aversion towards the target.

For the evaluative impression formation task, we followed the same procedures as outlined by Vala et al. (2012). This task allowed us to measure the response latency for the target categories.

Pre-test Stimuli

In an effort to gather words for the EMS task, we conducted an online pre-test involving 60 participants (68% female), aged between 20 and 70 years ($M = 28.46$; $SD = 6.71$). In the first segment of the study, participants performed a free association task, where they were asked to list five words linked with the concept of aversion. Prototype analysis revealed that the most frequently evoked words in response to the aversive stimulus were disgust, fear, stench, feces, vomit, and repulsion. In the second segment, participants evaluated 20 verbs and 23 nouns associated with the concept of aversion in relevant literature. The results showed that (a) aversive nouns are perceived more negatively than verbs linked to aversive behavior; (b) nouns and verbs are perceived with the same degree of aversion; (c) the most negatively perceived aversive nouns are: repugnant, repulsive, repulsion, rejection, banishment, aversion.

Pre-test 1 Overview: Disgust

Upon identifying words related to disgust, we developed an EMS task. We tested the hypothesis that White university students ($N = 90$; 62% female; age average of 20.12, $SD = 5.16$), when subliminally primed with photos of Black (as opposed to White) individuals, would take longer to identify the color of words linked to disgust versus neutral words. Our goal was to create a novel measure of implicit racial aversion by adapting an EMS. The findings suggested that participants, when subliminally primed with images of Black individuals, took more time to complete the EMT when faced with emotionally aversive words compared to neutral ones. This effect was not observed when participants were primed with images of White individuals or neutral targets. In essence, White participants exhibited aversion after being subliminally primed with Black targets, but not with White or neutral targets. However, no association was found with the ITB effect in the process of impression formation.

Pre-test 2 Overview: Disgust vs. Aversion

To test whether words associated with disgust cause greater interference in an Emotional Modified Stroop task than words linked to aversion, we conducted another pre-test. An online study was conducted using E-Prime GO software, recruiting 49 participants (87.2% female) with an average age of 26.44 ($SD=11.33$). Participants were randomly allocated to one of two experimental conditions: Words associated with Disgust (disgust vs. neutral) vs. Words associated with Aversion (aversion vs. neutral). The results showed that neither words related to disgust nor aversion caused significantly greater interference compared to neutral

words. Additionally, no association with the ITB in the context of impression formation was found.

Pre-Test 3

In an attempt to mirror a real-world patient assessment scenario, we executed an additional pre-test (i.e., in the diagnosis context). The primary aim of this trial was to ascertain whether avoidance behavior mediated the relationship between skin color and the time devoted to the patient.

Pre-Test 3 Overview

Initially, we introduced the study and asked the participants ($N = 200$; 56% female; age average of 22.59, $SD = 6.78$) to evaluate a clinical case of a patient (White or Black). Subsequently, using an iconographic representation of a hospital room, we requested participants to click on the image to indicate their placement in a hypothetical interaction with the previously presented patient. Following this, participants estimated the distance in centimeters between the patient and the indicated point. These estimated values served as proxies for aversion (i.e., the distance of approach towards the patient or withdrawal). Lastly, participants offered diagnostic hypotheses and clinical recommendations for the evaluated patient.

In addition, we adapted an online version of the Implicit Association Test (Carpenter et al., 2019; Greenwald et al., 2003). The task was performed in five blocks with stimuli of White and Black individuals' faces, being categorized along with categories of distancing and approaching. Faster associations of Black targets with aversive attributes and quicker associations of White targets with approach attributes would indicate a measure of behavioral intentions towards Blacks and Whites.

Results indicated that when considering the iconographic scenario presented, participants estimated a shorter distance to the White patient ($M = 48.32$, $SD = 27.89$) compared to the Black patient ($M = 55.82$, $SD = 37.57$). However, the difference was not statistically significant, $t(1, 199) = -1.61$, $SE = 4.65$, $p = .108$, $d = .227$. The D-IAT scores ranged from -0.68 to 1.48 ($M = .447$, $SD = .389$). These scores were significantly above zero, indicating an implicit racial bias favoring white individuals, $t(200) = 16.548$, $p = .001$, $d = 2.220$. Neither of these two measures were related to the time bias effect in patients.

Pre-Test 4

At the conclusion of Experimental Study 5, detailed in Chapter 2, before debriefing the participants, we inquired if they believed the patient in the scenario required a physical examination involving touch for a more accurate diagnosis and clinical conduct (i.e., we sought to identify a proxy to measure avoidance behaviors by reversing the item).

Pre-Test 4 Overview

As presented in Chapter 2, results indicated that participants invested more time in White patients than Black patients when making various clinical decisions, such as prescribing medication. Furthermore, participants exhibited less avoidance behavior towards the physical examination when evaluating a White ($M = 3.337$; $SD = 3.327$) than the Black ($M = 2.393$; $SD = 2.941$) patient, $t(1, 169) = 1.990$, $p = .048$, $d = .301$. This led us to test

mediation analysis. We found that when assessing White (as compared to Black) patients, physical examination avoidance was lower, and the lower the avoidance, the more time was invested in the clinical assessment of the patient ($b = 25.69$; $SE = 16.48$; 95% CI [.041; 63.59]). Based on this preliminary evidence, we developed the study presented in Chapter 4 of this dissertation. In this study, we measured physical examination avoidance between the independent variable (patients' skin color) and time invested in the patient.

Exploratory Analysis: Participants with Previous Study Experience

Participants in this group were aged between 22 and 33 years old ($M = 24.14$; $SD = 2.30$), predominantly male (75.5%), and in their sixth year of medical training (71.4%). This sample size also had a power of only .48 to detect the ITB effect of .28.

As a considerable number of participants had previously participated in a similar study and had been debriefed about its main objectives, we conducted an exploratory analysis of the data obtained from these individuals. Table 1 displays the means and standard deviations for the study variables based on the experimental condition. Although no statistically significant differences were found, the pattern of results for these participants diverged from the rest, as they generally invested more time in the Black patient compared to the White patient. Notably, when examining the time invested in indicating diagnostic hypotheses, a marginally significant difference was observed, $F(1, 47) = 3.427$, $p = .070$, $\eta_p^2 = .068$ (for all means comparisons see supplementary materials).

Table 1.

Means and Standard Deviations of the Study Variables (n = 49)

Variables	White Patient <i>M(SD)</i>	Black Patient <i>M(SD)</i>	<i>t-Student</i>	<i>d</i>
Invested Time (seconds)				
Hypotheses Indication	16.95 (11.40)	24.36 (15.89)	-1.851	-.530
Clinical Recommendations	69.39 (46.73)	104.14 (96.77)	-1.562	-.451
Communication	174.44 (101.93)	178.16 (133.84)	-.105	-.031
Aversive affect				
Physical Examination Avoidance	6.57 (2.99)	6.36 (3.59)	.225	.064
Diagnostic Accuracy				
Accuracy	.391 (.499)	.192 (.402)	1.545	.442
Recommendations Indicators				
Lab Exams Indicated	1.87 (1.94)	1.92 (1.52)	-.108	-.031
Medication Indicated	.739 (1.10)	.615 (.941)	.425	.122
Clinical Exams Indicated	.348 (.573)	.346 (.562)	-.010	-.003
Health-related behaviors Indicated	.565 (1.04)	.615 (.983)	-.174	-.050
Total Number of Recommendations	3.52 (2.19)	3.50 (2.37)	.033	.009
Quality of Recommendations	2.61 (.499)	2.42 (.758)	.998	.286
Communication Indicators				
Number of Words	63.60 (52.80)	68.57 (57.65)	-.313	-.090

Diagnosis Indication	.783 (.422)	.692 (.471)	.703	.201
Lab Exams Indication	.261 (.449)	.039 (.196)	2.293	.656
Medication Indication	.435 (.507)	.539 (.508)	-.713	-.204
Health-related Exams Indication	.261 (.449)	.385 (.496)	-.911	-.261
Appointment Indication	.478 (.511)	.385 (.496)	.650	.186
Clarity in Communication	6.23 (3.29)	6.31 (3.27)	-.085	-.025
Cordiality in Communication	6.22 (3.36)	6.50 (3.26)	-.298	-.085
Procedures Understanding	5.59 (3.08)	6.12 (3.25)	-.570	-.165
Effort in Communication	5.35 (2.93)	5.73 (3.07)	-.445	-.127
Quality of Communication	2.00 (1.09)	1.80 (1.29)	.578	.167

We subsequently conducted a correlation analysis among the variables to examine, in an exploratory way, their relationships across both experimental conditions (see Table 2). The findings reveal that time investment in clinical tasks is strongly linked to the quality of clinical recommendations and communication, clarity and cordiality of communication, and patients' perceived understanding of procedures and effort in communication. Moreover, participants' implicit racial bias in the Black patient condition was negatively associated with the time invested in clinical tasks, while in the White patient condition, though not statistically significant, the opposite pattern was observed.

Table 2*Exploratory correlations between the variables for the experimental conditions*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. TDH	-	.827**	.402	.529**	-.162	-.531**	-.252	.227	.528**	.222	.605**	.273	.180	.318	.344	.251
2. TCR	.118	-	.653**	.740**	.017	-.491*	-.168	.257	.649**	.484*	.793**	.508**	.392	.525**	.607**	.497*
3. TC	-.093	.565**	-	.946**	.077	-.390	-.319	-.019	.381	.318	.746**	.507*	.475*	.585**	.610**	.367
4. TT	.074	.713**	.948**	-	.051	-.432*	-.268	.022	.505**	.407*	.622**	.532**	.443*	.584**	.618**	.445*
5. PEA	-.070	.328	-.035	.025	-	-.015	-.150	.033	-.119	.047	-.145	.148	.099	.139	.116	.116
6. D-IAT	.143	.240	.300	.277	.311	-	.058	-.126	-.276	.115	-.356	.002	.052	-.008	-.032	.075
7. RAC	-.214	-.292	-.137	-.150	-.074	.036	-	.007	-.231	-.226	-.304	-.189	-.239	-.195	-.277	-.107
8. ACC	.002	.434*	.193	.339	.391	.403	.105	-	-.021	-.015	.145	-.108	-.046	-.048	-.086	-.158
9. TNCR	.265	.525*	.228	.333	.006	.364	-.040	.220	-	.613**	.573**	.222	.163	.210	.355	.299
10. QR	.233	.710*	.409	.520*	.086	.379	-.367	.278	.611**	-	.423*	.413*	.412*	.401*	.464*	.423*
11. NW	-.134	.681**	.840**	.721**	.178	.158	-.381	.167	.310	.477*	-	.651**	.657**	.662**	.767**	.586**
12. CC	.038	.248	.598**	.475*	-.195	-.004	-.379	-.231	.085	.347	.606**	-	.951**	.966**	.934**	.789**
13. CoC	-.094	.143	.660**	.498*	-.279	-.110	-.208	-.243	.039	.189	.639**	.789**	-	.924**	.909**	.775**
14. PU	-.015	.390	.812**	.680**	-.109	.139	-.418	-.194	.197	.400	.762**	.826**	.819**	-	.917**	.714**
15. EC	-.032	.395	.710**	.599**	-.033	-.025	-.327	-.066	.183	.408	.786**	.834**	.892**	.872**	-	.832**
16. QC	.156	.561**	.575**	.573**	.044	.018	-.120	.000	.420*	.670**	.617**	.674**	.511**	.695**	.699**	-

Note. ** $p < .001$; * $p < .05$; TDH = Time invested in indicating Diagnostic Hypotheses; TCR = Time invested in indicating Clinical Recommendations; TC = Time invested in Communicating; TT = Total Time invested in clinical tasks; PEA= Physical Examination Avoidance; RAC = Racism; ACC = Accuracy; TNCR = Total Number of Clinical Recommendations prescribed; QR = Quality of Clinical Recommendations; NW = Number of Words; CC = Clarity of Communication; CoC = Cordiality of Communication; PUC = Procedures Understanding; PEC = Effort in Communicating; QC = Quality of Communication. The values in the upper half of the table refer to the Black patient condition, while the values in the lower section relate to the White patient condition.

