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2023

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University of California
Santa Barbara

Testing Assumptions About Human Mating Psychology:
Dealbreakers and Mate Preferences

A dissertation submitted in partial satisfaction of the
requirements for the degree

Doctor of Philosophy
in
Psychological & Brain Sciences

by
Kathryn V. Walter

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June 2023

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Testing Assumptions About Human Mating Psychology:
Dealbreakers and Mate Preferences

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by

Kathryn V. Walter

Acknowledgments

A huge thank you to my advisor Dan Conroy-Beam, who trained me to be a good scientist. From Dan, I learned the ropes and politics of academia, how to code, how to do fancy statistical analyses, how to write pithy sentences, and how to pronounce the word “scarce”. Dan’s patience, good humor, high standards and attention to detail, as well as his love for science made the last six years some of the best of my life. Thanks to his advising and mentorship I feel like I have become a professional research psychologist.

Other faculty members have also influenced my thinking along the way. Jim Roney challenged and expanded my understanding of mating human psychology and encouraged me throughout graduate school. Nancy Collins gave me a foundation in statistics, and she and Shelly Gable helped me understand how social psychologists think about close relationships. Leda Cosmides and John Tooby taught me how to do evolutionary psychology and welcomed me into the wonderful evolutionary psychologist community. Zoe Liberman mentored me throughout graduate school, and she helped me think about my career and life in a more holistic way. Tamsin German always welcomed me into her lab meetings and often offered the perfect turn of phrase for complex concepts.

My cohort was a great source of support throughout graduate school. In particular, I would like to thank Laura Pritschet, Devi Klein, Cris Garduño, and Julian Gerson for helping me prepare for program milestones, making me laugh, and creating space to commiserate together about the tough times. Furthermore, I was so lucky to have met Laura day one of graduate school. She became one of my best friends, my roommate for two years, and a source of hilarity and support in my life. She also does the coolest research and is an inspiration to me as a scientist.

It has been awesome being a part of the Computational Mate Choice Lab over the past six years and seeing it grow. My lab mates Ben Gelbart, Carlos Sosa Colindres, and Ashley Coventry have been so supportive of my research and helped me become a better scientist and mentor. Also, I learned so much from other evolutionary psychology graduate students at UCSB. Thank you Tadeq Quillien, Spencer Mermelstein, Sakura Arai, Jack Strellich, Goirik Gupta, Tikal Catena, and Dylan Benkley, for your help along the way.

Additionally, my graduate school experience was made much easier by the behind-the-scenes help and support from Chris McFerron, Katherine Lowe, Joe Jablonski, Shane Zheng, and the Psychological & Brain Sciences department staff. Furthermore, the work in this dissertation would not have been possible without the help of some amazing undergraduate research assistants, as well as my colleagues from around the world, who collected the cross-cultural data I used in this dissertation.

My family was a huge source of support as I progressed through graduate school. My parents, Stacy and Bill Walter, my sister Emily Walter, and best friend Raemy Paterson sent me love and encouragement from afar. My soon to be in-laws, Debbie and John Preston gave me a private space to work during the pandemic, a place to exercise in their backyard, and dinners every Sunday. I am lucky to have such a fantastic community.

Finally, to my fiancé, Jonathan Preston, thank you for your support throughout graduate school, and especially in the last few months while I was writing this dissertation and working long, late hours. You cooked meals for me, made me laugh every day, completely took charge of wedding tasks that needed to be done, believed in me when I hit low points, and gave me so many hugs. It is fortunate that during my graduate study of human mating psychology, I found my ideal long-term mate.

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<https://doi.org/10.1098/rspb.2021.1115>

Walter, K. V., Conroy-Beam, D., Buss, D. M., Asao, K., Sorokowska, A., Sorokowski, P., ... Zupančič, M. (2020). Sex Differences in Mate Preferences Across 45 Countries: A Large-Scale Replication. *Psychological Science*, 31(4), 408–423.
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Abstract

Testing Assumptions About Human Mating Psychology:

Dealbreakers and Mate Preferences

by

Kathryn V. Walter

Assumptions about human mating psychology can range from a lay person's entertaining intuitions to ideas that are taken for granted by mating researchers but that, upon closer examination, rest on precarious theoretical and empirical foundations. Dealbreakers and short-term mate preferences are two topics that most people feel like they understand, but the research investigating these topics is limited to a handful of studies, leaving some important questions untested. Here, my aim is to offer some clarity about dealbreakers and mate preferences through the precision of computational models and the power of a large, cross-cultural dataset.

In chapter one I ask two questions. First, what are dealbreakers? And second, how do dealbreakers influence attraction and mate choice? I use an evolutionary perspective to generate hypotheses about how dealbreakers might be used by the mind. I propose that dealbreakers can either be disqualifiers or preferences. By disqualifiers, I mean traits that cause us to eliminate people as potential mates. By preferences, I mean traits that influence how attractive we find a potential mate. I use agent-based modeling, a method where computer simulated agents serve as avatars for real life participants and interact in a simulated mating market, to test between these two possibilities. Here, I found evidence that many of the traits we consider to be dealbreakers, such as smoking status, height, and religion, are not used by the mind as disqualifiers, rather they act like preferences and are integrated into overall

assessments of mate value. A person's sex, on the other hand, acts like a disqualifier. If a person is not our preferred sex, we do not consider them to be a potential mate.

In chapter two I examine patterns of short-term mate preferences in over 50,000 participants from 56 countries around the world. I test whether men and women have different short-term preferences, and if short-term preferences vary across countries due to disease prevalence, gender equality levels, and sex ratio. Additionally, I examine patterns of long-term mate preferences, to see if previous findings replicate. Overall, I found that both men and women, on average, prefer short-term sexual partners who are kind, healthy, and attractive, but women had higher ideal preferences for short-term mates than men did. There was one exception to that pattern—both men and women preferred the same level of physical attractiveness in a short-term mate, on average.

In chapter three I explore whether short-term mate preferences and long-term mate preferences are different from each other, indicating distinct short-term and long-term mating strategies. I used the same cross-cultural data from chapter two and a machine learning technique to explore whether individuals have different short-term and long-term mate preferences. I found that there are differences between short-term and long-term preferences, on average. Physical attractiveness preferences are higher, while kindness and resources preferences are lower, for short-term mates compared to long-term mates. However, I found that most participants (59-80%) preferred the same type of ideal mate for short-term and long-term relationships. Overall, this dissertation helps to bolster the theoretical and empirical foundations of dealbreakers and mate preferences research.

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Introduction

Intuitions About Human Mating Psychology

One of my favorite parts about studying human mating psychology is that everyone I talk to has some sort of opinion about the topics I research. Recently, at a party, a man told me about his dating experiences in Australia, where he lived for six-months. So many women were interested in him that he created an automated system to keep track of the women he was meeting and going on dates with. He credited his newfound dating success to the fact that Australian women found American accents very attractive.

As another example, on reality dating shows, people, typically women, often refer to catching “the ick” — a sudden, strong repulsed feeling about a potential mate or person they

are dating. While people have created a term for this phenomenon, people do not necessarily know why these disgusted feelings arise, and come up with explanations, such as, “he was wearing a two-in-one hoodie and leather jacket” after the fact.

Intuitions about our human mating psychology are entertaining and abundant. However, the past six years of training to be a psychologist have taught me to be very skeptical about these intuitions, and instead pursue other avenues to find explanations for human mating thoughts and behaviors. In particular, I use evolutionary principles to develop hypotheses, and then computational models and large cross-cultural datasets to test these hypotheses. This dissertation contains each of these elements— evolutionary psychological theory, computer simulations, and survey data from around the world — to answer a few questions about our feelings of attraction and repulsion towards certain potential mates.

For the lay reader, I want to explain some background about the theoretical approach and methods I use to do psychological research. I use an evolutionary perspective to help develop hypotheses about our psychology. Our brains, like our bodies, are the result of millions of years of evolution. We come from an unbroken chain of ancestors who were able to survive, find a mate, and reproduce. Thanks to them, our minds contain a mating psychology that helps us recognize potential mates, determine who we find attractive, choose romantic and sexual partners, and maintain, or end, mating relationships. These actions require psychological mechanisms that take pertinent information from the environment, process that information, and produce behavior. The “process that information” step can be a number of things: the mind can manipulate the information, store it in memory, compare it to previous mental models, inform other parts of the system, instruct motor neurons etc. (Cosmides & Tooby, 1987). My job as a psychologist is to uncover exactly what these psychological mechanisms are doing.

Additionally, as an evolutionary psychologist, I consider potential psychological mechanisms that would have likely led to individuals being better able to survive and reproduce than others in ancestral environments (Tooby & Cosmides, 1990).

To come up with hypotheses, I consider ancestral environments and potential mating mechanisms that would have solved problems our ancestors faced. One such problem is determining who, from among the people in one's community, should be considered as a potential mate. Some of the people we spend the most time with and are closest to us—our parents, our siblings, our in-laws, our best friends—we do not consider potential mates. This is easy for us, such that we do not really think about it, but how does the mind know this? What information is the mind getting from the environment and how is the mind processing that information to produce disgusting thoughts when even imagining this set of people as potential mates? I became interested in this question when thinking about what we mean when we talk about dealbreakers. Dealbreakers, like “the ick” I mentioned at the beginning of this introduction, are intuitive. We seem to have some level of understanding that they influence our mating behavior. However, we lack precise knowledge of the psychological mechanisms that produce feelings and actions that lead us away from certain people as potential mates.

Therefore, in chapter one, I ask two questions. First, what are dealbreakers? And second, how do dealbreakers influence attraction and mate choice? I begin by using an evolutionary perspective to outline theory and generate hypotheses about how dealbreakers might be used by the mind in the mating process. Then I use agent-based modeling, a method where computer simulated agents serve as avatars for real life participants and interact in a simulated mating market. This method is useful in that it allows me to do many things that would be unethical and impossible for real life participants. In models, I can break up

relationships, change the information processing algorithms that agents use to make mating decisions, have agents form relationships, and repeat this process over and over again. This allows me to test how humans might be incorporating dealbreakers into mate choice. Furthermore, the explicitness of code allows me to have a precise understanding of what the psychological mechanisms are likely doing in the mind.

In chapters two and three I consider another problem our ancestors faced. We have limited time and energy to pursue mates, so we need to be able to determine the best potential mate or mates to invest in. One way we solve this problem is by feeling more attracted to some potential mates compared to others. We have a mate preference psychology which guides our feelings of desire. But what qualities does our mate preference psychology use to evaluate mates? I have spent a great deal of time in graduate school working on answering this question in terms of what we are attracted to in an ideal long-term romantic partner. I have also examined how our long-term mate preferences differ due to gender and cultural differences (Walter et al., 2020, 2021).

For this dissertation, I turned my attention to short-term mate preferences. In chapter two I examine patterns of short-term mate preferences in men and women in 56 countries around the world. I test whether men and women have different short-term preferences, and if short-term preferences vary across countries due to disease prevalence, gender equality levels, and sex ratio. I also examine patterns of long-term mate preferences as well, to see if my previous findings replicate.

In chapter three I ask another question: are short-term sexual mate preferences and long-term romantic mate preferences actually different from each other, indicating distinct short-term and long-term mating strategies? I use the same cross-cultural data from chapter

two and a machine learning technique to explore whether people have different short-term and long-term mate preferences and the implications this has for how we think about mating strategies.

Overall, this dissertation tests assumptions we have about dealbreakers and mate preferences. Rather than relying on intuition, I offer a theoretical and data driven approach to understanding these aspects of our mating psychology.

Chapter 1

Disqualifiers or Preferences? How humans incorporate dealbreakers into mate choice

In the 1980s, two biologists, Darryl Gwynne and David Rentz, were doing fieldwork in Western Australia. Walking along a dirt road, they noticed something strange. Among the beer bottles and cans tossed on the side of the road, one type of bottle was covered with many male jewel beetles. Upon closer inspection, they realized that the males were attempting to mate with these short bottles, referred to as “stubbies”. Like the female jewel beetle, these stubbies were larger than the male, flightless, an amber brown color, and had a small, dimpled texture along the bottom. According to Gwynne and Rentz (1983), the color and texture of the stubbies causes them to resemble the way light reflects off of a female jewel beetle’s fore wings, attracting the males to them. In addition, the shape and size of the bottle may have

additionally increased its resemblance to female jewel beetles. They noticed that empty wine bottles of a different shape and color nearby were ignored (Gwynne & Rentz, 1983).

This example illustrates a mating attempt gone wrong— it is a costly mistake on the male's part to devote its mating effort towards an object that will never produce offspring. Gwynne and Rentz suggested that the stubbies' resemblance to females, paired with the male's low parental investment, could explain the relatively indiscriminate mating pattern and risk-taking behavior of the males (Gwynne & Rentz, 1983).

However, indiscriminate may not be the best word to describe the male jewel beetles' behavior, as the wine bottles and other objects in the environment did not induce this mating behavior. Rather, the evolutionary novelty of the stubbies, and the fact that they activated the male's attraction and mating system, gives us clues as to what specific features allow objects to *qualify* as a mate for male jewel beetles. In other words, this phenomenon allows us to gain an understanding of the specific criteria, shaped over evolutionary history, that activates the mating system of male jewel beetles. Perhaps, to be perceived as a mate by a male jewel beetle, an object needs to reflect light of a particular color and pattern, to be rounded, stationary, and larger than the male. Alternatively, perhaps only a portion of these qualities need to be present for an object to be considered a mate.

How male jewel beetles determine what objects are potential mates falls under the research domain of "mate recognition". In biology, studying this process in sexually reproducing species is considered fundamental to understanding mating behavior (Mendelson & Shaw, 2012; Ryan & Rand, 1993). However, in humans, little attention has been directed towards the question: What criteria does the mind use to determine what in the environment counts as a potential mate?

The reason this question—who counts as a mate?—is important, is because it can help us orient the discussion and research questions around what are colloquially known as “dealbreakers.” Dealbreakers research has blossomed over the last decade (Boysen et al., 2019; Csajbók & Berkics, 2022; Joel & Charlot, 2022; Jonason et al., 2015). However, dealbreakers research lacks the theoretical foundation underlying mate preference research. Furthermore, current dealbreakers research is vague, relying on intuition and shared experience rather than computational precision. For example, dealbreakers are defined as “unfavorable characteristics” or “traits people avoid in potential mates”(Jonason et al., 2015, 2020). While these definitions seem reasonable, they provide very little information about how exactly dealbreakers are different from mate preferences or how dealbreakers fit in the overall mating process.

Current research pieces together existing theories (e.g. prospect theory (Kahneman & Tversky, 1979), error management theory (Haselton & Buss, 2000), sexual strategies theory (Buss & Schmitt, 1993)) as well as findings about individual differences in mate preferences to explain dealbreaker findings, rather than taking a ground-up theoretical approach. The result is a literature that talks a lot about dealbreaker “factors”, as well as sex differences and individual differences in dealbreakers (Csajbók et al., 2023; Csajbók & Berkics, 2022; Jonason et al., 2020), but leaves basic questions unanswered. First, precisely what are dealbreakers? Second, are dealbreakers distinct from preferences? Third, how do people incorporate dealbreaker information into mate choice?

Here, I offer preliminary answers to these questions. In the first section, I use an evolutionary psychological perspective to do a task analysis in order to develop theory and hypotheses about how dealbreaker information might be perceived and used by the mind

(Cosmides & Tooby, 1994). Next, I present the results of a series of empirical studies testing some of my initial hypotheses.

Evolutionary Task Analysis

An Adaptive Problem: What Qualifies as a Mate?

From an evolutionary perspective, living things are vehicles built to enable and promote the replication of genes (Dawkins, 1976). Those genes that replicate more relative to other genes increase in frequency and spread throughout the environment while others decrease in frequency and can be eliminated from the gene pool. For humans, a sexually reproducing species, gene replication requires the challenging task of finding a mate. However, not all things in the environment are potential mates—in fact, the vast majority of objects and organisms that humans interact with are not mates.

Due to limitations on time, energy, and cognitive resources, it is physically impossible for the mind to consider every single thing in the environment as a potential mate (Gigerenzer & Selten, 2002). In addition, mating with some things is more likely to result in successful gene replication than others—as an obvious example, mating with a human is much more likely to lead to gene replication than mating with a tree. While the distinction between humans and plants as mates and non-mates is obvious to most (sober) humans, this distinction relies on evolved psychological mechanisms. Without these mechanisms a person could spend a lifetime calculating and comparing the sexual attractiveness of every blade of grass in their environment. However, that person would have less reproductive success than someone who directed their attraction system towards humans. Furthermore, a person who directed their mating system broadly towards humans would have less reproductive success than someone who directed their mating system more narrowly toward *adult* humans capable of reproduction.

Over time, the genes for carefully honed psychological mechanisms responsible for parsing the environment into mates and non-mates and directing the attraction system towards viable mates would be selected for and become a part of our mind's universal evolved architecture.

How does the mind know where to direct its mating psychology? First, our senses enable us to perceive the environment and parse the environment into distinct objects. A large repertoire of mechanisms enables us to do so (e.g. vision system, auditory system), but I will not discuss them here. Once the mind can parse the environment into distinct objects it then needs to further differentiate these objects by category. The reason categorization is crucial is because it allows an individual to make inferences quickly about novel objects. For example, if a person needed to evaluate every individual wolf it encountered to understand its properties, then they would likely not survive for as long as someone who was able to learn about wolves and their features once, and then apply that conceptual knowledge to all future objects with similar properties. The process of categorization, therefore, allows the mind to extract specific information from entities in the environment and activate the appropriate motivational systems (Tooby et al., 2005). For instance, recognizing an object as a predator will activate different psychological systems than recognizing an object as food (Barrett, 2015).

The mind divides objects present in the environment into categories that would have been useful throughout evolutionary history (Delton & Sell, 2014). This process is complex because categories often overlap and vary in specificity: objects could be classified broadly as animate or inanimate, but also classified more specifically as animals, humans, kin, parents, etc. One way to cut through this broad categorization space is to use evolutionary theory. That is, to think about evolved concepts— mental representations of various kinds of objects we would have encountered throughout evolutionary history (Markman, 1989; Tooby et al., 2005).

For example, we have a predator concept, which allows us to categorize and recognize predators as different from other objects present in the environment. This allows us to respond to a predator—and not respond to other non-predator objects, like rocks—in ways that would have led to relative reproductive success in ancestral conditions (e.g. flee, freeze, scream) depending on context (Barrett, 2015; Delton & Sell, 2014; Marks, 1987). Overall, this categorization process allows the mind to extract information about the properties of objects encountered in the environment and activate appropriate motivational systems.

For the task of mate recognition, the mind needs to figure out which things in its environment are mates and which are not. One way this could work is for the mind to have a mate concept: a mental representation of the category “mate”. This concept would have some set of viable mate criteria to which different types of objects can be compared and evaluated. Based on this evaluation the mind then needs to be able to tag or label certain objects as potential mates.

However, there is another problem the mind must solve—there are more than just the two categories: “mates” and “all other objects” in the mating process problem space. The mind also needs to identify certain objects as “non-mates” because “all other objects” are not all the same. A “non-mate” category is necessary because human mating is dyadic, and therefore objects—humans—ignored by a person’s mating system could still identify and pursue that person as a mate. Mating actions taken by others that are not considered potential mates, and directed towards a person, may inflict costs on that person. For example, if someone’s sibling pursued them as a mate, that sibling may limit the person’s mate choice through mate guarding and coercion, cause the person to incur reputational costs, and inflict direct fitness costs (e.g. through inbreeding Charlesworth & Charlesworth, 1999). Simply not recognizing this sibling

as a mate would not help a person to avoid their advances, necessitating a reaction like sexual disgust (Tybur et al., 2013). In order for the mind to know what types of objects might potentially inflict these costs, they also need to be recognized and labeled as a distinct category: “non-mates”.

Together, mate and non-mate tags provide necessary information to activate appropriate motivational systems such as attraction or disgust, while objects with no tags do not activate mating related motivational systems (Figure 2). Only once the mind has solved these problems and recognized potential mates distinct from non-mates and all other objects, is the mind then able to evaluate potential mates, choose mates, and engage in relationships with these mates.

The mate recognition system introduced above is broad, encompassing every object in a human’s environment. However, here we focus more narrowly on how the mate recognition system evaluates humans as potential long-term romantic partners and how this process relates to dealbreakers. From an evolutionary perspective, mating with some people will lead to more reproductive success than mating with other people. In fact, mating with most of the people we interact with regularly could lead to disastrous fitness consequences. Therefore, the mind may use a potential mate concept in order to check whether a person meets specific qualifications. Examining the evolved function of both the mate tag and the non-mate tag can help make more specific predictions about the criteria used by the mind to determine a mate or non-mate tag.

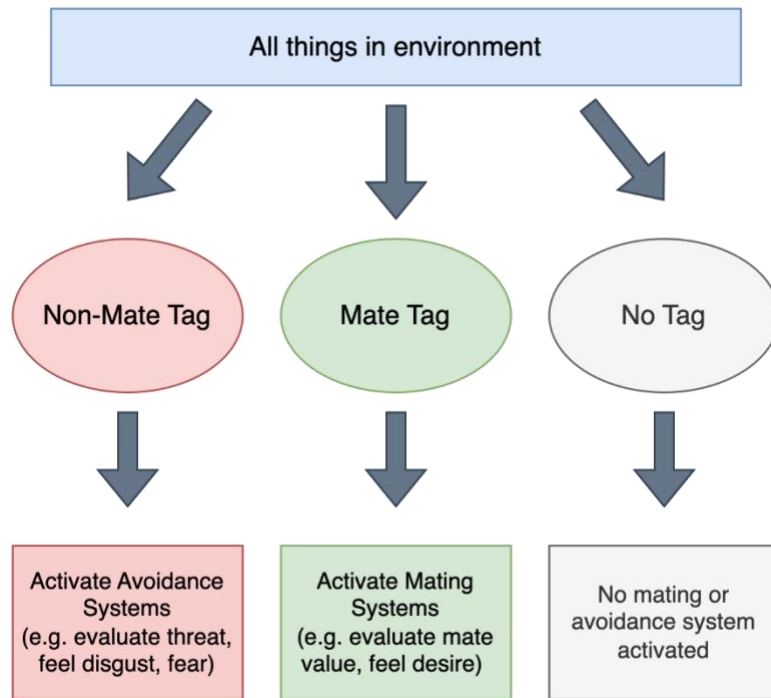


Figure 2. Broad level view of how the mate recognition system could work.

Mate Tag. The function of the mate tag is to route the attraction evaluation system towards viable long-term mate options. Viable here, means mates with qualities that will lead the person who mates with them to have relatively high fitness outcomes. At an initial recognition stage, much information about a potential mate is unknown, such as their intelligence and kindness. In order for a person to learn about these traits some amount of time and energy must be spent getting to know the potential mate. Yet, we do not indiscriminately approach every single person around us to determine their mate quality via these less obvious dimensions. However, if a target has a mate tag, then the mind can activate motivational systems that lead a person to gather more information about that target pertaining to various dimensions of mate value.

Non-Mate Tag. The function of the non-mate tag is to activate various motivational systems in order to prevent potential costs (reproductive, reputation, physical, support) that can

be inflicted by the mating actions of another person, or by one's own mating actions. The costs that can be inflicted by a non-mate or by one's own mating actions vary across domains:

1. *Reproductive costs* can be incurred through lowered fitness of offspring either by inbreeding depression (e.g. mating with a close family member), or by mating with someone of low genetic quality (e.g. mating with someone who is unattractive or diseased).
2. *Reputational costs* can be incurred by mating with someone with a mate value that is much lower than one's own mate value and thus artificially lowering one's own perceived mate value on the mating market. Additionally, reputational costs can be incurred by mating with someone who is morally problematic according to local norms (e.g. a cousin or a friend's mate).
3. *Physical costs* can be incurred by sustaining injuries from coercion, a lack of physical autonomy through the monopolization of time and energy, the restriction of enacting one's own mate choice, and the threat of catching a disease.
4. *Support costs* can be incurred through threat of or actual withdrawn cooperation and/or assistance (in the case of a family member, friend, colleague, boss).

Each of these types of situations may activate different motivational systems. Because of the different types of problems to be solved by tagging someone as a “non-mate”, there may be multiple types of non-mate tags. For instance, there may be a non-mate, low-threat tag for identifying people that would be costly to mate with, but pose a low risk of inflicting physical costs (e.g. children, extremely elderly). In that case, the appropriate motivational system activated by romantically considering this type of non-mate (e.g. a child) may be disgust. Alternatively, a non-mate, high-threat tag might identify non-mates that would pose a high risk

of inflicting costs (e.g. if they are formidable). The appropriate motivational system activated by the romantic actions of this type of non-mate may be fear.

Here, my goal was to sketch out a broad theory of how the mate recognition system might work, but to only focus on an initial test of one part of the theory. For researchers interested in avoidance, disgust, and fear, I wanted to provide some initial hypotheses about non-mate tags. However, the current research primarily focuses on mate tags.

Mate Recognition Criteria

What criteria could be used to determine that someone is a potential mate? A few categories are likely important: the sex of the person, the genetic relatedness of the person, and the age of the person. These categories (sex, relatedness, age) have clear fitness consequences, given that spending energy mating with people that are opposite sex, fertile, and not closely genetically related would have resulted in better direct reproductive success over evolutionary history, than achieved by those who spent their energy pursuing individuals that did not meet those criteria.

However, there could be other categories that are incorporated as criteria for recognizing potential mates as well, such as a person's physical attractiveness, group membership, or formidability. Alternatively, these qualities may be used to determine a person's overall mate value *after* they have already been recognized and tagged as a potential mate. There are two separate tasks to consider here: (1) who is a potential mate? (2) how does this potential mate compare to my other potential mate options? The first task is about mate recognition, the second task is about mate value calculation. "Dealbreakers," thus far have been discussed in the literature both ways: as qualities that eliminate people from romantic

consideration, as well as qualities that reduce a person's overall mate value. Teasing these two tasks apart helps to clarify the role of dealbreakers in the overall mating process.

Dealbreakers, Disqualifiers, and Preferences

What would it mean for a quality to be a “dealbreakers”? Are dealbreakers *disqualifiers*: qualities that eliminate people from qualifying as a potential mate? Or are they *preferences*: qualities that are compared to ideal preferences and used to calculate a potential mate's overall mate value¹ (Figure 3). Disqualifiers are criteria that help determine whether a person will receive a mate tag. Preferences help evaluators determine how attracted they should feel towards a potential mate. What qualities are used by the mind as disqualifiers and what qualities are used by the mind as preferences is an open question.

I have suggested some categories that might comprise the mind's potential mate template (e.g. sex, relatedness, age), and therefore could be used as disqualifiers. However, it is possible that only one, some, or none of these criteria is important for mate recognition. For instance, the mind could just use sex and relatedness information to decide whether someone is a potential mate, and then incorporate information about age as a preference when evaluating relative attraction to potentials. Additionally, there may be other categories that the mind uses to recognize a potential mate.

¹ For an answer to "what is a mate preference?" see (Conroy-Beam et al., 2022)

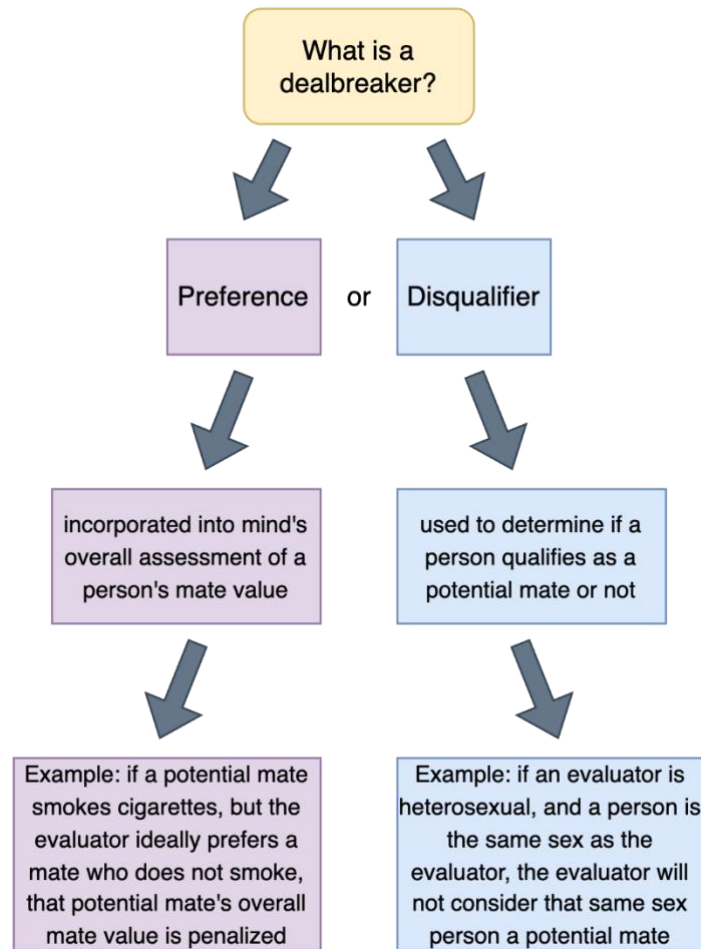


Figure 3. Two potential ways to conceptualize dealbreakers and how the mind uses them in the mating process.

Individual and Group Differences. Mate and non-mate tagging as well as motivational system responses will likely be calibrated to individual and sex specific differences. For instance, women, more than men, may find more people to be potential physical threats, due to women's, on average, smaller height and weight. Reproductive costs are also greater for women than men, due to women's longer minimum parental investment. Women may therefore have more narrow criteria than men for tagging someone as a mate.

Tag Updating. Some of the information likely needed to assign a mate or non-mate tag can be inferred very quickly. Information like sex, age, attractiveness, and formidability can be inferred by just looking at someone (Sell et al., 2009). However, other information, such

as information pertaining to mate quality via dimensions like intelligence, or information about potential reputational or support costs, might be discovered after an initial tag has already been assigned (Miller & Todd, 1998). For example, an evaluator might consider a person a potential mate but, upon discovering that the person is already in a relationship with the evaluator's friend, might update the mate tag to a non-mate tag and adjust behaviors accordingly (e.g. reduce flirtation). This is similar to what is colloquially described as "discovering a dealbreaker." Alternatively, an evaluator might consider a person a non-mate, but then discover that the person is a famous actor, and might update the non-mate tag to a mate tag and adjust behaviors towards the person (e.g. increase flirtation). What is unknown is whether this process is part of adjusting a person's mate value up or down as information is discovered (the way preferences work), or whether these discoveries result in inclusion or elimination of a person as a potential mate (disqualification).

Additionally, there may be some non-mate tags that are relatively permanent. That is, regardless of new information, the non-mate tag remains. This would be expected in the case of a non-mate that is a close relative or a particular sex (depending on one's sexual orientation). Even if a person of the non-preferred sex is discovered to be a multimillionaire, the non-mate tag would remain. An open question is which qualities act like preferences (can be compensated for by new information) and which act like disqualifiers (cannot be compensated for by new information)?

Expanding the Long-Term Mating Process

As discussed above, to pursue, evaluate, select, and keep a mate, the mind needs to first determine who is a potential mate. Additionally, due to the dyadic nature of mating in humans, the mind also needs to determine who not to pursue, as well as who may inflict costs in a

mating context. The mate recognition system is a solution to these adaptive problems and allows for the activation of other motivational systems, such as evaluation and avoidance, as well as down-stream mating processes like choice and retention (Figure 4). The addition of mate recognition to the long-term mating process also allows us to begin to examine where and how dealbreakers are incorporated into mating.

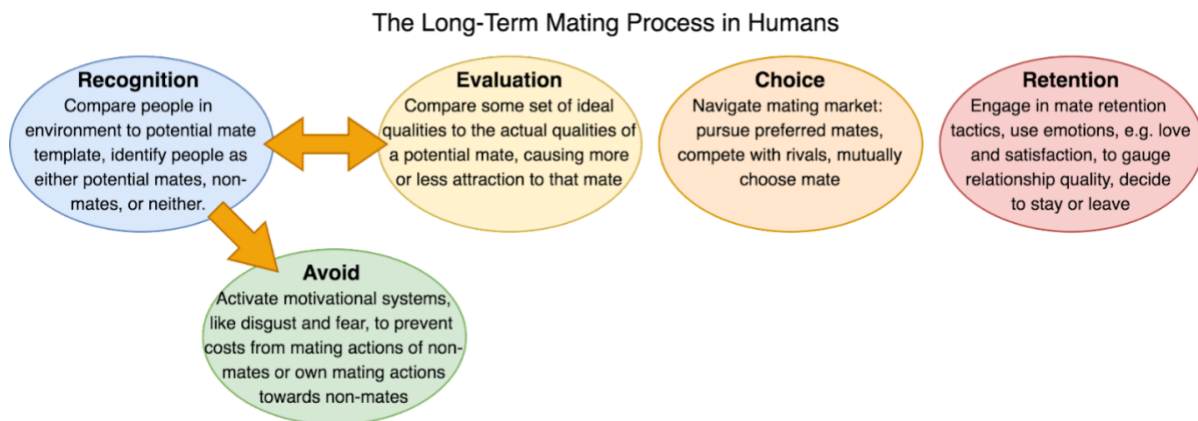


Figure 4. An overview of the long-term mating process in humans and where mate recognition is predicted to fit into the process. A mate tag will activate the attraction evaluation system in order to gather more information pertaining to various dimensions of mate value. Recognition is connected to evaluation by a double-headed arrow to show how information learned in the evaluation stage can change a mate tag to a non-mate tag. A non-mate tag will activate various avoidance systems in mating-related contexts. A non-mate tag can also change if the recognition system receives new information that the person is a viable mate.

Current Studies

The theory outlined above leads to many research questions and hypotheses. Here, however, we focus on the following questions: (1) what are dealbreakers— disqualifiers or preferences? And (2) how are dealbreakers incorporated into mate choice? To answer these questions, we first collected open-ended data from participants about qualities that they consider dealbreakers. We used these qualities to create a questionnaire to ask two different samples of couples about their dealbreakers as well as their current traits. We used this information to create agent-based models using the data from these real-life couples. In the

models we used a method called “couple simulation” to recreate the mate recognition, attractiveness calculations, and mate choice processes that these individuals may have used in their real life mate choice (Conroy-Beam, 2021). Because we were interested in dealbreakers, here we compared two different model types, each of which represented hypotheses for how dealbreakers might be incorporated into mate choice: (1) as preferences, or (2) as disqualifiers. This allowed us to determine which dealbreakers are likely used by the mind to recognize potential mates and which are used to evaluate the relative attractiveness of potential mates.

Determining Dealbreaker Traits

Part of the answer to the question, “what is a dealbreaker?” is to determine what traits people consider to be dealbreakers. Others have done work on this topic already, finding that in long-term relationships people avoid mates that have anger issues, are dismissive of their interests, have poor hygiene, are uncaring, smell bad, etc. (Jonason et al., 2015). While this previous work has been helpful in identifying the range of what people think dealbreaker traits are, here we were especially interested in characteristics that might be used to *disqualify* potential romantic partners. In our thinking, traits like “has anger issues” could be considered the lower end of a continuous kindness scale, and preference for a kind mate has already been well established in the literature (Buss, 1989; Walter et al., 2020). Therefore, some of the traits people identify as dealbreakers are likely already accounted for via a person’s preference psychology. Here, we wanted to examine dealbreakers that might be distinct from preference psychology. We wanted to know the characteristics a person could have that would cause them to not even be considered as a romantic partner—a narrower approach to examining dealbreakers.

Furthermore, prior research is ambiguous as to *when* dealbreakers are incorporated into the mating process. Because earlier nominations of dealbreakers have not considered the sequential process of attraction and choice, previously proposed dealbreakers range from things that could be immediately known (e.g. smelling bad) to things that could take a while to know about someone (e.g. has anger issues). Here, we wanted to see if there were traits that served to narrow the pool of considered mate options before attraction was even activated (e.g. used by the mate recognition system to identify someone as a “mate”). Therefore, we wanted to examine potential dealbreakers that could be evaluated and incorporated early in the mating process as disqualifiers: traits that influence who people consider potential partners. While we had a list of characteristics, derived theoretically, that we thought could be potential disqualifiers (e.g. sex, age, genetic relatedness), we also wanted to ask people for other candidate dealbreakers that were used by the mind as disqualifiers.

Study 1A Methods and Results

We collected act nominations from $n = 641$ participants through Amazon’s Mechanical Turk, $n = 363$ of which filled out the dealbreaker act nomination portion of the survey. Participants were given the following instructions:

“We are interested in who people consider or don’t consider as a romantic partner. Here we want to know about things that make you **rule someone out** as a possible long-term romantic partner. These could include physical, psychological, or social characteristics. For example, aspects of a person’s behavior (ex: bad manners), beliefs and values (ex: opposing political party), background (ex: lower education level), personality (ex: moody), or appearance (ex: too tall). Please write down as many things as you can think of that would

keep you from seriously dating a person. Please be as specific as possible. There are no right or wrong answers.”

Participants were given ten short answer spaces to nominate potential dealbreakers. All of these nominations were placed in a list and exact duplicates were eliminated. That left a total of $N=1731$ uniquely nominated dealbreakers. This list was then Q-sorted into categories separately by three of the authors.

We then came together to discuss the categories and to come up with a list of dealbreakers that met the following criteria: (a) can be discovered early in the mating process, (b) are relatively objective, and (c) could be asked about on a survey. We used these criteria because, first, we were interested in the early stages of mating process and interested in dealbreakers that were used by the mind as disqualifiers. In particular, we were interested in traits a person could discover before they became highly invested in a relationship with that person. Second, due to our methodology, we needed traits that could be assessed by both a person, their mate, and others in the mating pool in the same way. For example, if I am 5’6”, all people can agree on that fact. However, for a trait such as “apathetic towards interests”, if my partner thinks I’m dismissive of their interests, I might think that I am invested in their interests, and someone else might think I am somewhat invested in their interests. While these other more target specific dealbreakers are likely important to consider in attraction and mate choice, we were interested in examining qualities that could be assessed mostly objectively by all people. Lastly, because we were collecting data online, we needed items that could be measured well using a survey. This eliminated nominated dealbreakers like “smelling bad”, because we could not precisely measure something like a person’s scent.

After our discussion and use of our criteria to cull the nominated list, we compiled an initial list of candidate dealbreakers. The initial list contained the following items: politics, age, smoking status, height, race, religion, education, weight, hair color, eye color, kids from a previous relationship, tattoos, employment status, social class, sexual orientation, and sex.

Study 1B Methods and Results

Next, we took our initial list and asked a new set of participants, $n = 484$ Mechanical Turk workers, about the importance of these potential dealbreakers. We gave them the following instructions: “Please consider each factor and rate **how important** it is to you when determining whether to eliminate someone as a possible romantic partner.” Participants rated the importance of each factor from 1-11 (extremely unimportant factor to extremely important factor). Overall, sex and sexual orientation were considered most important, while hair color, eye color, and tattoos were considered least important (Figure 5).

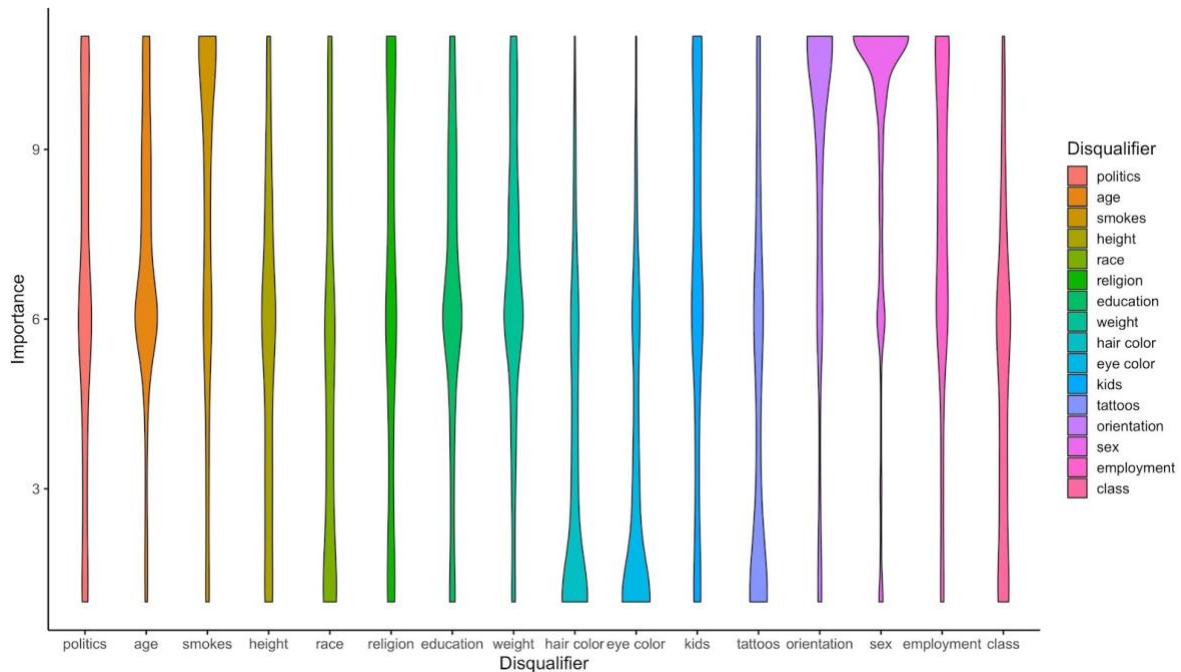


Figure 5. Violin plots of importance ratings of proposed disqualifiers. Wider areas mean more participants rated the disqualifier at that importance value. Each disqualifier is shown in a different color to help with readability.

We used these results to pare down the final dealbreaker list to include the following: sex, age, race, social class, religious affiliation, smoking status, weight, height, kids from prior relationships, education, and political orientation. We eliminated hair color, eye color, and tattoos because they were not considered important by participants.

We also eliminated employment status because we planned to use the list to examine established couples and their past mate choice of each other. Their employment status was particularly likely to be different than it was when couples first chose each other. We also eliminated sexual orientation because we planned to collect data from only heterosexual couples.

Next, we used this final dealbreaker list to create a questionnaire and ask existing couples about their dealbreakers as well as their own corresponding traits. We created agent-based models using the data from these couples, each simulated agent had the dealbreakers and traits of a human participant and was placed in a simulated mating market to choose a mate. We used the couple simulation method to attempt to recreate the mate recognition, attractiveness calculation, and mate choice processes that participants had made in real life. Here, our goal was to determine how these dealbreakers were incorporated into mate choice, as disqualifiers or as preferences.

Proof of Concept Models

To know that the couple simulation method can be used to determine whether dealbreaker traits are incorporated into mate choice as disqualifiers or preferences, I first needed to establish that couple simulation can distinguish between these types of models in principle. The couple simulation method has been used successfully to compare models of mate choice as well as preference integration models (Conroy-Beam, 2021; Conroy-Beam et

al., 2022). However, couple simulation has not yet been used to compare different ways of incorporating dealbreaker traits into the mate choice process. Therefore, I created and tested proof of concept models to establish that couple simulation could be used in this way.

The proof-of-concept models were built in the following way: 1) I created large, simulated populations of agents 2) these agents chose one another as mates using one of the algorithms that I wanted to test 3) I took a sample of couples from this large, simulated population, and 4) I ran couple simulation using all of the algorithms we wanted to test. I know that couple simulation works if the algorithm that performs best at pairing true couples from the original population is the algorithm that the original population used to make their mate choices.

If the proof-of-concept models work, then I know that couple simulation can identify which algorithm is the “true” model of mate choice processes— it will be the model version that more accurately recreates original couples. When applying couple simulation to real human samples, I can compare the couple simulation accuracies of different versions of the models. Whichever version has the higher accuracy is closest to the mate choice process that people used to make their mate choices in real life.

Proof of Concept Model Set Up

Generating the Agent Population

I used the data structure of the sample from Study 2 to generate a large, simulated population of agents. I sampled randomly with replacement from the human data to generate 50,000 agents, each with preferences, traits, and dealbreakers for sex and race. Due to the homogeneity of the mostly white sample, I stratified agent generation by subgroups (white males, nonwhite males, white females, nonwhite females) so that we had proportions of

different race agents that matched the proportion of different race participants in our sample but did not have only one participant representing each race. After generating the agents, I adjusted the simulated agent's preferences and traits so that the preferences and traits of each agent were correlated like those of the human sample. To do so, I used Cholesky decomposition to impose the real data's covariance matrix on the simulated traits and preferences at the subgroup level. This allowed me to have a large, simulated population of randomly generated agents that had preferences and traits that matched correlation patterns found in real human data.

Once the agents were generated, I then separated them into 100 random subgroups of 500 agents each. Each subgroup was 50% male and 50% female. I separated agents into these smaller groups of 500 to simulate the size of real human social networks, as humans do not know all the humans in their entire population. I created copies of the original population, to create a total of five identical populations. I then had agents in each population select each other as mates according to that population's specified decision algorithm. I created five different populations, each representing different ways disqualifier traits could be incorporated into the mate choice process (Table 1).

The mate choice process is complex, with many steps. For instance, people must evaluate potential mates on many dimensions and incorporate all of that information to determine how attracted to the potential mates they are. Then people must decide whom to choose out of their many potential options. Couple simulation has been used to investigate these other parts of the mate choice process. This prior work has found evidence that people evaluate the attractiveness of potential mates by calculating the Euclidean distance between their own ideal preferences and the actual traits of potential romantic partners in

multidimensional space (Conroy-Beam et al., 2022). Prior work has also found evidence that people choose between potential partners through an iterated mutual investment process based on these initial attractiveness values: the resource allocation model (Conroy-Beam, 2021).

Baseline Model. The baseline model does not incorporate any candidate dealbreaker traits. However, it does include other steps in the process of mate choice that have been previously studied using couple simulation. Agents have 16 preferences and 16 traits that have been found to be important in determining attraction (Conroy-Beam et al., 2022). These include qualities like kindness, intelligence, health, etc. Agents use their preferences and the traits of other agents to evaluate the overall attractiveness or mate value of every agent. They do so by calculating the Euclidean distance between their own ideal preferences and the actual traits of potential romantic partners in multidimensional space. Agents then use these mate values to proportionally invest in other agents they find attractive. Agents then update their investment based on how much mutual investment they receive. Eventually agents with the highest investments in each other form pairs. This mutual investment and choice process is called the resource allocation model (Conroy-Beam, 2021). We then examine the percentage of original couples that were accurately paired.

In the proof-of-concept models, I examined two potential dealbreaker traits: sex and race. I chose these two traits to test our methodology because they represented different ways we asked participants about dealbreakers. For sex, participants were heterosexual so participants who were same sex would not pass a participant's dealbreaker. For race, participants could belong to multiple categories simultaneously. Participants who said they were in one or more race categories that participants indicated would be unacceptable in a long-term partner were considered to not pass a participant's dealbreaker. This dealbreaker

information was incorporated into the models in two different ways: as disqualifiers or as preferences.

In the dealbreaker models, I held every part of the mating process constant, except for the way agents incorporated information about dealbreaker traits. In the models, as in the baseline model, initial mate value is always based on the distance between the agent's ideal preferences and the potential mate's traits. Additionally, as in the baseline model, agents always choose their mates using the resource allocation model.

Dealbreakers as Disqualifiers. Conceptually, disqualifiers eliminate a person from consideration as a potential mate. In the models this is operationalized as making a person's mate value zero. If a potential mate has a mate value of zero from the perspective of an agent, then that agent will not invest in that potential mate. Here, when I incorporate sex as a disqualifier for heterosexual agents, if a potential mate is the opposite sex, they "pass" an agent's disqualifiers. The potential mate's mate value stays exactly the same. However, if a potential mate is the same sex as the agent, they do not pass the agent's disqualifiers and their mate value is zeroed out.

Dealbreakers as Preferences. Conceptually, preferences help us evaluate the relative attractiveness of a potential mate. In our model this process is operationalized as calculating the Euclidean distance between an agent's ideal preferences and a potential mate's traits across multiple dimensions (Conroy-Beam et al., 2022). To incorporate dealbreakers as preferences, the dealbreaker trait is added as an additional preference dimension in the mate value calculation. For example, sex becomes a preference dimension to be incorporated into attraction calculations. For heterosexual agents, if a potential mate is the opposite sex, that potential mate is considered to exactly match the agents' preferences (essentially considered a

10/10 on that dimension). However, if a potential mate is the same sex as an agent, that potential mate is penalized by 2 (and considered an 8/10) on that dimension. We decided to only penalize by 2 because we calculated that 1.97 is the average distance between a person's preference and a potential mate's actual trait in the population. What this means is that other positive qualities can compensate for dealbreakers – it does not lead to a person's complete elimination as a mate, just a mate value penalty.

Table 1

Proof-of-concept model algorithm versions

Algorithm Version	Attraction Calculation (MV)	Disqualifiers
1. Baseline	$\sqrt{\sum(ideals - traits)^2}$	None
2. Sex as a Preference	$\sqrt{\sum(ideals - traits)^2 + \begin{cases} sex == sexpref, 0 \\ sex \neq sexpref, 2^2 \end{cases}}$	None
3. Sex as a Disqualifier	$\sqrt{\sum(ideals - traits)^2}$	$\begin{cases} fail\ sex\ check, MV * 0 \\ pass\ sex\ check, MV * 1 \end{cases}$
4. Race as a Preference	$\sqrt{\sum(ideals - traits)^2 + \begin{cases} race == racepref, 0 \\ race \neq racepref, 2^2 \end{cases}}$	None
5. Race as a Disqualifier	$\sqrt{\sum(ideals - traits)^2}$	$\begin{cases} fail\ race\ check, MV * 0 \\ pass\ race\ check, MV * 1 \end{cases}$

Note: MV means Mate Value.

Proof of Concept Model Iterations. The original sample of couples lacked racial diversity, with only a small percentage of participants (11.8%) being non-white. Because of this lack of diversity, I was unable to distinguish between incorporating race as a disqualifier vs. a preference when using the same racial distribution as the sample. Therefore, I created a version of the proof-of-concept models where white and non-white agents were equally represented in the generated agent population.

An implication of this finding is that couple simulation cannot tell us whether dealbreaker traits are used in mate choice as disqualifiers or preferences if the sample lacks enough heterogeneity in that trait. This is a limitation of the method, but the method works well if the sample is sufficiently diverse.

At the end of the agent-generation phase of the proof-of-concept models I had five populations of couples. Each population of couples had chosen each other by using one of the algorithms specified in Table 1.

Testing Couple Simulation

I tested to see if couple simulation can be used to identify the “true” decision processes that agents had used to make their mate choices. I did so by sampling from one population of couples, running each algorithm version and comparing accuracies. Couple simulation worked if the algorithm that reproduced the most couples was the “true” algorithm the population originally used to make their decisions. I repeated this process 100 times for each population.

Here, I was interested in specifically whether we could use couple simulation to distinguish between dealbreaker traits incorporated as disqualifiers and dealbreaker traits incorporated as preferences. Therefore, I compared the accuracies of model versions 2 vs. 3, and model versions 4 vs. 5 (specified in Table 1).

Model Results

I found that couple simulation was able to identify whether dealbreakers traits were incorporated into mate choice as a preference or as a disqualifier (Figure 7). When the underlying model for the population was race incorporated as a disqualifier and we sampled from that population and ran couple simulation, we were able to recreate original couples more accurately when we ran the model version that incorporated race as a disqualifier, compared

to when race was incorporated as a preference. This same pattern emerged when the underlying model for the population was sex incorporated as a disqualifier. This demonstrates that couple simulation has the power to detect if dealbreakers are incorporated into mate choice as disqualifiers.

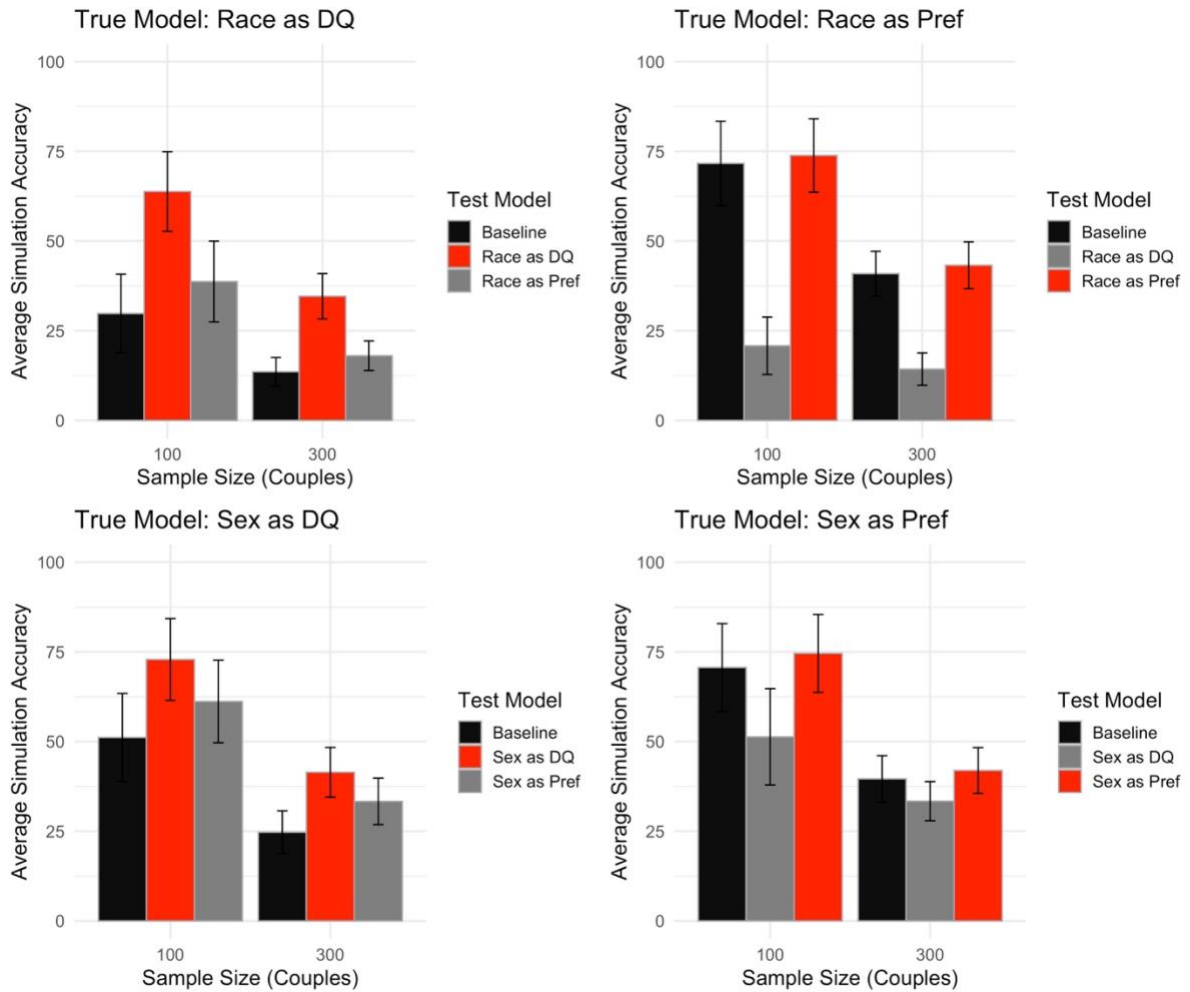


Figure 7. Barplots showing the model accuracy with 95% confidence intervals for the proof-of-concept models across sample sizes. Each plot represents a population that selected mates using a different underlying, “true” algorithm. The “true” model accuracy is shown in red.

The patterns when sex and race were incorporated into mate choice as preferences are slightly less clear. While both emerged as the most accurate overall in the models where they were the underlying algorithm of their population, they are not that much more accurate than the baseline version of the model.

To examine the proof-of-concept model results more closely, I created confusion matrices which show how often the true model outperformed alternative models in couple simulation accuracy (Figure 8). Overall, results show that the true model outperforms alternatives most of the time, and this pattern gets stronger as sample size increases. This pattern matches the pattern shown in other couple simulation proof-of-concept models from prior research (Conroy-Beam et al., 2022). Therefore, couple simulation has more power to identify the underlying true model of the mate choice process in larger samples.

Additionally, if we look at the results comparing dealbreakers incorporated as disqualifiers to those incorporated as preferences, we can see that couple simulation can differentiate between those two versions of the model.



Figure 8. Confusion matrices for the proof-of-concept models using samples drawn from the more racially heterogeneous simulated population. A dark green diagonal of ones would show that couple simulation is able to perfectly detect the true model of dealbreakers. Importantly, we show that with a large enough sample size, couple simulation can differentiate between dealbreaker traits incorporated as preferences vs. disqualifiers. With a large enough sample size, couple simulation can also identify the true model, though distinction between some versions of the model is more challenging.

Discussion

Overall, the proof-of-concept models indicate that the couple simulation method can be used to distinguish whether dealbreaker traits are incorporated into the mate choice process as disqualifiers or preferences. However, there are some limitations to the couple simulation

method. First, couple simulation is less precise in identifying the true model for small sample sizes. Second, if the sample lacks variation in a certain dealbreaker trait, couple simulation is not able to distinguish between different versions of the model. These limitations are important to keep in mind when interpreting results using the couple simulation method. However, I have also shown with these proof-of-concept models that despite these constraints, couple simulation is a useful tool for comparing different potential ways that dealbreakers could be incorporated into mate choice.

Study 2

Now that I have established that couple simulation can be used to evaluate which dealbreaker traits were incorporated into the mating process as disqualifiers, and which were incorporated as preferences, I then implemented couple simulation to examine the role of dealbreakers in the mating process using data collected from real-life long-term couples.

Methods

Participants

Participants were heterosexual long-term romantic couples collected using Qualtrics survey panel service. The target sample size was $k = 500$ dyads, with the criteria that participants be heterosexual, live in the United States, be in a romantic relationship, and cohabitate with their romantic partner. A total of $n = 738$ dyads completed a portion of the survey, but $n = 212$ were eliminated from the final sample due to failing at least one of two attention checks. Additionally, $n = 4$ were eliminated for not being heterosexual. This resulted in a final sample size of $n = 522$ (1044 total participants). The average relationship length was $M = 27.83$ years, a median length $Mdn = 27$ years, with a range of 1-64 years. Participants had an average age of $M = 56.89$, a median age of $Mdn = 59$ and ranged from 21-89 years old.

Most participants were married ($n = 977$, 93.58%). The number of married individuals is an odd number because three members of different couples opted to write in a relationship description, rather than select “married” (while their partner selected “married”). However, these three participants left their relationship status blank. A small portion of the sample was engaged ($n = 34$, 3.26%), and dating ($n = 14$, 1.34%). Some participants chose to write in a relationship description ($n = 19$, 1.82%). These descriptions included, “Living together”, “committed relationship”, “partner”, “domestic partner”, “divorced but together”, “been together 15 years not married” and “cohabitation” or was left blank.

Most participants were white ($n = 920$, 88.12%), some were Asian ($n = 55$, 5.27%), some were Latino ($n = 28$, 2.69%), some were black ($n = 24$, 2.30%), a few were Native American ($n = 4$, 0.38%), some were mixed race ($n = 9$, 0.86%), and a few declined to say ($n = 4$, 0.38%).

Materials

We asked participants about their dealbreakers, their mate preferences, their corresponding traits, and the corresponding traits of their romantic partner. Dealbreakers were asked about in the following way: for example, to ask about smoking as a dealbreaker, the question was “Which of the following **cigarette smoking habits** would be **acceptable** to you in a potential romantic partner? Please select as many or as few options as are applicable for you.” Participants then could check off: “rarely smokes”, “regularly smokes”, and “doesn’t smoke”. The dealbreaker traits we asked about in this way were: race, class, politics, education, weight, religion, smoking status, kids from a prior relationship, and height.

Because our participants were heterosexual, we assumed that they considered people of the opposite sex acceptable mates and those of the same sex unacceptable mates. For the

age dealbreaker, we used information from another part of the survey about each participant's maximum acceptable age for a romantic partner and minimum acceptable age for a romantic partner to infer their dealbreaker range. We assumed that they found people between their minimum and maximum age range to be acceptable mates and those outside of that range to be unacceptable mates.

Participants also indicated their corresponding traits for each of these dealbreakers (for instance, they reported their own education level, their own height, etc.). For race, participants, were able to select multiple options. For other traits (e.g. religion, politics), they could only select one option to describe themselves.

For preferences, we used the MPQ, a mate preference questionnaire which has 31 items assessing 15 dimensions of ideal preferences on an 11-point Likert scale (two items for each dimension: kindness, physical attractiveness, status, affectionateness, ambition, artistic ability, disposition, health, humor, intelligence, parenting, religiosity, resources, sexiness, family support) as well as one item assessing age preference on an 11-point Likert scale. This measure was created and validated previously (Conroy-Beam et al., 2022). Participants rated themselves and their romantic partners on these same items using the same scale, except for age which was self-reported in years. The measures used in this study can be found in the appendix.

Procedure

Participants filled out the survey online. Each member of a couple was instructed to take their portion of the survey on their own, in private. One member of the couple filled out their portion of survey completely, then the second member of the couple filled out their portion of the survey completely. Participants were asked survey questions in a somewhat

random order. First, participants were asked demographic questions, including their own traits that corresponded to the dealbreakers we were testing. Then, they were asked three blocks of questions: their ideal preferences, their own traits, and their partner's traits. These blocks were presented in a random order, with items randomized within each block. Next participants filled out some measures for other studies, including relationship satisfaction, and different ways of asking about preferences, including minimum and maximum thresholds. Then they filled out their dealbreakers. They were then asked other relationship and preference questions that were used for other research projects not discussed here.

Data Processing and Analyses

Each participant's ideal preferences were calculated by averaging the two items for each of the 15 preference dimensions. Each participant's own traits were calculated by taking the average of their own ratings of themselves on each dimension (2 items for each dimension) as well as their romantic partner's ratings of the participant's traits (2 items for each dimension). This created a composite measure of each participant's own traits on the 15 ideal preference dimensions. We did this to get a more accurate measure of each participant's traits, not just relying on self-report, but also on their partner's perception of their traits. Participant's reported height and age were changed in format to match the height and age dealbreaker question format. Some participants said they preferred not to disclose their race ($n = 4$) and these participants were able to automatically pass everyone's dealbreakers. Some participants said they preferred not to disclose their religion ($n = 70$) and these participants were able to automatically pass everyone's dealbreakers.

The data from human participants were then used to create simulated agents. Each participant was represented by an agent who had their reported dealbreakers, preferences, and

traits. All agents were placed together in a mating pool. Each agent then calculated their attraction to every single other agent in the pool based on the Euclidean distance between their personal ideal preferences and every other agent's traits (Conroy-Beam & Buss, 2017).

We then created different versions of the models to test how our participants may have included the proposed eleven dealbreaker traits into mate choice, as well as a baseline model when no dealbreaker information was incorporated into the model. The output of our models was the percentage of couples that mutually chose their real-life mate in the simulation. A higher accuracy means that the model is closer to recreating the mate choice processes that participants used in real life. I compared the couple simulation accuracy of different models: a disqualifier model and a preference model for each of the 11 proposed dealbreaker traits. Overall, by comparing the simulation accuracy of the disqualifier version of the model and preference version of the model for each trait, we can determine if the mind incorporates that trait into mate choice as a disqualifier or a preference.

Results

The simulation accuracies for Study 2 are presented in Figure 8. Overall, most traits followed the same pattern in which the models that incorporated the dealbreaker trait as a preference tended to be more accurate than the models that incorporated the dealbreaker trait as a disqualifier. Paired permutation tests indicated that the difference between disqualifier and preference models was significant for height, smoking, age, class, politics, education, religion, weight, and prior kids (all $ps < .01$). The accuracies for race incorporated as preference compared to as a disqualifier were not significantly different ($p = .247$) from each other but were in the same direction as the other dealbreaker traits. As discussed in the proof-of-concept model section of this paper, couple simulation is unable to distinguish between the preference

and disqualifier versions of the model when there is a lack of racial diversity in the sample, which is the case in this sample.

In contrast to the other dealbreaker traits, when sex was incorporated into mate choice as a disqualifier it recreated couples with a higher accuracy than when sex was incorporated as a preference. A paired permutation test indicated that this difference was statistically significant, $p = .006$.

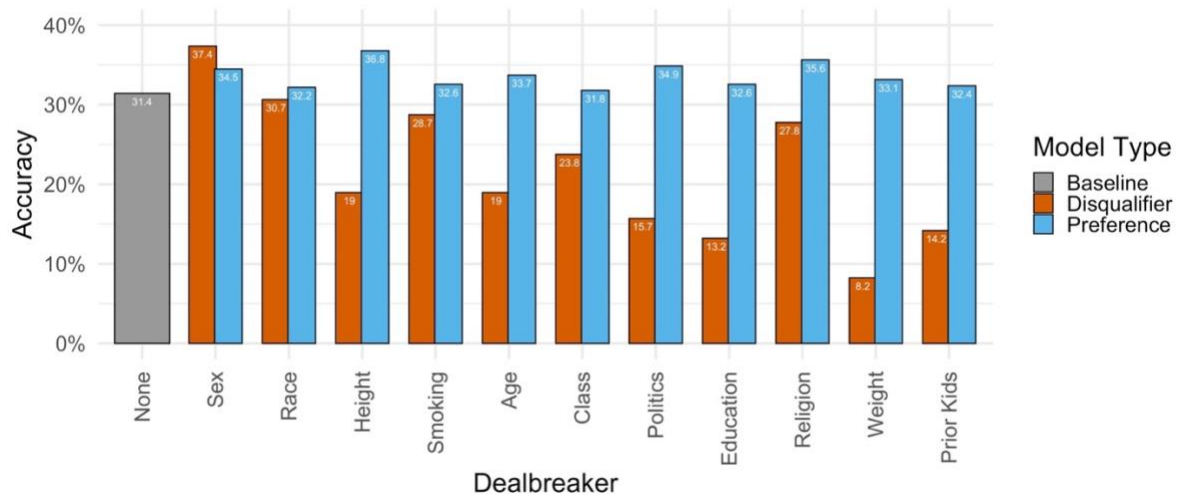


Figure 8. A bar plot showing the percent of couples accurately recreated by couple simulation. Each bar shows the results for a different type of model: preference or disqualifier, for each dealbreaker trait. The gray bar also shows the couple simulation accuracy of the baseline model when no dealbreaker traits are included.

Discussion

Overall, these results suggest that most traits that people colloquially tend to consider dealbreakers are incorporated into mate choice processes like preferences. That is, we use information about whether a potential mate meets our dealbreakers to adjust their overall mate value up or down. Like preferences, dealbreaker information helps us determine the relative attractiveness of our potential mates. In contrast, these results also suggest that a person's sex, which also could be considered a dealbreaker, is incorporated into the mind like a disqualifier.

That is, we use sex to determine whether a person should even be considered as a potential mate or not.

While this pattern of results is enlightening, this study did have a few limitations. One limitation is that the participants in this sample had been in relationships for a very long time. The couple simulation method uses information collected in the present to make inferences about mate choices that happened in the past. For many of our participants, decades have passed since they had made their mate choice using their dealbreakers and preferences. Their own preferences, dealbreakers and traits likely changed during this time (Gerlach et al., 2019). Therefore, we wanted to see if our pattern of results would replicate in a sample of participants in more nascent relationships.

Study 3

The purpose of Study 3 was to see if the results from Study 2 would replicate in a sample of participants in newer, less established relationships. We collected data from a sample of couples who had been in their romantic relationships with each other for less than five years. We also added an additional dealbreaker trait (political party), as well as changed the format and wording of some of our dealbreaker questions to make it more obvious that we were asking about dealbreakers.

Methods

Participants

Data was collected from $n = 295$ (590 total participants) heterosexual long-term romantic couples using Qualtrics Panel Service. To be eligible to participate in the study participants needed to be living in the United States and needed to have been in the relationship with their current partner for less than 5 years. Some participants, $n = 39$, did not fill out any

of the dealbreaker measures—these participants, as well as their partners, were eliminated from the sample.

The resulting sample size for this study was $n = 259$ dyads (518 total participants). The average relationship length was $M = 2.85$ years, $Mdn = 3$, with a range of 0-5 years. Participants had an average age of $M = 26.12$ years old, $Mdn = 26$, and ages ranged from 18-57 years old. Most participants described their relationship status as dating ($n = 326$, 62.93%), some were engaged ($n = 46$, 8.89%), and some were married ($n = 146$, 28.19%).

The sample for Study 3 was more racially diverse than the sample in Study 2. Most participants were white ($n = 278$, 53.67%), some were black ($n = 90$, 17.37%), some were Asian ($n = 64$, 12.36%), some were Latino ($n = 53$, 10.23%), a few were Native American ($n = 5$, 0.97%), some were middle eastern ($n = 3$, 0.58%), some were mixed race ($n = 23$, 4.44%), and a some declined to say ($n = 2$, 0.39%).

Materials

The materials used in Study 3 were largely the same as in Study 2. There were, however, some important changes. First, in Study 3, the wording of the dealbreaker questions was changed slightly. We changed “acceptable” to “unacceptable” in order to ask participants more directly about things they did not want. For example, we asked participants “which of the following cigarette smoking habits would be unacceptable to you in a potential romantic partner? Please select each option that would be unacceptable to you; you can select as many or as few options as you would like.” The hope was that this wording change would more closely mirror how participants thought about dealbreakers— as negative traits they did not want in a romantic partner. We also wanted to be sure that our finding that dealbreakers were incorporated into mate choice like preferences was not due to the way we worded the question.

However, this wording change appeared to cause confusion for participants in Study 3. In Study 2, on average, 14% of the time, participants' actual partners did not meet their dealbreakers. Due to the length of relationships in Study 2, we expected that some peoples' current partners would not meet their dealbreakers as people and preferences can change over time. However, in Study 3 participants' actual partners did not meet their dealbreakers 25% of the time, on average. This increase was surprising considering that these participants had only been in relationships for a short time, and our expectation was that in Study 3 this partner elimination percentage would drop, in comparison to Study 2. It is challenging to tell whether this increase in partners not meeting dealbreakers is due to confusion, difficulty with the wording of the question or lack of attention, or if it reflects a true pattern in younger participants and more nascent relationships.

A close look at the data reveals that participants often stated that only the trait their partner had was unacceptable. The frequency of this pattern leads us to believe that these participants thought they were indicating which trait was acceptable, rather than unacceptable. It is possible that participants thought this way because they spent a lot of time answering questions about their preferences and what they wanted in a partner earlier in the survey. However, we did give them an attention check and then another type of measure about relationship satisfaction prior to the question block about dealbreaker traits. We also bolded the word "unacceptable." However, participants may have been fatigued at this point in the survey or may have had trouble understanding the question— we cannot know for sure. Alternatively, as this was a younger sample of participants in newer relationships, participants may have discovered that these traits were dealbreakers for them after forming the relationship.

Additionally, partners may have engaged in deceptive tactics so that participants may be unaware of their partner's traits, such as their political views or smoking habits.

We had a few other minor changes to the survey from Study 2 to Study 3. We added an additional response option to the religion dealbreaker and trait questions: "spiritual, but not religious". Our hope was to reduce the number of participants who said they preferred not to answer. In Study 2, 76 participants (7.28%) said "prefer not to answer," and here in Study 3, 48 participants (9.27%) said "prefer not to answer." Given that the percentage increased a bit, it is possible that we are missing categories in our religion question. We also changed the format of our class dealbreaker question to closely match the MacArthur Scale of Subjective Social Status (Adler et al., 2000) as it is an established measure of social status.

We did not include age as a dealbreaker trait in this study as it is already included as an ideal preference. While age is a candidate disqualifier, the age distribution in this sample is relatively narrow (90% of participants were between the ages of 19 and 34), so this sample does not provide the range for a good test of age as a disqualifier. Lastly, we added an additional dealbreaker trait: political party affiliation. A strength of our dealbreaker questionnaire is that we can ask about categorical variables, so we wanted to try an additional way of asking about political views. All measures used in Study 3 can be found in the Appendix.

Procedure and Analyses

Data collection procedure was the same as in Study 2. There were some small changes in the measures included in the survey for other research projects not discussed here. Data processing and analyses were identical to Study 2.

Results

The simulation accuracies for Study 3 are presented in Figure 9. Overall, most traits followed the same pattern in which the models that incorporated the dealbreaker trait as a preference tended to be more accurate than those that incorporated the dealbreaker trait as a disqualifier. Paired permutation tests between disqualifier and preference models for each trait indicated that the difference was significant for race, height, smoking, class, politics, political party, education, religion, and weight (all p s < .05). The accuracies for prior kids incorporated as preference compared to as a disqualifier were not significantly different ($p = .499$) from each other but were in the same direction as the other dealbreaker traits.

Like in Study 2, when sex was incorporated into mate choice as a disqualifier it recreated couples with a higher accuracy than when sex was incorporated as a preference. However, in contrast to Study 2, a paired permutation test indicated that this difference was not statistically significant, $p = .746$.

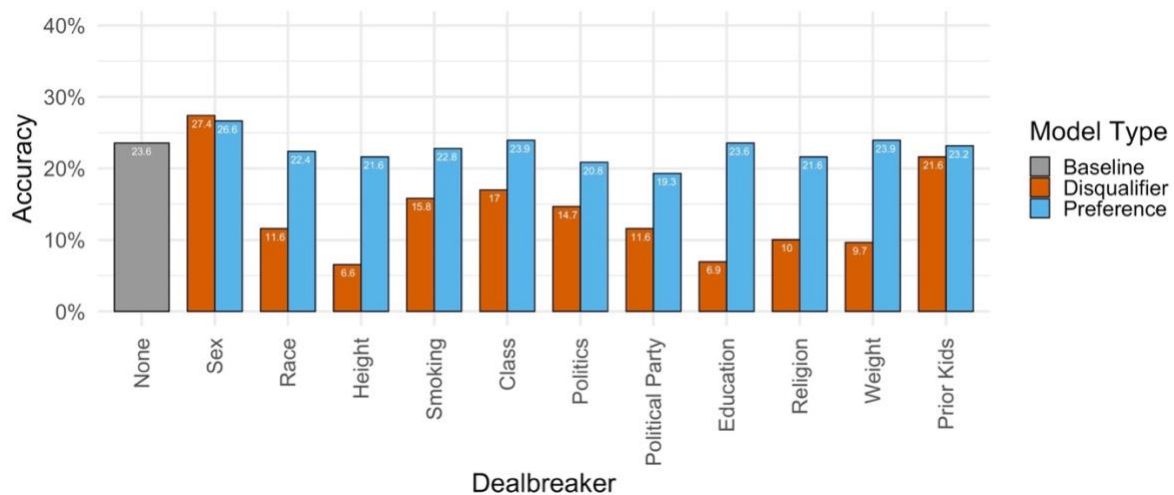


Figure 9. A bar plot showing the percent of couples accurately recreated by couple simulation. Each bar shows the results for a different type of model, preference or disqualifier, for each dealbreaker trait. The gray bar also shows the couple simulation accuracy of the baseline model when no dealbreaker traits were included in the model.

Discussion

Overall, the results of Study 3 replicate the patterns found in Study 2. When a dealbreaker trait was incorporated into the model like a preference, the model paired more real-life couples than when a dealbreaker trait was incorporated into the model like a disqualifier. These results again suggest that traits people tend to consider dealbreakers are used in the mate choice process like preferences. That is, we use information about whether a potential mate meets our dealbreakers or not to adjust their overall mate value up or down. Like preferences, most dealbreaker information seems to help us determine the relative attractiveness of our potential mates.

As in Study 2, the results of Study 3 also suggest that a person's sex is incorporated into the mate choice process like a disqualifier. That is, we use a person's sex to determine whether that person should be considered as a potential mate or not. However, the accuracy percentage when sex was incorporated as a disqualifier was not significantly higher than the accuracy percentage when sex was incorporated as a preference. Therefore, we must be somewhat cautious in interpreting this pattern. However, based on the patterns we found in the proof-of-concept models, we know that it is more challenging to distinguish between sex incorporated as a disqualifier and sex incorporated as a preference in smaller samples. This leads us to believe that the smaller sample size of Study 3 may be why we were not able to strongly distinguish between the two model versions for sex.

Another important difference between Study 2 and Study 3 is that overall couple simulation accuracy went down in Study 3. This is somewhat surprising because couple simulation accuracy tends to go up in smaller samples (Conroy-Beam, 2021). The most likely

explanation for this lower accuracy is due to the homogeneity of the sample, because of similarity in age based on the recruitment criteria (Conroy-Beam et al., 2022).

Furthermore, unlike in Study 2, the inclusion of dealbreakers into the mate choice process in Study 3 did not significantly improve couple simulation accuracy above baseline accuracy. That is, adding additional preference dimensions like education, politics, height etc., did not enable us to pair original couples with more accuracy than the 16 preference dimensions already included in the baseline model (e.g. kindness, intelligence, humor etc.). One potential explanation for this difference is the change in the dealbreaker question wording from Study 2 to Study 3 (changing “acceptable” to “unacceptable”). We believe this is responsible for the high proportion of participants (25%) who listed dealbreaker traits that their partners possessed as unacceptable. However, this also could reflect a true pattern in the population of couples in newer relationships. This pattern of responses likely led to lower mate value ratings for a person’s actual partner in the simulations, compared to the mate value of other more attractive options who passed their dealbreakers. This lower mate value would make them less likely to be matched with their original partner, leading to lower couple simulation accuracy when we included these dealbreaker dimensions.

It is also possible that some dealbreaker traits are either not important in mate choice or are already captured in other dimensions that are already included in the baseline model. The question of which dealbreakers do people actually use to evaluate their attraction to potential mates is an important one to answer but is not the focus of the current studies. Here, we were more interested in how dealbreakers were likely incorporated into the mating processes, as either disqualifiers or preferences. In both studies, we found evidence supporting the claim that most dealbreaker traits are likely incorporated as preferences in mate evaluation,

with the exception of sex, which we found was more likely incorporated as a disqualifier in mate recognition.

General Discussion

While mate preferences have been a popular research topic for decades, dealbreakers have only recently gained the attention of relationships researchers. Dealbreaker work thus far has led to some interesting insights about what traits are considered to be dealbreakers, as well as sex differences and individual differences in the dealbreakers people have, and how people report to use dealbreakers in mate choice (Apostolou & Eleftheriou, 2022; Boysen et al., 2019; Csajbók et al., 2023; Csajbók & Berkics, 2022; Joel & Charlot, 2022; Jonason et al., 2015, 2020, 2022). Current researcher reliance on only colloquial definitions and nominations of dealbreakers, coupled with the overall complexity of the mating process—with its many stages and shifting market dynamics—has led to confusion in terms of how dealbreakers fit in with the broader mate preference and mate choice literature. Therefore, here we developed a theoretical foundation for dealbreakers using evolutionary psychological principles (Cosmides & Tooby, 1994), and tested some initial hypotheses with precise, formalized models.

We proposed that there are multiple problems that the mind needs to solve in choosing a mate – one problem is recognizing a person as a potential mate, and another problem is determining the relative attractiveness of potential mates. Dealbreakers might be used by the mind in either of these ways. On the one hand, dealbreakers could be used to recognize mates as disqualifiers—traits used in an initial culling process so that a person does not waste time discovering more information about non-viable mates. On the other hand, dealbreakers might be used by the mind like ideal preferences — used to determine a potential mate’s overall mate value in comparison to other potential mates.

Here, we used data from real couples and agent-based models to test between these two possibilities for a dozen proposed dealbreaker traits. We found overall that we were able to simulate the mate choices that participants made in real life better when dealbreaker traits, like height, religion, kids from a prior relationship, and political views, were incorporated into mate choice like preferences, compared to when they were incorporated as disqualifiers. The only exception to this pattern was for a person's sex— we were able to recreate the mate choices participants made in real life better when sex was incorporated into mate choice as a disqualifier, compared to as a preference. Our participants were heterosexual, so we were able to recreate their mate choices more accurately when they did not even consider same sex mates. In sum, many of the traits that people consider to be dealbreakers are likely preferences in that they are used by the mind to determine the relative mate value of potential mates.

What this means is that if a potential mate does not pass a person's dealbreaker, for instance, a potential mate smokes cigarettes and the person considers this to be unacceptable for a long-term romantic partner, the smoker's mate value will go down by some amount, but the smoker will still be considered as a potential mate by that person. Additionally, if that smoker has other traits that closely match the person's other preferences more so than other options in the mate pool, the smoker can still be the highest mate value option.

These findings dovetail well with another study in the dealbreaker literature which examines the role of dealbreakers in mate choice using a clever “choose your own adventure” design (Joel & Charlot, 2022). Participants read a story about a new dating relationship and were able to choose, at various times, to stay or leave the new relationship based on the information they have learned about the other person. Overall, participants in this study tended to encounter at least two dealbreakers before choosing to end the relationship. In our study,

though employing a different method of studying mate choice, we found patterns consistent with finding that the presence of one dealbreaker was not grounds for complete rejection. Our findings also are consistent with another study which examined how the presence of both positive, “dealmaker” information, and the presence of negative, “dealbreaker” information, influenced overall interest in romantic partners (Jonason et al., 2020). The researchers found that both positive and negative information influenced participant’s levels of interest in romantic partners. These cumulative findings point to an understanding that the function of many dealbreakers, like the function of preferences, is to solve the problem of determining the relative attractiveness of potential romantic partners.

On the other hand, here we also found that there are dealbreakers that function to solve the problem of mate recognition, like sex. We predict that other traits like age (in the broad life-stage sense) and genetic relatedness may function as disqualifiers as well, but were unable to test those here. It is also possible that other dealbreakers that have been identified by researchers such as bad hygiene, mental health problems, ugliness, hostility etc. function as disqualifiers too (Csajbók et al., 2023; Jonason et al., 2015). However, based on the results of the current study, we would hypothesize that many of the dealbreakers that have been identified in the literature are essentially mate preferences.

While the current work provides theoretical foundations for thinking about dealbreakers as well as empirical tests of some proposed hypotheses, there are some important limitations to consider. First, we were only able to test a limited number of traits using our methodology, so other dealbreakers that have been identified were unable to be tested here. Future work, perhaps using another methodology, like speed dating paradigms, could examine the function of other proposed dealbreakers, like poor hygiene, ugliness, and smelling bad.

Additionally, in our models we kept all penalties for meeting or not meeting a dealbreaker the same across participants to limit the complexity of the models. However, it is possible that different people may have different penalties for a person meeting or not meeting a dealbreaker. Prior research has found that there were sex differences and individual differences in responses to dealbreakers (Jonason et al., 2020). Future versions of models could incorporate these differences and test if this added complexity allowed us to more accurately pair original couples.

Furthermore, here we focused on dealbreaker traits that could be determined early on in a relationship. However, there are dealbreakers that have been identified in other research, like if a person has anger issues or is apathetic, that may be discovered at later stages of courtship or cause a person to choose to dissolve an existing relationship. Future research could examine the role of dealbreakers in break ups. Based on the results of the current study, our hypothesis would be that when people in relationships discover that their partner does not pass one or more of their dealbreakers, they adjust their partner's mate value downward. This change would relate to other downstream relationship emotions like satisfaction and possibly lead to relationship dissolution (Conroy-Beam et al., 2016; Hromatko et al., 2015). Future research can examine how dealbreakers function in different relationship stages and whether they act similarly to or differently than ideal mate preferences.

The couple simulation methodology used in this study, though a powerful tool for uncovering mate choice processes, has some limitations. First, it attempts to recreate people's mate choices retrospectively— using their current preferences to infer about their past mate choices. While there is some evidence that mate preferences are stable across the lifespan (Bredow & Hames, 2019), there is also evidence that preferences can shift towards a person's

current partner (Gerlach et al., 2019). However, there is no research on how stable dealbreakers are across time. Here, since we found the same pattern in the way dealbreakers were incorporated into mate choice in very established relationships as well as in newer relationships, we feel confident that the results will replicate across a variety of relationship lengths. However, we do not know whether dealbreakers shift from before entering a relationship to after entering a relationship. These unknowns offer exciting directions for future research.

The current work also offers some insights into dealbreaker measurement. We found that dealbreakers are like preferences, but many dealbreakers are difficult to measure on a continuous dimension. For example, religion, political party, race, and smoking status are all categorical variables. Here, we offer a simple way to measure a person's dealbreakers, by asking them to check which options from a list are acceptable. We found that the opposite wording, which we tried in Study 3, asking participants to check which options are unacceptable from a list, was likely more challenging for participants to understand. This has implications for the measurement of dealbreakers in future studies, as we found that participants find affirmative questions easier. We also found a way to incorporate these dealbreakers as categorical preferences in mate choice – by adding each dealbreaker trait as an additional preference dimension and incorporating it into overall mate value calculations. Conceptualizing dealbreakers as categorical preferences can be helpful for including them in future studies.

The focus of the current research was to compare two different ways of incorporating dealbreakers, not to examine which traits led to improvements in couple simulation accuracy. However, the question of which traits are most important in determining mate choice is an

exciting direction for future work. People vary on many different dimensions, and we know from preference research that certain qualities are very important to most people in a romantic partner, like kindness, intelligence, and health (Buss, 1989; Walter et al., 2020). We also know that people are more likely to list certain dealbreakers, like disheveled appearance, laziness, and living too far away (Jonason et al., 2015). What remains unknown is what trait dimensions are most influential in making mate choices. Some of the dealbreakers incorporated in the current research led to higher couple simulation accuracy— like height, religion, and politics. This means that when we incorporated these dimensions, we were better able to recreate the mate choices participants made in real life. This suggests that people use dimensions like height, religion, and politics to make their mate choices. However, here we only added one dealbreaker at a time and it is possible that some dimensions provide overlapping information. For example, due to sex differences in height, a height dealbreaker might be picking up on the same variation between people as does sex, rather than adding any additional information to differentiate between potential mates. Future studies could use couple simulation to systematically add in preference and dealbreaker dimensions and see if each new dimension adds additional accuracy to the model. This would help determine which preference and dealbreaker dimensions people are using to make mate choices.

Furthermore, though we outlined many theoretically based predictions here about the mate recognition system, we were only able to test a small portion of these ideas. Here, we focused specifically on examining dealbreaker traits that might be used by the mate recognition system and how they fit into the mating process. However, we did not test our predictions of how the mate recognition system, and the recognition of various proposed types of “non-mates,” connect to avoidance systems like disgust and fear. Other work has already examined

some of these relationships. For instance, we have a kin recognition system which allows us to infer whether a person is related to us, and activates sexual disgust when thinking of a related person in mating contexts (Lieberman et al., 2007; Tybur et al., 2013). Future work could examine how exactly the mind determines that someone is a “non-mate” and what type of motivational systems are activated across various mating contexts. For example, does a potential mate that the pursuit of whom may violate a social norm and lead to reputational costs, like a close friend’s romantic partner, get disqualified as a potential mate, tagged as a non-mate, or have a lowered mate value? Or is that person evaluated just like other potential mates, but then people use the person’s relative mate value and the potential costs of pursuing them to decide how to act? Alternatively, does a person with a low relative mate value due to things like hygiene or looks get labeled as a non-mate and then activate sexual disgust in a mating context? Further theorizing and testing will be necessary to parse out how we recognize and evaluate potential mates and non-mates across contexts.

Overall, this work grounds dealbreaker research in evolutionary psychological theory, which allows mating researchers to consider the evolved function of dealbreakers in the long-term mating process and use that to guide future studies. Here, we were able to ask whether dealbreakers serve to narrow the potential mate pool by disqualifying costly mates, or whether they serve to help determine the relative attractiveness of potential mates. We found that certain characteristics like a person’s sex, serve to narrow the potential mate pool, but other characteristics like religion, height, race, and political party are incorporated into mate choice like preferences, adjusting a potential mate’s overall mate value up or down. Dealbreakers can be disqualifiers or preferences – but these results indicate that most of the dealbreakers we talk about in everyday life act like preferences. However, more research is needed to examine other

proposed dealbreakers and their role in romantic relationships. Here, we were able to explore how we recognize potential mates, how we incorporate categorical preferences into mate value evaluations, and overall, how dealbreakers fit into mate choice. This work indicates that research into dealbreakers is a promising topic in human mating psychology that can shed new light on unanswered questions in the long-term mating process.

Chapter 2

Patterns of long-term and short-term mate preferences across 56 countries

Research examining mate preferences across cultures has found universal patterns of preferences for long-term romantic partners (Buss, 1989; Kenrick & Keefe, 1992; Walter et al., 2020). In general, large-scale cross cultural mate preference research has found that most people around the world want a romantic partner who is kind, healthy and intelligent. Additionally, there are universal average sex differences in preferences for physical attractiveness, resources, and age. Specifically, men indicate they want romantic partners younger than themselves with higher levels of attractiveness than women do, and women indicate they want romantic partners older than themselves with higher levels of good financial prospects than men do. This pattern has been consistently found across cultures and is not

explained by other variables such as gender equality or pathogen prevalence (Walter et al., 2020).

Importantly, these universal patterns of mate preferences reflect predictions that follow from an evolutionary psychological perspective. Our long-term mate preferences correspond to challenges that our ancestors faced throughout human history. First, both men and women faced the challenge of finding a cooperative long-term mate, as human infants require extensive care and have a long childhood (Rosenberg, 2021). Finding a partner that was kind and understanding, intelligent and healthy (so they would be around to help) are important considerations for both men and women. By choosing a long-term partner with these characteristics, a person would be more likely to have children who survived to adulthood and had children of their own, than someone who chose someone who was uncooperative, unintelligent, and unhealthy. Over evolutionary time, our long-term mate preference psychology evolved to value traits that led to relative reproductive success.

However, there are some challenges that men and women face that are sex specific. Women, for example, face the unique challenge of nine months gestation, birth, followed by potentially years of breast-feeding. All of these processes require resources, like food, time, and support. Women, therefore, evolved a mate preference psychology that values characteristics that correspond to the ability to acquire and provide resources for themselves and their children— to a greater degree than men. In contrast, men face the unique challenge of finding partners that are able to reproduce. While men can reproduce throughout their adult lives, women’s reproductive years are limited to a narrower time period, ending with menopause. Men, therefore, evolved a mate preference psychology that values characteristics that correspond to fertility – youth and physical attractiveness— to a greater degree than

women. Studies of long-term mate preferences across cultures find universal patterns of preferences that support these predictions.

However, humans do not only engage in long-term mating strategies. Humans also engage in very short-term sexual relationships, like one-night stands, brief passionate relationships like flings, long-term sexual relationships, like friends with benefits, and concurrent mating relationships, like affairs. In the mating literature, these different types of mating have been categorized as either short-term mating or long-term mating (Buss & Schmitt, 1993). While not every relationship type fits neatly into these two categories, short-term and long-term mating have been useful categories for examining the different mating strategies used by humans.

Some evolutionary researchers have developed sexual strategies theory, which makes predictions about short-term mating psychology based on evolutionary psychological principles (Buss & Schmitt, 1993). A core premise of sexual strategies theory is that both women and men pursue short-term mating relationships for a variety of reasons. From an evolutionary perspective, short-term mating presents different challenges for men and women. For women, because of their large investment in any resulting offspring from a short-term sexual relationship, the cost to benefit ratio of short-term mating is higher compared to the cost to benefit ratio for men, and they are predicted to set higher standards for short-term mates (Li & Kenrick, 2006). Additionally, men are predicted to be more willing to engage in short-term mating than women. Many studies have found that men have lower time thresholds for engaging in sexual relationships, are more willing to have casual sex with a stranger, and have less restricted mating orientations, compared to women (Buss & Schmitt, 1993; Clark &

Hatfield, 1989; Schmitt, 2005). The universal sex difference in willingness to engage in short-term mating has been well-established and tested across cultures.

Sexual strategies theory also predicts that women may pursue a short-term sexual relationship to evaluate a man as a potential long-term mate, or to secure a man as a back-up mate, or to leave a current relationship for a better partner. What follows from these predictions is that a woman's short-term preferences may be very similar to her long-term mate preferences as these strategies ultimately are used to lead to a future long-term mate (Buss & Schmitt, 1993). Men, on the other hand, are predicted to prioritize the quantity of short-term mating partners, and therefore tend to lower their short-term mate preferences, compared to their long-term mate preferences, when a low-cost short-term mating opportunity arises (Buss & Schmitt, 2019). Part of the complexity of studying short-term mate preferences is that there are multiple reasons why an individual may be considering an ideal short-term sexual partner.

However, despite this complexity, one consistent pattern of short-term mate preferences has emerged across multiple studies. Both men and women tend to desire high levels of physical attractiveness in a short-term mate (Buunk et al., 2002; Fletcher et al., 2004; Li, 2007; Li et al., 2011; Li & Kenrick, 2006; P. Regan et al., 2000; P. C. Regan & Joshi, 2003), and this finding has been replicated multiple times across study designs and in a few different cultures. But men and women may prioritize physical attractiveness in short-term mates for different reasons. For women, a man's physical attractiveness can be an indicator of his overall genetic quality. Women indicate preferences for symmetrical and masculine male faces for short-term mates (Li & Kenrick, 2006). A symmetrical face can indicate low mutation load or the ability to avoid or fight off infections without scarring (Sugiyama, 2015). Masculine features like a wide jaw can be indicators of high levels testosterone, which can indicate

underlying health and genetic quality, as maintaining high levels of testosterone can have immunosuppressive effects (Roney et al., 2006). Men, on the other hand, are predicted to desire physically attractive short-term mates because attractiveness corresponds to women's fertility and reproductive health (Li & Kenrick, 2006). However, men too, may also value physical attractiveness in a short-term mate because it indicates genetic quality. It has also been argued that other traits, like intelligence, could be also be indicators of good genes, and therefore it is puzzling they are not valued as highly as attractiveness in short-term mating (Buss & Schmitt, 2019). However, one potential reason for this is that physical appearance and attractiveness can be immediately assessed in a very short period of time, while characteristics like intelligence, can require time and energy to discover.

Other findings, that both men and women prefer well-rounded short-term mates (Li & Kenrick, 2006), that women set higher standards for ideal short-term mates than men do (P. C. Regan, 1998b), and that some men and women also prefer the same qualities in a short-term mate as they do a long-term mate (Li & Kenrick, 2006; Vigil et al., 2006), have not been examined by more than one or two studies or research paradigms. Additionally, many of these studies rely on U.S. first year psychology student samples. Though these findings reflect hypotheses about short-term mate preferences derived from an evolutionary psychological perspective, there is insubstantial evidence to make broad claims about short-term mate preference psychology. The majority of mate preference research has focused on long-term mate preferences and universal patterns of long-term mate preferences across cultures have been established and replicated (Buss, 1989; Walter et al., 2020). However, cross-cultural patterns of short-term preferences remain a mystery.

The current study examines patterns of short-term mate preferences as well as long-term mate preferences, in a large, cross-cultural sample, with 50,010 participants in 56 countries. In the current study we examine gender differences in short-term and long-term mate preferences as well as potential sources of cross-cultural variation in preferences due to gender equality, pathogen prevalence and sex ratio. We also examine short-term and long-term preferences as a function of age and relationship status. Overall, the current research will be able to determine whether prior findings about short-term and long-term preferences replicate in a new large, cross-cultural sample. Additionally, we will be able to establish whether there are universal patterns in short-term mate preferences that reflect predictions derived from an evolutionary perspective.

Methods

Participants

Participants were recruited through an international collaboration led by researchers in Poland. Data were collected online in the summer of 2021 from participants around the world. A total of $n = 52,010$ (66.30% female) participants from 56 countries met the exclusion criteria and comprised the sample analyzed here (Table 1). Participants ranged in age from 18-90 years old ($M = 31.43$, $Mdn = 26$, $SD = 13.02$). Overall, $n = 25,295$, or 48.63% reported being in a committed relationship or married, $n = 26,694$, and 51.32% reported being single or dating.

Exclusion Criteria

Due to variation in sample sizes collected from each country, exclusion criteria were used to narrow the data set to only include countries with a large enough sample size to run the analyses in the current research and produce interpretable results. Minimum sample size per country was determined through a G*Power analysis for detecting a difference between two

independent groups with a Cohen's d of 0.27. This effect size was based on the effect size of the sex difference in mate preferences for physical attractiveness found in Walter et al. (2020), which was the smallest effect size found for sex differences in mate preferences that were predicted to be sex differentiated. The minimum sample size per country, based on the power analysis, was 217 participants.

Additionally, only participants who filled out and passed the attention check were included in the sample analyzed here. To simplify the cross-cultural interpretations of our results, we only included participants who were currently living in the country where they were raised. Furthermore, as this was an initial look at short-term mate preferences across cultures, we limited the sample to heterosexual participants who had a gender identity of male or female. Lastly, due to the difficulty of missing values in our planned analyses, we excluded participants who did not report their age, did not fill out one or more of the mate preference questions, as well as those participants who had impossible preference values, values outside of the scale measured, that were likely included due to a clerical error. This exclusion process left us with the final sample size reported here.

Table 1

Sample Size and Gender of Participants by Country

Country	Sample Size	% Women
Algeria	992	69.05%
Argentina	899	58.18%
Belgium	1769	56.47%
Bosnia and Herzegovina	305	79.02%
Brazil	916	56.77%
Canada	443	45.37%
Chile	1254	83.25%
Colombia	458	64.85%
Croatia	1405	77.08%
Czech Republic	583	73.93%
Denmark	232	79.31%

Dominican Republic	277	69.68%
Ecuador	1169	56.72%
Estonia	242	84.71%
Finland	385	78.96%
France	1222	73.24%
Georgia	377	77.98%
Ghana	217	5.07%
Greece	768	84.64%
Honduras	495	67.07%
Hungary	410	80.98%
India	449	37.86%
Ireland	245	75.92%
Israel	598	57.19%
Italy	3104	73.29%
Japan	1675	44.36%
Kazakhstan	413	71.91%
Kenya	267	43.45%
Lithuania	415	69.64%
Macedonia	908	63.22%
Malaysia	835	77.72%
Mexico	296	44.26%
Morocco	1852	50.65%
Netherlands	374	52.67%
New Zealand	256	52.34%
Nigeria	389	47.81%
Norway	877	81.76%
Philippines	1376	71.08%
Poland	3355	72.19%
Portugal	1147	65.39%
Romania	570	60.53%
Russia	2063	67.09%
Serbia	1146	71.29%
Slovakia	921	78.72%
Slovenia	865	85.43%
South Korea	778	53.60%
Switzerland	314	73.25%
Taiwan	341	51.03%
Thailand	226	42.04%
Tunisia	343	47.81%
Turkey	6278	69.85%
United Kingdom	279	64.87%
Ukraine	887	79.71%
Uruguay	296	79.39%
United States of America	2593	55.61%
Venezuela	461	56.62%

Measures

Long-term mate preferences

We modified and shortened the MPQ, a mate preference questionnaire which has 31 items assessing 16 dimensions of ideal preferences on an 11-point Likert scale (Conroy-Beam et al., 2022). We needed a shortened measure due to space limitations in our collaborative survey which included measures from other researchers for other projects. Here, we asked participants about their mate preferences for 6 trait dimensions: kindness, health, physical attractiveness, good financial prospects, strength of religious beliefs, and age category, using one item for each dimension. In the instructions, we defined an ideal long-term mate as an “ideal long-term (committed, romantic) partner”. As an example of the structure of the long-term preference questions, we asked participants, “How physically attractive should your ideal romantic partner be? (i.e. your most preferred value)?”

Participants were then able to choose a value from an 11-point Likert scale going from “extremely physically unattractive (Bottom 1 out of 100 people)” to “extremely physically attractive (Top 1 out of 100 people)”. Numerically, preference ratings ranged from 0-10. These preference measures can be found in the appendix. In this paper, we refer to preference for good financial prospects as preference for resources, and preference for strength of religious beliefs as preference for religiosity, to make the writing more succinct.

All participants rated themselves on these same six dimensions using the same 11-point scale, except for their own age which they reported in years. If participants had a romantic partner, they also rated their partner on the same six dimensions using the same 11-point scale, except for their partner’s age which they reported in years.

Short-term mate preferences

We asked about participant's ideal short-term preferences using the same questions as their ideal long-term preferences, but we modified the description of the ideal mate. In the instructions, we defined an ideal short-term mate as an "ideal short-term (uncommitted, sexual) partner". As an example of the structure of the short-term preference questions, we asked participants, "How physically attractive should your ideal sexual partner be? (i.e. your most preferred value)?" Participants were then able to choose a value from an 11-point Likert scale going from "extremely physically unattractive (Bottom 1 out of 100 people)" to "extremely physically attractive (Top 1 out of 100 people)".

Relative age

We asked participants about their short-term and long-term age preferences using the same question stems as the other preference dimensions. For example, we asked "how old should your ideal sexual partner be in years (i.e. your most preferred value)?" We also used an 11-point Likert scale, but with age categories as answer options, starting with "Under 20", then "21-26" then "27-32" etc., until "over 75". We then created two variables, short-term partner relative ideal age and long-term partner relative ideal age, first by changing each participant's age (originally in years) to the same 11-point category format, and then subtracting their age preference from their own age. This allowed us to examine whether a person wanted someone older, younger, or the same age as themselves. A relative age preference value of 0 means they prefer someone in the same age category as themselves, a value of -1 means someone in one category younger than themselves, a value of 1 means someone in one category older than themselves. Relative age preferences range from -10 to 10.

Relationship status

We asked participants about their relationship status and participants were able to select “single”, “dating”, “in a committed relationship”, or “married”. Since we were interested in comparing the mate preferences of single people vs. people in relationships, we created a variable called partner status. Participants who were “single” or “dating” were considered single, while participants who were “in a committed relationship” or “married” were considered partnered.

Pathogen prevalence

The two pathogen prevalence measures we used were (1) years of life lost to communicable diseases (Institute for Health Metrics and Evaluation, Global Burden of Disease, 2019a) as this type of measure was used previously to examine cross-cultural variation in preferences (DeBruine et al., 2010), and (2) estimated deaths resulting from infectious and parasitic diseases (Institute for Health Metrics and Evaluation, Global Burden of Disease, 2019b) as it was also used previously to examine cross-cultural variation in mate preferences (Walter et al., 2020). The two indices were highly correlated with each other ($r = .96$).

Gender equality

The three gender equality measures were (1) the Gender Development Index (GDI) (United Nations Development Programme, 2021a), (2) the Global Gender Gap Index (GGGI) (World Economic Forum, 2021) and (3) the Gender Inequality Index (GII) (United Nations Development Programme, 2021b). These measures were correlated with each other (GDI and GGGI, $r = 0.59$, GDI and GII, $r = 0.48$, GII and GGGI, $r = 0.50$). Gender equality indices consider different inputs. The GDI measures gender inequalities in female and male life expectancy at birth, inequalities in female and male years of schooling, and inequalities in

female and male estimated earned incomes. The GGGI measures gender inequalities in economic participation and opportunity, educational attainment, health and survival, and political empowerment. The GII measures the maternal mortality ratio (number of maternal deaths per 100,000 live births) and adolescent birth rate, gender inequalities in education levels, gender inequalities in parliament seats, and gender inequalities in labor force participation rates.

Sex ratio

The three measures of sex ratio were (1) adult sex ratio (World Population Prospects, 2021), (2) sex ratio ages 15-49 (World Population Prospects, 2021), and (3) sex ratio at birth (The World Bank, 2020). Sex ratio at birth was negatively correlated with the other two measures (adult sex ratio, $r = -0.42$, sex ratio ages 15-49, $r = -0.33$). Adult sex ratio and sex ratio ages 15-49 were highly correlated with each other ($r = 0.95$). We included these three measures of sex ratio because they have been used in prior work examining sex differences in mate preferences across cultures used these measures (Walter et al., 2021). Additionally, it remains unclear which sex ratio measure would be closest to the one that humans use to determine the abundance or scarcity of potential mates in their environments which is the conceptual variable of importance here.

Control variables

Control variables included gross domestic product per capita (GDP) (International Monetary Fund, 2022), latitude (Central Intelligence Agency, 2022), world region (continent), most common religion (Central Intelligence Agency, 2021), and income inequality (Gini index) (The World Bank, 2021a), gross national income (GNI) (The World Bank, 2021b), infant survival rate (United Nations, 2022a), life expectancy (United Nations, 2022b), and

percentage of population that is urban (The World Bank, 2021c). These controls were selected because they were used in previous cross-cultural work examining the relationship of preferences and gender equality, pathogen prevalence, and sex ratio (Walter et al., 2020, 2021). For all control variables we attempted to collect the publicly available data that were closest to 2021, which was the year we collected data from participants.

Analyses

Gender differences in mate preferences

Multilevel models were used to assess gender differences in mate preferences across cultures. Six multilevel models, one for each long-term mate preference trait (physical attractiveness, resources, kindness, health, religiousness, and relative age) assessed gender differences in long-term mate preferences. Six multilevel models assessed gender differences in short-term mate preferences for the same traits. In these models, the preference variable was the outcome variable, and the participant gender (male or female) was the predictor. Mate preference variables were standardized across countries prior to analyses to provide slope values comparable with Cohen's d .

Multivariate Analyses

The six long-term preference variables were used to calculate Mahalanobis D between men and women within each country. Additionally, the six short-term preference variables were also used to calculate D between men and women within each country. Bootstrapping was used to estimate 95% confidence intervals (CIs) around these D values for each country.

A Monte Carlo cross-validated logistic regression was used to assess the ability of short-term preferences to predict participant gender. Logistic regression models were trained in a random training set to predict participant gender using their short-term ideal preferences,

then these models were applied in a separate testing set to predict the gender of participants. Each fold of this cross-validation left out 10% of the data for testing. The relevant outcome variable was the percentage of participant genders correctly predicted by the model in the testing set. This process was repeated for 10,000 iterations, providing an estimate of out-of-sample predictive accuracy of short-term preferences, and estimated CIs. This entire process was repeated to assess the ability of long-term preferences to predict participant gender.

Preferences as a function of relationship status

Multilevel models were used to assess differences in mate preferences due to relationship status across cultures. Six multilevel models, one for each long-term mate preference trait (physical attractiveness, resources, kindness, health, religiousness, and relative age) assessed relationship status differences in short-term mate preferences. Six multilevel models assessed relationship differences in long-term mate preferences. In these models, the preference variable was the outcome variable, and the participant's relationship status (single or partnered) was the predictor. Mate preference variables were standardized across countries prior to analyses to provide slope values comparable with Cohen's *d*.

Potential sources of cross-cultural variation

Three potential sources of cross-cultural variation were examined: pathogen prevalence, gender equality, and sex ratio. We ran two versions of each model described below, one without control variables, and one with control variables. In the main text we report the results of the models with control variables, as these are the more conservative test. The results of the models without control variables can be found in the appendix.

The effect of pathogen prevalence on ideal short-term mate preferences was tested in series of multilevel models predicting short-term preferences from a nation-level pathogen

prevalence index described above. One multilevel model was fitted for each of the six short-term mate preference variables. Each model used the relevant ideal mate preference as the outcome variable and predicted this variable using the pathogen prevalence index. This process was repeated to assess the effect of pathogen prevalence on ideal long-term mate preferences.

The effect of gender equality on gender differences in short-term mate preferences was examined by fitting a series of multilevel models predicting ideal short-term mate preferences from gender and nation-level gender equality. Each model had one of the six short-term mate preferences as an outcome variable. These models used the interaction of participant gender and one measure of gender equality as the predictor variable. This process was repeated to assess the effect of gender equality on gender differences in long-term mate preferences.

Lastly, the effect of sex ratio on gender differences in short-term mate preferences was examined by fitting a series of multilevel models predicting ideal short-term mate preferences from gender and nation-level sex ratio. Each model had one of the six short-term mate preferences as an outcome variable. These models used the interaction of participant gender and one measure of sex ratio as the predictor variable. This process was repeated to assess the effect of sex ratio on gender differences in long-term mate preferences.

Sex Ratio and Relative Preferences

One issue with cross cultural comparisons is that people in different countries may differ in whether they have a high preference for a trait vs. a low preference for a trait, depending on the distribution of traits in their country. For instance, a person in one country might say they want an ideal long-term mate who is an 7/10 in attractiveness and that may be very high, compared to the average attractiveness level of long-term mates in their country. Another person in a different country may say they want an ideal long-term mate who is an

10/10 in attractiveness and that may be very high, compared to the average level attractiveness of long-term mates in their country. Therefore, it can be difficult to compare absolute preference levels across cultures. To account for this possibility, we created “relative preferences” (Walter et al., 2021). Relative preferences are calculated using the following formula:

$$\text{relative preference} = \frac{\text{participant preference} - \text{mean opposite gender trait in their country}}{\text{standard deviation of the opposite gender trait in their country}}$$

Relative preferences allow us to understand how demanding a preference value is in each country, which allows us to compare preferences across countries more precisely.

The effect of sex ratio on gender differences in relative short-term mate preferences was examined by fitting a series of multilevel models predicting ideal relative short-term mate preferences from gender and nation-level sex ratio. Each model had one of the five relative short-term mate preferences as an outcome variable (we did not include age preferences for these models). These models used the interaction of participant gender and one measure of sex ratio as the predictor variable. This process was repeated to assess the effect of sex ratio on gender differences in relative long-term mate preferences.

Results

Gender Differences in Mate Preferences

Long-term Preferences

Kindness. Across cultures, women reported preferences for kinder ideal long-term mates than men, on average, $b = 0.25$, $SE = 0.02$, $p < .001$ (Figure 1). Mate preferences were standardized across countries prior to analysis, so all b values can be interpreted as equivalent to Cohen’s d s. A positive b value indicates that women had a higher ideal preference than men did, on average. A negative b value indicates that men had a higher ideal preference than

women did, on average. The average for women was 7.80, 95% *CI*s = [7.78, 7.82], and the average for men was 7.32, 95% *CI*s = [7.29, 7.35]. The sex difference (*b*) ranged from -0.08 in Tunisia to 0.51 in Ghana.

Health. Women also reported preferences for healthier ideal long-term mates than men, on average, $b = 0.15$, $SE = 0.02$, $p < .001$. The average for women was 7.40, 95% *CI*s = [7.38, 7.42], and the average for men was 7.08, 95% *CI*s = [7.05, 7.10]. The sex difference (*b*) ranged from -0.29 in Tunisia to 0.45 in Malaysia.

Resources. Women also reported higher preferences for ideal long-term mates with good financial prospects compared to men, on average, $b = 0.43$, $SE = 0.03$, $p < .001$. The average for women was 6.59, 95% *CI*s = [6.58, 6.61], and the average for men was 5.89, 95% *CI*s = [5.86, 5.92]. The gender difference (*b*) ranged from -0.02 in Tunisia to 1.09 in Kazakhstan.

Religiosity. Women reported preferences for more religious ideal long-term mates than men did, on average, $b = 0.10$, $SE = 0.02$, $p < .001$. The average for women was 4.17, 95% *CI*s = [4.14, 4.20], and the average for men was 4.10, 95% *CI*s = [4.06, 4.14]. The gender difference (*b*) ranged from -0.13 in New Zealand to 0.34 in Honduras. It should be noted that the distribution of preferences for religion was bimodal, with one mode at 0, meaning “extremely weak religious belief” (10,121 participants), and another mode at 5, meaning “average religious belief” (15,243 participants). The religious preference distribution is unlike the distribution of the other preferences, which had negatively skewed distributions.

Attractiveness. Men reported a higher preference for a physically attractive ideal long-term mate than women, on average, $b = -0.13$, $SE = 0.02$, $p < .001$. The average for men was

6.76, 95% *CI*s = [6.73, 6.78], and the average for women was 6.53, 95% *CI*s = [6.51, 6.55]. The gender difference (*b*) ranged from -0.32 in Argentina to 0.09 in Malaysia.

In summary, across cultures, women preferred more of each characteristic—kindness, health, resources, religiousness— in an ideal long-term mate, on average, than did men. The only exception to this pattern was for physical attractiveness, where men reported preferences for more physically attractive long-term mates than did women. Overall, participants, on average, reported their highest long-term preferences for kindness, followed by health. Men then reported higher preferences for physical attractiveness, compared to resources, on average. Women reported the opposite pattern, higher preferences for resources, compared to physical attractiveness, on average. Both men and women reported lower ideal long-term preferences for religiosity, compared to other traits, on average.

Short-Term Preferences

Kindness. Across cultures, women reported preferences for kinder ideal short-term mates than men did, on average, $b = 0.34$, $SE = 0.02$, $p < .001$. The average for women was 7.46, 95% *CI*s = [7.44, 7.48], and the average for men was 6.79, 95% *CI*s = [6.76, 6.82]. The gender difference (*b*) ranged from -0.16 in Tunisia to 0.67 in Ghana.

Health. Women also reported preferences for healthier ideal short-term mates than men did, on average, $b = 0.20$, $SE = 0.02$, $p < .001$. The average for women was 7.51, 95% *CI*s = [7.49, 7.53], and the average for men was 7.06, 95% *CI*s = [7.03, 7.09]. The gender difference (*b*) ranged from -0.07 in Tunisia to 0.36 in Georgia.

Resources. Women reported higher preferences for ideal short-term mates with good financial prospects than men did, on average, $b = 0.42$, $SE = 0.03$, $p < .001$. The average for

women was 6.26, 95% *CI*s = [6.24, 6.28], and the average for men was 5.55, 95% *CI*s = [5.52, 5.58]. The gender difference (*b*) ranged from -0.03 in Tunisia to 0.87 in Russia.

Religiosity. Women reported preferences for more religious ideal short-term mates than men did, on average, $b = 0.09$, $SE = 0.02$, $p < .001$. The average for women was 3.85, 95% *CI*s = [3.82, 3.88], and the average for men was 3.79, 95% *CI*s = [3.74, 3.83]. The gender difference (*b*) ranged from -0.14 in New Zealand to 0.38 in Honduras. Like long-term preferences, the distribution of short-term preferences for religion was bimodal, with one mode at 0, meaning “extremely weak religious belief” (11,767 participants), and another mode at 5, meaning “average religious belief” (16,608 participants). This is unlike the distribution of the other preferences that had negatively skewed distributions.

Attractiveness. Across cultures, men and women did not significantly differ in their reported preferences for physical attractiveness in an ideal short-term mate. The average preference for men was 7.06, 95% *CI*s = [7.03, 7.09], and the average preference for women was 7.08, 95% *CI*s = [7.06, 7.10]. When looking at individual slopes by country, the gender difference (*b*) ranged from -0.20 in Algeria to 0.11 in Israel.

In summary, across cultures, women preferred more of each characteristic — kindness, health, resources, religiosity— in an ideal short-term mate on average, than did men. The only exception to this pattern was for physical attractiveness, where both men and women reported desiring equal levels of physical attractiveness in an ideal short-term mate. On average, women reported their highest short-term preferences for health, followed by kindness, then physical attractiveness, then resources. Men, on average, reported their highest short-term preferences equally for health and physical attractiveness, followed by kindness, then resources. Both men

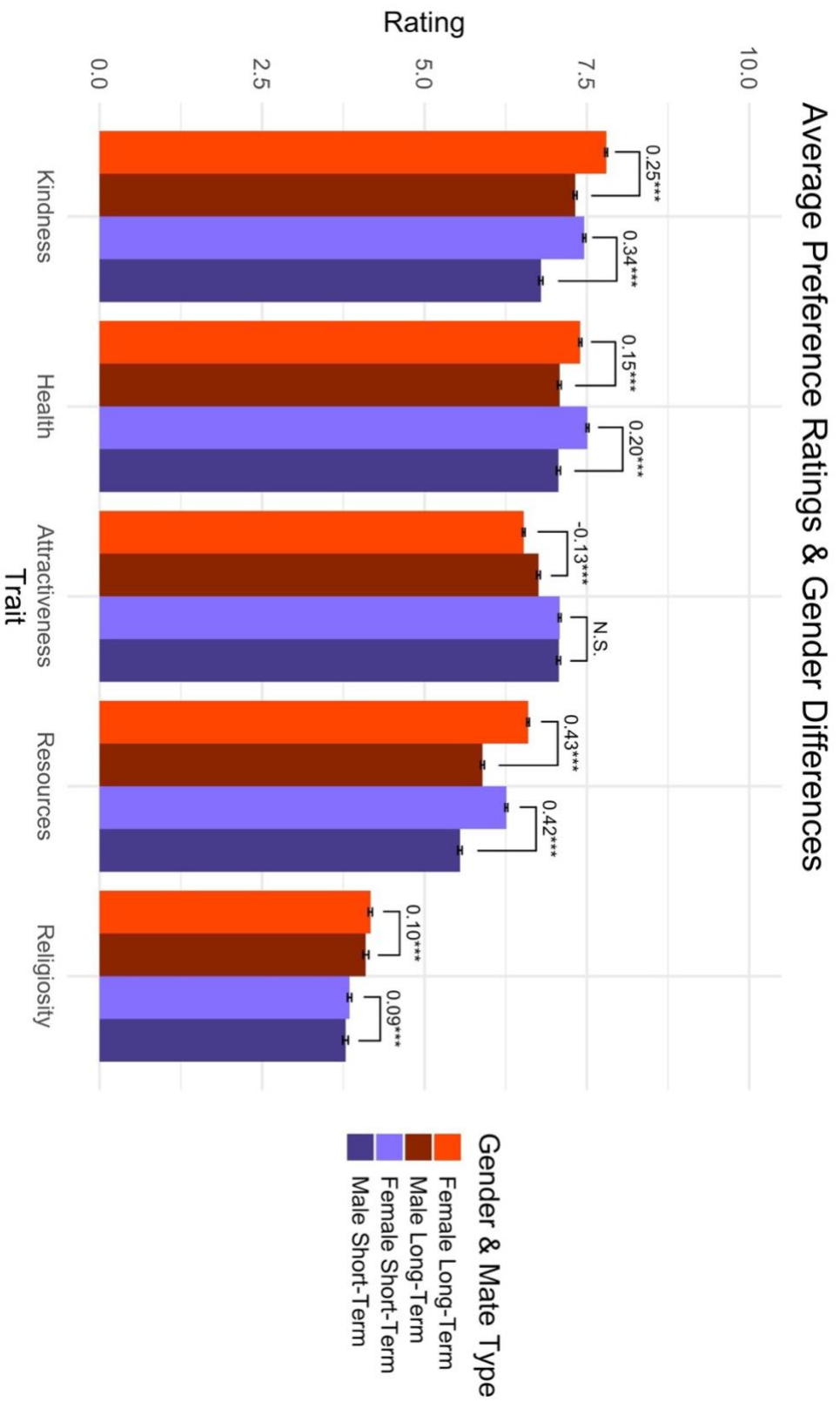


Figure 1. Average preference ratings by type of mate (long-term and short-term) and by gender (female and male). Error bars represent 95% confidence intervals. Numbers over bars depict average random slope (*b*) values across countries. Positive values indicate that women had a higher preference for a particular trait compared to men. Negative values indicate that men had a higher preference for a particular trait compared to women. *** indicates $p < .001$.

and women reported lower ideal short-term preferences for religiosity, compared to other traits, on average.

Relative Age Preferences

Across cultures, men and women reported different preferences for the relative age of an ideal long-term mate on average, $b = 0.67$, $SE = 0.04$, $p < .001$ (Figure 2). Men preferred a long-term mate younger than themselves, $M = -0.31$, 95% CI s = $[-0.33, -0.29]$, while women preferred a long-term mate older than themselves, $M = 0.47$, 95% CI s = $[0.46, 0.48]$. The gender difference (b) ranged from -0.05 in Malaysia to 1.58 in Algeria. As noted in the measures section, a relative age preference value of 0 means the participant prefers someone in the same age category as themselves, a value of -1 means the participant prefers someone in one category younger than themselves, a value of 1 means the participant prefers someone in one category older than themselves. Relative age preferences can range from -10 to 10.

The same pattern of results emerged for men's and women's preferences for the relative age of an ideal short-term mate, $b = 0.66$, $SE = 0.04$, $p < .001$. However, both men and women preferred slightly younger ages for ideal short-term mates, in comparison to their preferences for long-term mates. Men preferred a short-term mate younger than themselves, $M = -0.41$, 95% CI s = $[-0.43, -0.39]$, while women preferred a short-term mate older than themselves, $M = 0.42$, 95% CI s = $[0.41, 0.43]$. The gender difference (b) ranged from 0.02 in Thailand to 1.42 in Algeria.

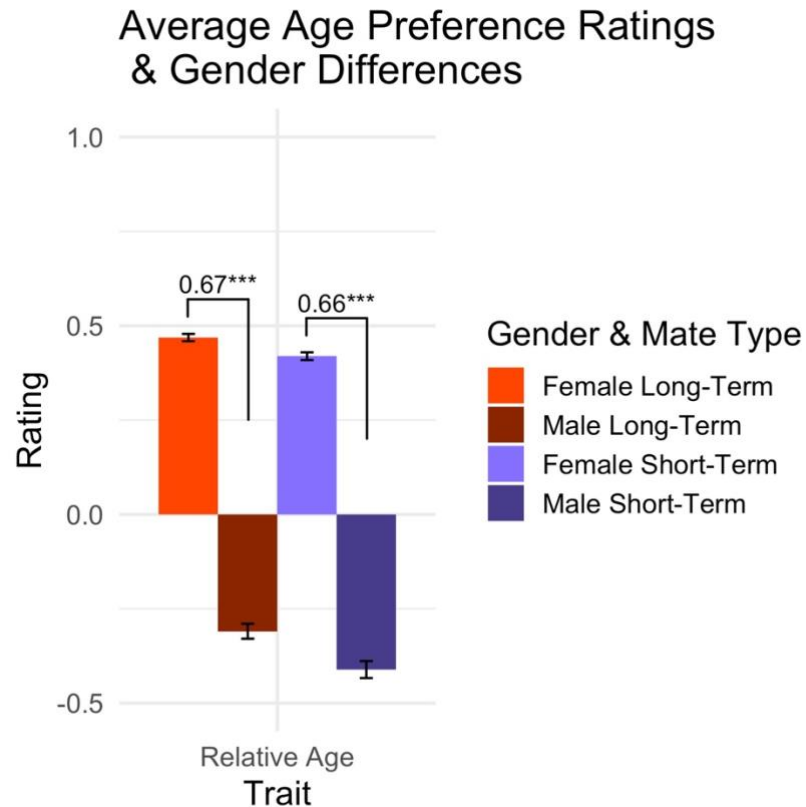


Figure 2. Average relative age preference ratings by type of mate (long-term and short-term) and by gender (female and male). Error bars represent 95% confidence intervals. Numbers over bars depict average random slope (b) values across countries. Positive values indicate that women had a higher preference relative age preference compared to men. *** indicates $p < .001$.

Relative Age Preferences Across Age

We also examined relative age preferences for an ideal long-term mate across age, by gender (Figure 3). Overall, women's age preferences decreased slowly across the life span. Younger women tended to prefer long-term mates older than themselves, on average, while older women, starting around the mid-fifties, preferred partners younger than themselves, on average. Men's age preferences also decreased over the lifespan, but more rapidly than women's. Very young men preferred long-term mates older than themselves, but starting around the mid-thirties, men preferred increasingly younger long-term mates, on average. It

should be noted that our sample is positively skewed across age. We only have 213 participants older than 75, so the findings for older adults should be interpreted with caution.

Additionally, we had 23 90-year-old female participants from Turkey who reported preferences for ideal long-term and short-term mates 50+ years younger than themselves. Because we were concerned that these were potentially errors or outliers and because they only represented one country, the plots shown here only include participants up to age 89.

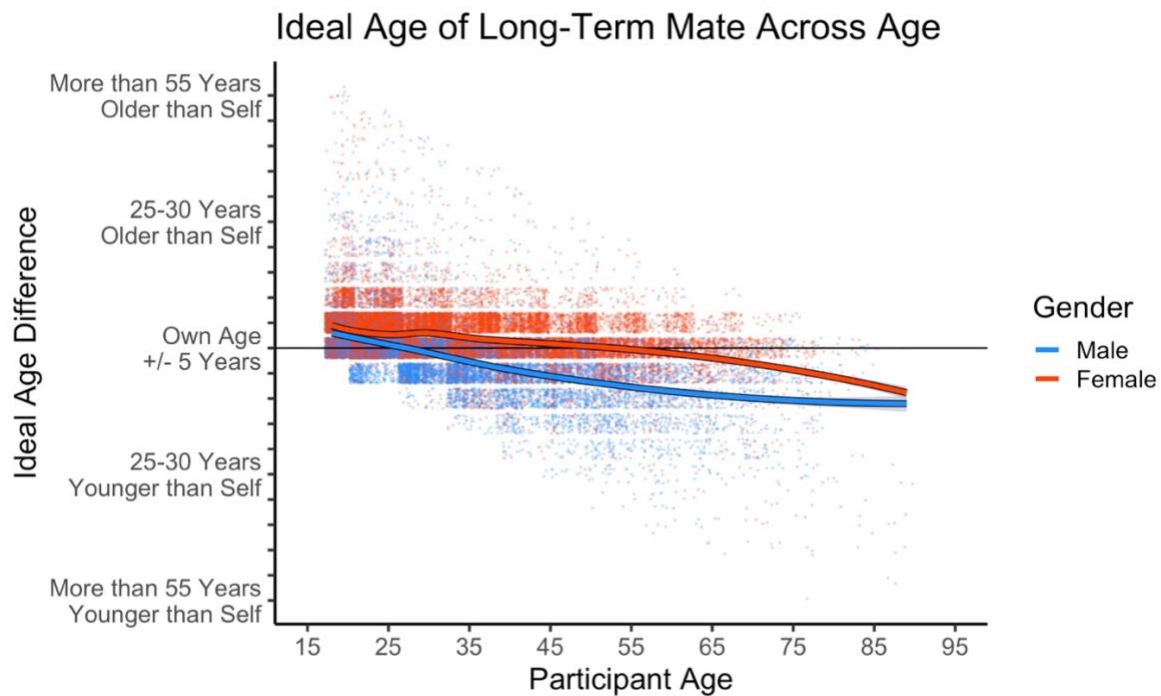


Figure 3. Preferred age difference between participants and an ideal long-term mate is plotted across participants' ages, separately for female and male participants. Data are jittered to reduce overplotting. Trend lines were generated by locally estimated scatterplot smoothing to illustrate the pattern of the data. Shaded areas indicate 99% confidence intervals.

We also examined relative age preferences for an ideal short-term mate across age, by gender (Figure 4). Overall, the pattern of results for short-term ideal ages was very similar to the pattern for long-term ideal ages. Women's age preferences for a short-term mate decreased across the life span. Younger women tended to prefer short-term mates older than themselves, on average, while older women, starting around the fifty, preferred short-term

mates younger than themselves, on average. Men's age preferences also decreased over the lifespan, but more rapidly than women's did. Very young men preferred short-term mates older than themselves, but starting around thirty men preferred increasingly younger long-term mates, on average.

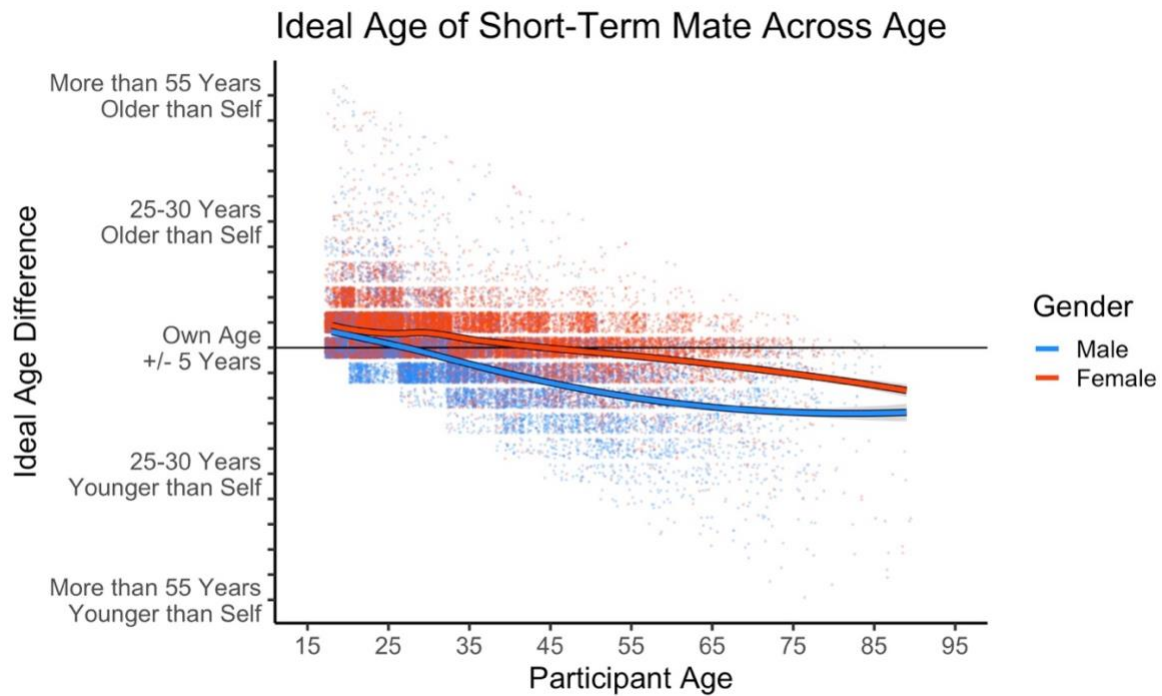


Figure 4. Preferred age difference between participants and an ideal short-term mate is plotted across participants' ages, separately for female and male participants. Data are jittered to reduce overplotting. Trend lines were generated by locally estimated scatterplot smoothing to illustrate the pattern of the data. Shaded areas indicate 99% confidence intervals.

Multivariate Analyses

Predicting Gender from Preferences

A Monte Carlo cross-validated logistic regression was also used to assess the ability of long-term mate preferences to predict participant gender. Chance predictive accuracy was $M = 0.50$, 95% CIs [0.49, 0.51]. The average predictive accuracy of long-term mate preferences to predict gender was significantly above chance, $M = 0.85$, 95% CIs = [0.84, 0.86].

We also used a Monte Carlo cross-validated logistic regression to assess the ability of short-term mate preferences to predict participant gender. Chance predictive accuracy was $M = 0.50$, 95% CI s = [0.49, 0.51]. The average predictive accuracy of short-term mate preferences to predict gender was significantly above chance, $M = 0.73$, 95% CI s = [0.72, 0.74].

Multivariate Gender Differences

We found when calculating the Mahalanobis D between men and women using all six long-term preference variables within each country, the overall sex difference was large, mean $D = 1.11$ (Figure 5). These D values ranged from 1.80, 95% CI s = [1.59, 2.15], in Switzerland, to 0.16, 95% CI s = [0.11, 0.28], in Morocco. Our results were consistent overall with those of Walter et al. (2020). Using data from five ideal long-term preferences for kindness, intelligence, attractiveness, health, and resources, Walter et al. (2020) found that the mean Mahalanobis D between males and females was 0.73.

For short-term preferences, we found when calculating the Mahalanobis D between men and women using all six short-term preference variables within each country, the overall gender difference was also large, mean $D = 1.05$ (Figure 6). These D values ranged from 1.71, 95% CI s = [1.46, 2.09], in Switzerland to 0.17, 95% CI s = [0.12, 0.28], in Morocco.

Due to the low number of women in the sample from Ghana, we had to exclude them from the Mahalanobis D calculations since the preference variance was too low.

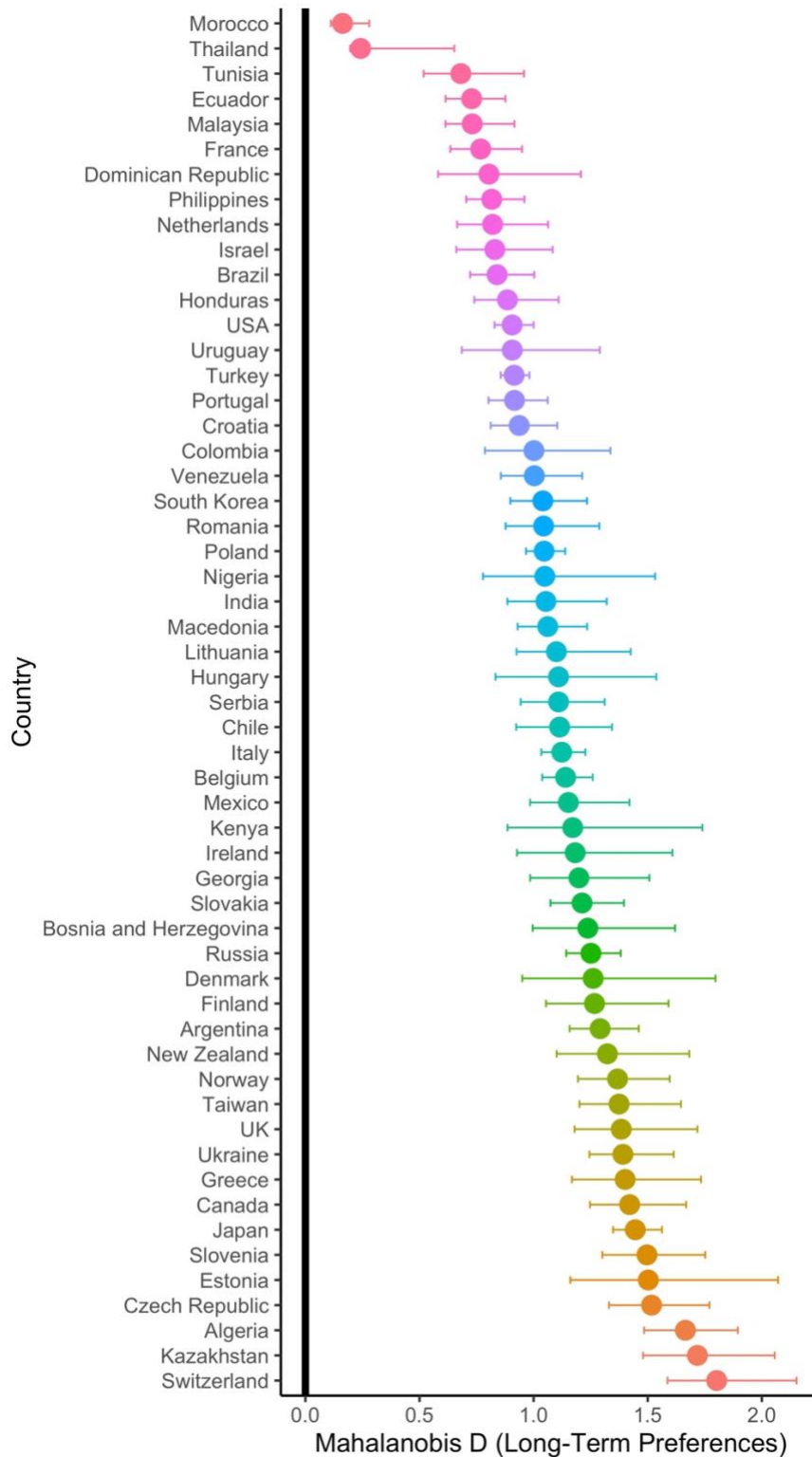


Figure 5. Mahalanobis distance (D) for each country in the current dataset (except Ghana). Larger D values indicate more gender differentiation in the overall pattern of long-term mate preferences. Error bars represent bootstrapped 95% confidence intervals. D and CIs for each country are color coded and shown in increasing D order for easier readability.

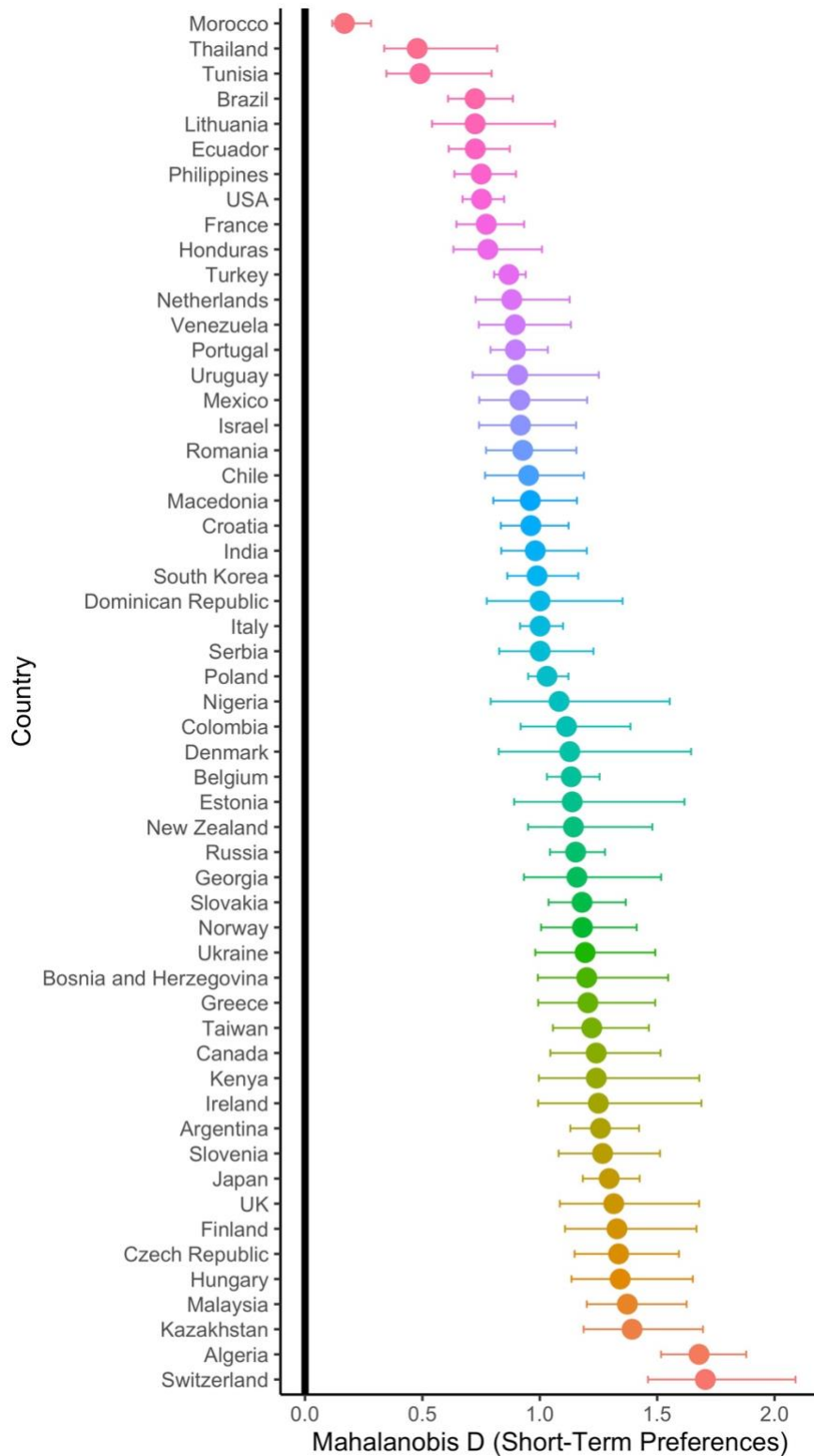


Figure 6. Mahalanobis distance (D) for each country in the current dataset (except Ghana). Larger D values indicate more gender differentiation in the overall pattern of short-term mate preferences. Error bars represent bootstrapped 95% confidence intervals. D and CIs for each country are color coded and shown in increasing D order for easier readability.

Pathogen Prevalence

Table 2 shows the results of the multilevel models predicting long-term mate preferences from nation-level pathogen prevalence index, controlling for GDP, latitude, world region, most common religion, income inequality, GNI, infant survival rate, life expectancy, and percentage of population that is urban. Pathogen prevalence predicted preferences for the religiosity of an ideal long-term mate for both measures (Figure 7). Countries with higher levels of pathogen prevalence had higher ideal preferences for the religiosity of long-term partners. The same pattern of results was found when examining the relationship between pathogen prevalence and short-term mate preferences (Table 3). Pathogen prevalence did not significantly predict any other ideal long-term or short-term preferences when control variables were included in the models.

Table 2

Results of Multilevel Models Predicting Each of Six Long-Term Mate Preferences from Pathogen Prevalence (With Controls)

Trait	Pathogen Prevalence Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Est. Deaths	-0.131	0.083	.126
	Years Life Lost	-0.181	0.131	.180
Attractiveness	Est. Deaths	-0.049	0.065	.458
	Years Life Lost	0.001	0.102	.991
Health	Est. Deaths	-0.065	0.060	.290
	Years Life Lost	-0.012	0.096	.902
Kindness	Est. Deaths	-0.011	0.061	.856
	Years Life Lost	0.067	0.095	.485
Religion	Est. Deaths	-0.210	0.083	.018*
	Years Life Lost	-0.338	0.128	.015*
Relative Age	Est. Deaths	0.037	0.098	.711
	Years Life Lost	-0.011	0.154	.944

* $p < .05$

Table 3

Results of Multilevel Models Predicting Each of Six Short-Term Mate Preferences from

Pathogen Prevalence (With Controls)

Trait	Pathogen Prevalence Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Est. Deaths	-0.153	0.079	.066
	Years Life Lost	-0.231	0.125	.076
Attractiveness	Est. Deaths	-0.029	0.073	.700
	Years Life Lost	0.036	0.115	.759
Health	Est. Deaths	-0.069	0.064	.287
	Years Life Lost	-0.011	0.102	.918
Kindness	Est. Deaths	-0.051	0.042	.231
	Years Life Lost	-0.039	0.066	.566
Religion	Est. Deaths	-0.175	0.082	.043*
	Years Life Lost	-0.322	0.123	.015*
Relative Age	Est. Deaths	-0.013	0.077	.867
	Years Life Lost	-0.032	0.120	.794

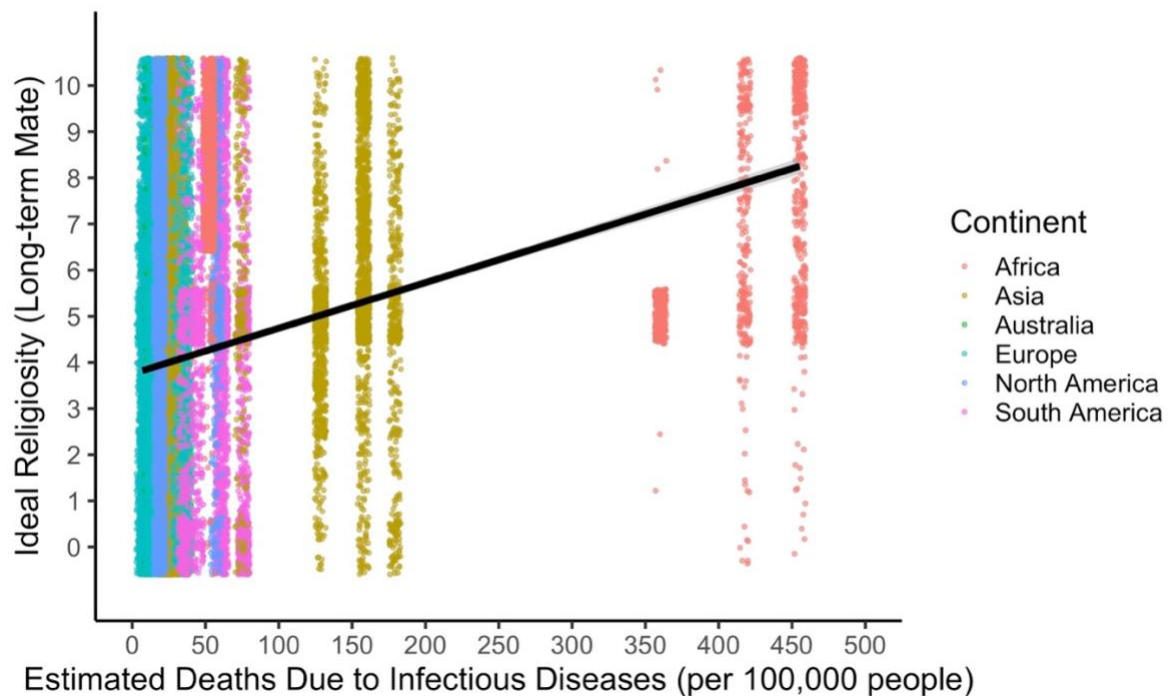
* $p < .05$ 

Figure 7. Religiosity preference values for and ideal long-term partner are plotted across pathogen prevalence, operationalized as the nation-level number of estimated deaths due to infectious diseases per 100,000 people. Data are color coded by continent and are jittered to reduce overplotting. Regression line shown in black. Shaded areas indicate 95% confidence intervals.

Gender Equality

Table 4 shows the results of the multilevel models predicting long-term mate preferences from gender and nation-level gender equality indices, controlling for GDP, latitude, world region, most common religion, income inequality, GNI, infant survival rate, life expectancy, and percentage of population that is urban. Overall, gender equality did not robustly predict gender differences in any of the long-term mate preference measures.

However, gender equality predicted the gender differences in some measures of short-term mate preferences. Table 5 shows the results of the multilevel models predicting short-term mate preferences from gender and nation-level gender equality indices, including control variables. All three measures of gender equality predicted the gender difference in short-term preferences for a kindness. In places where women and men were more equal, the gender difference in kindness preferences for a short-term mate were larger (Figure 8). In particular, women's short-term kindness preferences decreased as gender equality (measured by GGGI) increased, $b = -0.044$, $SE = 0.021$, $p = .037$. Men's short-term kindness preferences also decreased as gender equality increased, but at a faster rate than women's, $b = -0.076$, $SE = 0.03$, $p = .025$. This same pattern replicated for the two other measures of gender equality, GDI and GII.

Furthermore, GII predicted the gender differences in short-term preferences for attractiveness and religiosity (Figure 9, Figure 10). As these patterns were not replicated by the other measures of gender equality we examined here, they should be interpreted with caution. Women's short-term physical attractiveness preferences increased as gender equality increased, $b = 0.061$, $SE = 0.031$, $p = .051$, though this was marginally significant. Men's simple slope was not significant. Women's short-term religiosity preferences decreased as

gender equality increased, $b = -0.334$, $SE = 0.037$, $p < .001$. Men's short-term religiosity preferences also decreased as gender equality increased, $b = -0.327$, $SE = -0.042$, $p < .001$.

Table 4

Results of Multilevel Models Predicting Each of Six Long-Term Mate Preferences from Gender and Gender Equality (With Controls)

Trait	Gender Equality Measure	b	SE	p
Resources	GGI	-0.007	0.033	.824
	GDI	0.057	0.030	.059
	GII	-0.006	0.028	.831
Attractiveness	GGI	-0.007	0.021	.733
	GDI	-0.010	0.020	.629
	GII	0.009	0.018	.618
Health	GGI	-0.016	0.026	.551
	GDI	0.036	0.025	.152
	GII	-0.030	0.023	.197
Kindness	GGI	0.017	0.019	.361
	GDI	0.029	0.017	.103
	GII	-0.012	0.017	.488
Religion	GGI	-0.012	0.019	.518
	GDI	0.017	0.018	.346
	GII	0.032	0.016	.056
Relative Age	GGI	0.011	0.044	.803
	GDI	-0.054	0.041	.196
	GII	-0.032	0.038	.411

Table 5

Results of Multilevel Models Predicting Each of Six Short-Term Mate Preferences from Gender and Gender Equality (With Controls)

Trait	Gender Equality Measure	b	SE	p
Resources	GGI	-0.015	0.030	.630
	GDI	0.050	0.028	.080
	GII	-0.004	0.027	.868
Attractiveness	GGI	0.017	0.018	.342
	GDI	0.028	0.017	.103
	GII	-0.040	0.015	.012*

Health	GGGI	-0.005	0.024	.839
	GDI	0.037	0.022	.096
	GII	-0.039	0.020	.059
Kindness	GGGI	0.048	0.023	.044*
	GDI	0.068	0.019	.001**
	GII	-0.055	0.019	.005**
Religion	GGGI	-0.029	0.021	.182
	GDI	-0.0007	0.020	.971
	GII	0.050	0.017	.006**
Relative Age	GGGI	0.034	0.042	.427
	GDI	-0.036	0.040	.376
	GII	-0.056	0.036	.125

*p<.05, **p<.01

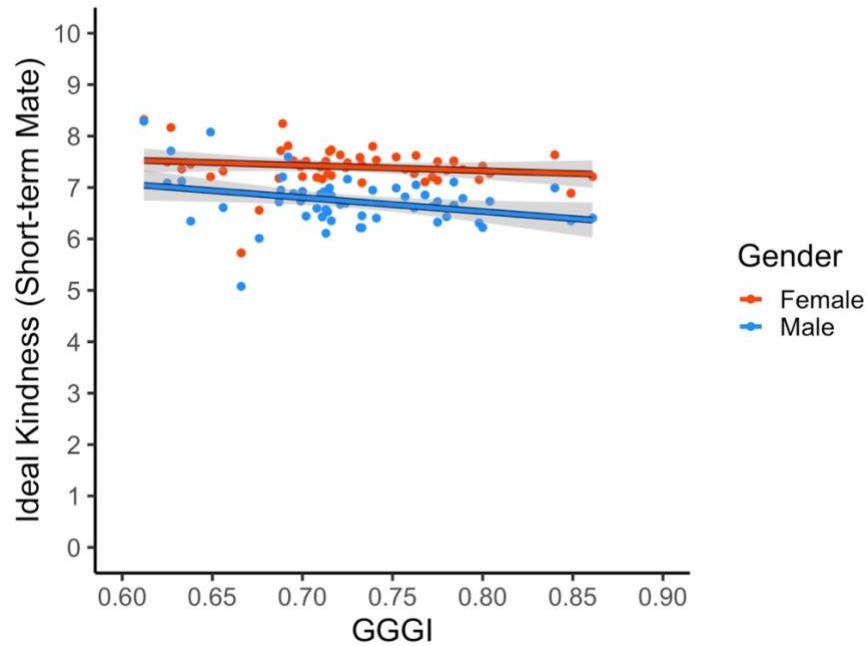


Figure 8. Average ideal short-term preference for kindness for each country as a function of each country's GGGI score. GGGI scores go from less gender equality to more gender equality, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

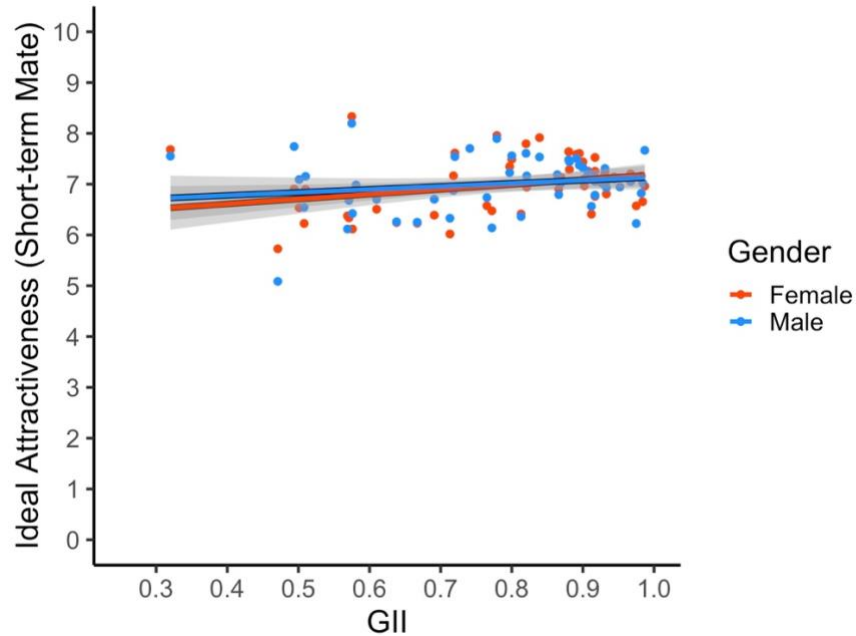


Figure 9. Average ideal short-term preference for attractiveness for each country as a function of each country's GII score. GII scores go from less gender equality to more gender equality, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

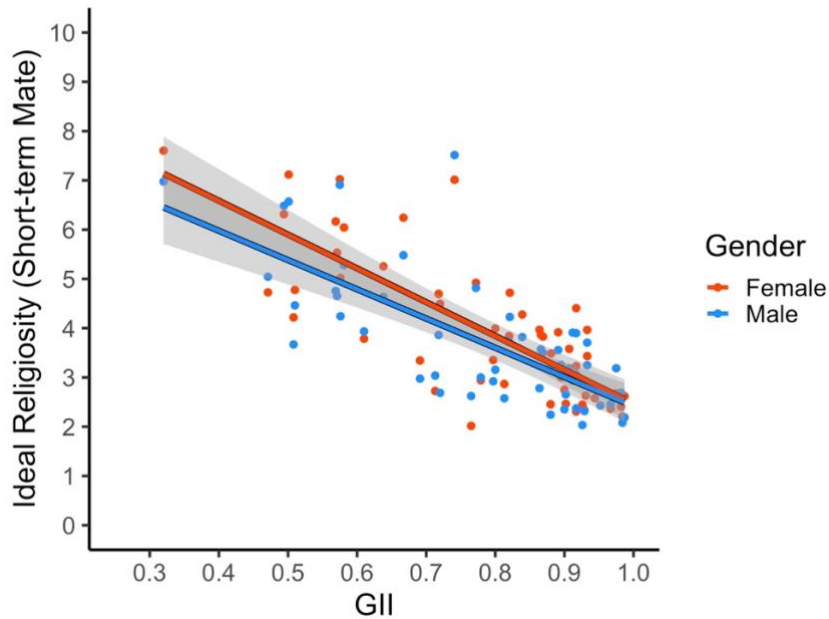


Figure 10. Average ideal short-term preference for religiosity for each country as a function of each country's GII score. GII scores go from less gender equality to more gender equality, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Sex Ratio

Long-term Mate Preferences

Table 6 shows the results of the multilevel models predicting long-term mate preferences from gender and nation-level sex ratio measures, controlling for GDP, latitude, world region, most common religion, income inequality, GNI, infant survival rate, life expectancy, and percentage of population that is urban. Overall, sex ratio predicted gender differences in long-term mate preferences for health, and one measure of sex ratio predicted gender differences in long-term mate preferences for resources.

Table 6

Results of Multilevel Models Predicting Each of Six Long-Term Mate Preferences from Gender and Sex Ratio (With Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.035	0.025	.158
	Adult	-0.054	0.028	.055
	15 to 49	-0.066	0.027	.020*
Attractiveness	Birth	0.021	0.016	.215
	Adult	-0.032	0.018	.083
	15 to 49	-0.032	0.018	.085
Health	Birth	0.045	0.020	.029*
	Adult	-0.046	0.022	.045*
	15 to 49	-0.049	0.023	.035*
Kindness	Birth	0.010	0.015	.514
	Adult	0.025	0.017	.139
	15 to 49	0.015	0.017	.384
Religion	Birth	0.016	0.015	.308
	Adult	-0.005	0.017	.773
	15 to 49	-0.013	0.017	.442
Relative Age	Birth	-0.044	0.034	.210
	Adult	0.031	0.039	.437
	15 to 49	0.044	0.039	.266

* $p < .05$

All three measures of sex ratio predicted the gender difference in long-term preferences for health. However, the pattern of results varied across sex ratio measures. First, in places where the sex ratio at birth was larger, meaning there were more male babies born than female babies, the gender difference in health preferences for a long-term mate was larger, than in places where the sex ratio at birth was smaller (Figure 11). In particular, women’s long-term health preferences were higher in places where male babies were more abundant, $b = 0.071$, $SE = 0.033$, $p = .038$. Men’s simple slope was not significantly different from zero.

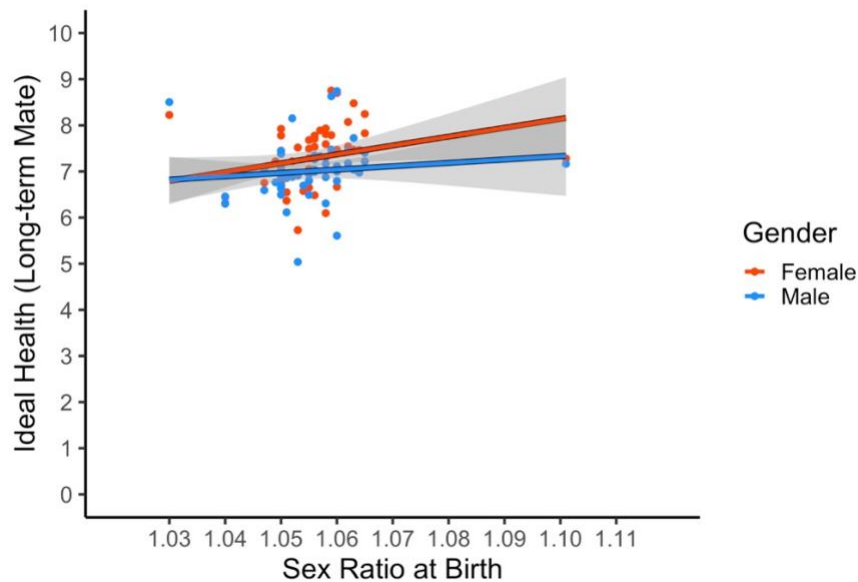


Figure 11. Average ideal long-term preference for health for each country as a function of each country’s sex ratio at birth (ratio of males born to females born). Sex ratio at birth values go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Second, in places where the adult sex ratio was larger, meaning there were more adult men in the country than adult women, the gender difference in health preferences for a long-term mate was smaller, than in places where there were less adult men than adult women (Figure 12). In contrast to the sex ratio at birth results, women’s long-term health preferences were lower in places where adult males were more abundant, $b = -0.114$, $SE = 0.037$, $p = .003$.

Men's simple slope was not significantly different from zero. The same pattern was found for sex ratio ages 15-49. That is, in places where there were more 15-49 year old men in the country than 15-49 year old women, the gender difference in health preferences for a long-term mate was smaller, than in places where adult sex ratio was smaller (Figure 12). Again, women's long-term health preferences were lower in places where adult males were more abundant, $b = -0.092$, $SE = 0.038$, $p = .021$. Men's simple slope was not significantly different from zero.

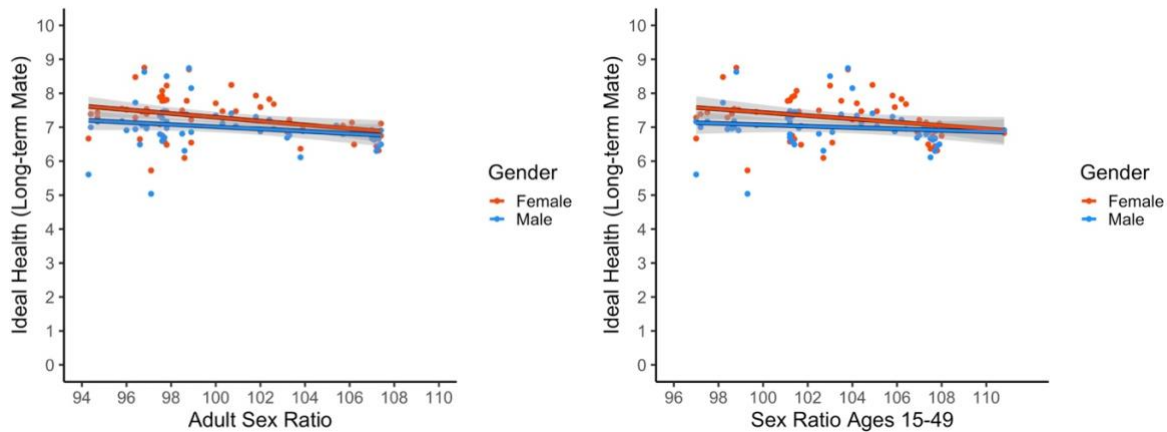


Figure 12. Average ideal long-term preference for health for each country as a function of each country's adult sex ratio (left) and as a function of each country's sex ratio for ages 15-49. Sex ratio values are the number of males per 100 females and go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Additionally, sex ratio for those ages 15-49 predicted the gender difference in long-term preferences for resources (Figure 13). As this pattern was not replicated by the other measures of sex ratio we examined here, it should be interpreted with caution. Specifically, women's long-term preferences for resources were lower in places where men ages 15-49 were more abundant than women ages 15-49, $b = -0.078$, $SE = 0.036$, $p = .037$. Men's simple slope was not significantly different from zero. Overall, these sex ratio results are contrary to what would be predicted and what has been found in previous studies.

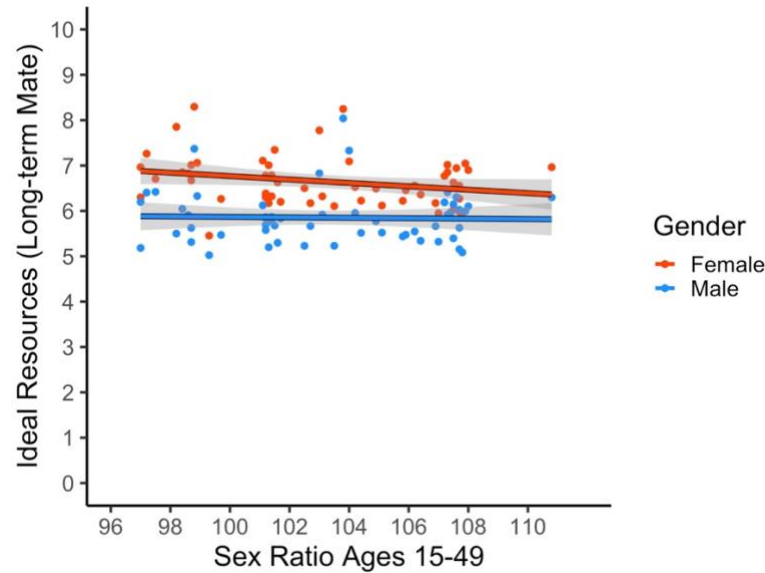


Figure 13. Average ideal long-term preference for resources for each country as a function of each country's sex ratio for ages 15-49. Sex ratio values are the number of males per 100 females and go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Short-term Mate Preferences

Table 7 shows the results of the multilevel models predicting short-term mate preferences from gender and nation-level sex ratio measures, with control variables. Overall, both adult sex ratio and sex ratio ages 15-49 predicted gender differences in short-term mate preferences for resources (Figure 14). In particular, women's short-term resources preferences were lower in places where adult men were more abundant than adult women, $b = -0.090$, $SE = 0.041$, $p = .030$. Men's simple slope was not significantly different from zero. The same pattern was found for the relationship between gender differences in short-term preferences for resources sex ratio ages 15-49. Women's short-term resources preferences were lower in places where adult men were more abundant than adult women, $b = -0.109$, $SE = 0.040$, $p = .008$. Men's simple slope was not significantly different from zero. Again, these results are contrary to what would be predicted.

Table 7

Results of Multilevel Models Predicting Each of Six Short-Term Mate Preferences from Gender and Sex Ratio (With Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.031	0.024	.199
	Adult	-0.066	0.025	.012*
	15 to 49	-0.083	0.025	.002**
Attractiveness	Birth	0.024	0.015	.106
	Adult	-0.018	0.016	.277
	15 to 49	-0.019	0.016	.252
Health	Birth	0.035	0.018	.062
	Adult	-0.028	0.020	.177
	15 to 49	-0.030	0.021	.157
Kindness	Birth	0.004	0.019	.825
	Adult	0.016	0.021	.450
	15 to 49	0.011	0.022	.624
Religion	Birth	0.021	0.017	.229
	Adult	-0.018	0.019	.369
	15 to 49	-0.028	0.019	.149
Relative Age	Birth	-0.046	0.033	.165
	Adult	0.006	0.038	.870
	15 to 49	0.016	0.038	.680

* $p < .05$

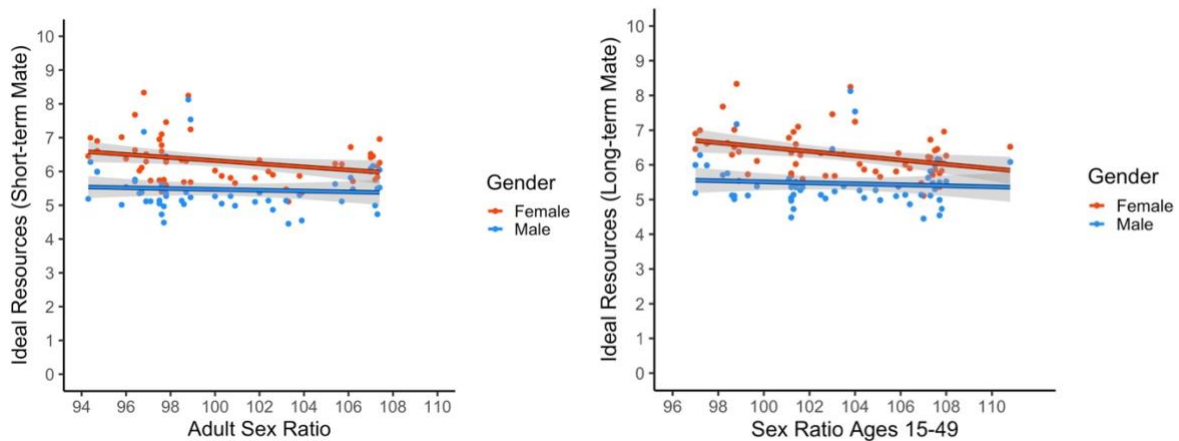


Figure 14. Average ideal short-term preference for resources for each country as a function of each country's adult sex ratio (left) and as a function of each country's sex ratio ages 15-49 (right). Sex ratio values are the number of males per 100 females and go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Relative Long-term Preferences

Table 8 shows the results of the multilevel models predicting relative long-term mate preferences from gender and nation-level sex ratio measures, controlling for GDP, latitude, world region, most common religion, income inequality, GNI, infant survival rate, life expectancy, and percentage of population that is urban. Overall, two measures of sex ratio predicted gender differences in relative long-term mate preferences for health, and two measures of sex ratio predicted gender differences in relative long-term mate preferences for resources.

Table 8

Results of Multilevel Models Predicting Each of Five Relative Long-Term Mate Preferences from Gender and Sex Ratio (With Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.056	0.030	.071
	Adult	-0.084	0.033	.015*
	15 to 49	-0.095	0.033	.006**
Attractiveness	Birth	0.023	0.028	.412
	Adult	-0.033	0.031	.283
	15 to 49	-0.038	0.031	.232
Health	Birth	0.080	0.033	.020*
	Adult	-0.078	0.038	.044*
	15 to 49	-0.074	0.039	.059
Kindness	Birth	0.035	0.025	.171
	Adult	0.005	0.029	.860
	15 to 49	0.009	0.030	.767
Religion	Birth	0.040	0.036	.277
	Adult	-0.007	0.041	.868
	15 to 49	-0.025	0.042	.549

* $p < .05$, ** $p < .01$

Specifically, adult sex ratio and sex ratio for those ages 15-49 predicted the gender difference in relative long-term preferences for resources (Figure 15). Women's relative long-term preferences for resources were lower in places where adult men were more abundant than

adult women, $b = -0.117$, $SE = 0.038$, $p = .003$. Men's simple slope was not significantly different from zero. The same pattern was found for sex ratio ages 15-49. Women's relative long-term preferences for resources were lower in places where men ages 15-49 were more abundant than women ages 15-49, $b = -0.079$, $SE = 0.040$, $p = .052$, though this was marginally significant. Men's simple slope was not significantly different from zero. Overall, these results are contrary to what would be predicted and what has been found in previous studies examining the relationship between sex ratio and gender differences in relative preferences.

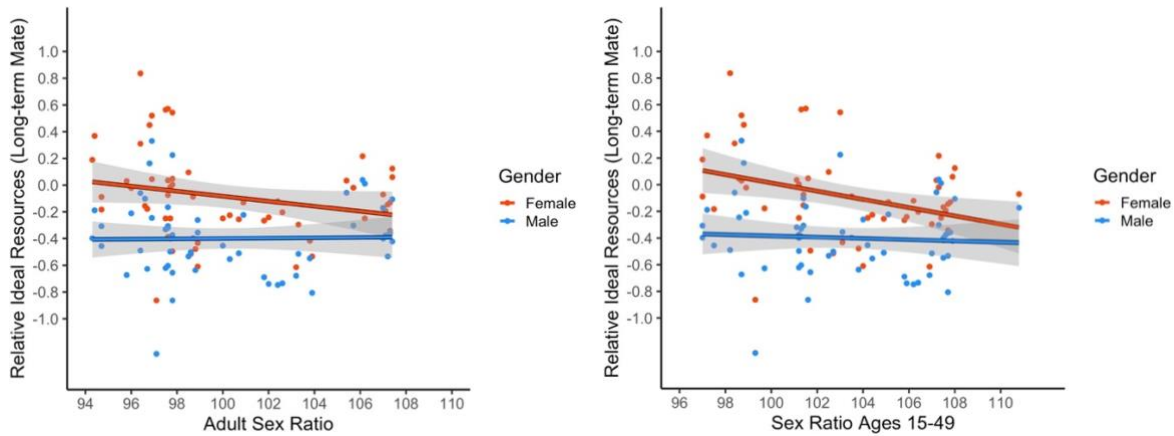


Figure 15. Average relative ideal long-term preference for resources for each country as a function of each country's adult sex ratio (left) and as a function of each country's sex ratio ages 15-49 (right). Sex ratio values are the number of males per 100 females and go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Additionally, adult sex ratio and sex ratio at birth predicted the gender difference in relative long-term preferences for health (Figure 16). Women's relative long-term preferences for health were lower in places where adult men were more abundant than adult women, $b = -0.074$, $SE = 0.031$, $p = .020$. Men's simple slope was not significantly different from zero. However, the pattern for sex ratio at birth was different. Neither women's nor men's simple slopes were significantly different from zero, and the pattern is different. Overall, the gender

difference in relative preference for ideal health is larger in places where more male infants are born, compared to female infants.

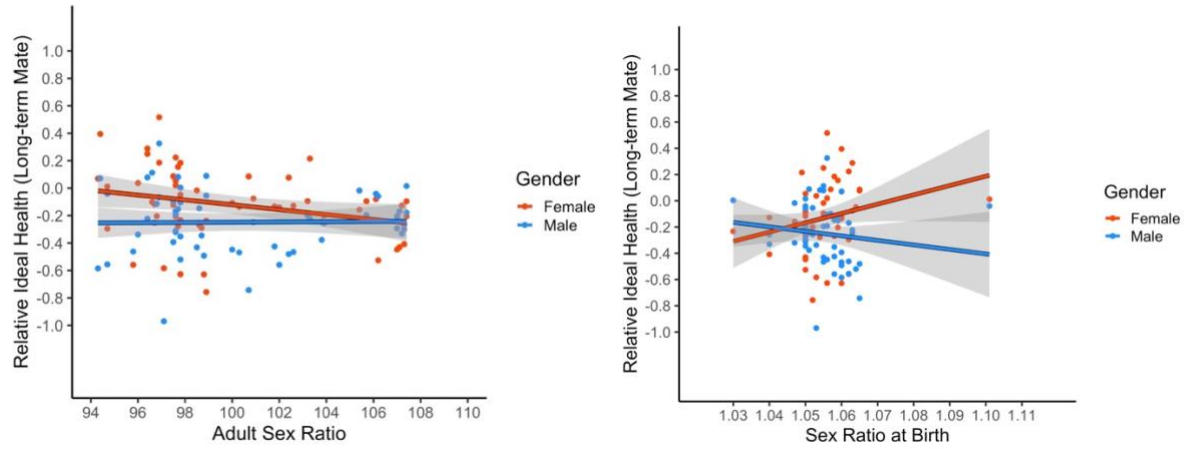


Figure 16. Average relative ideal long-term preference for resources for each country as a function of each country's adult sex ratio (left) and as a function of each country's sex ratio at birth (right). For adult sex ratio, values are the number of males per 100 females and go from less abundant males to more abundant males, left to right. For sex ratio at birth, values are the ratio of males born to females born and go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Relative Short-term Preferences

Table 9 shows the results of the multilevel models predicting relative short-term mate preferences from gender and nation-level sex ratio measures, with control variables. Overall, one measure of sex ratio predicted gender differences in relative short-term mate preferences for health, and two measures of sex ratio predicted gender differences in relative short-term mate preferences for resources.

Table 9

Results of Multilevel Models Predicting Each of Five Relative Short-Term Mate Preferences
From Gender and Sex Ratio (With Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.045	0.027	.099
	Adult	-0.090	0.028	.003**
	15 to 49	-0.105	0.028	<.001***
Attractiveness	Birth	0.023	0.025	.352
	Adult	-0.020	0.028	.472
	15 to 49	-0.024	0.028	.392
Health	Birth	0.066	0.031	.036*
	Adult	-0.057	0.035	.109
	15 to 49	-0.052	0.036	.152
Kindness	Birth	0.027	0.030	.382
	Adult	-0.004	0.035	.909
	15 to 49	0.005	0.035	.886
Religion	Birth	0.047	0.036	.198
	Adult	-0.021	0.041	.615
	15 to 49	-0.040	0.041	.329

* $p < .05$, ** $p < .01$, *** $p < .001$

Specifically, adult sex ratio and sex ratio for those ages 15-49 predicted the gender difference in relative short-term preferences for resources (Figure 17). Women's relative long-term preferences for resources were lower in places where adult men were more abundant than adult women, $b = -0.101$, $SE = 0.043$, $p = .023$. Men's simple slope was not significantly different from zero. The same pattern was found for sex ratio ages 15-49. Women's relative long-term preferences for resources were lower in places where men ages 15-49 were more abundant than women ages 15-49, $b = -0.14$, $SE = 0.041$, $p < .001$. Men's simple slope was not significantly different from zero. Overall, these sex ratio results are contrary to what would be predicted and what has been found in previous studies examining long-term relative preferences.

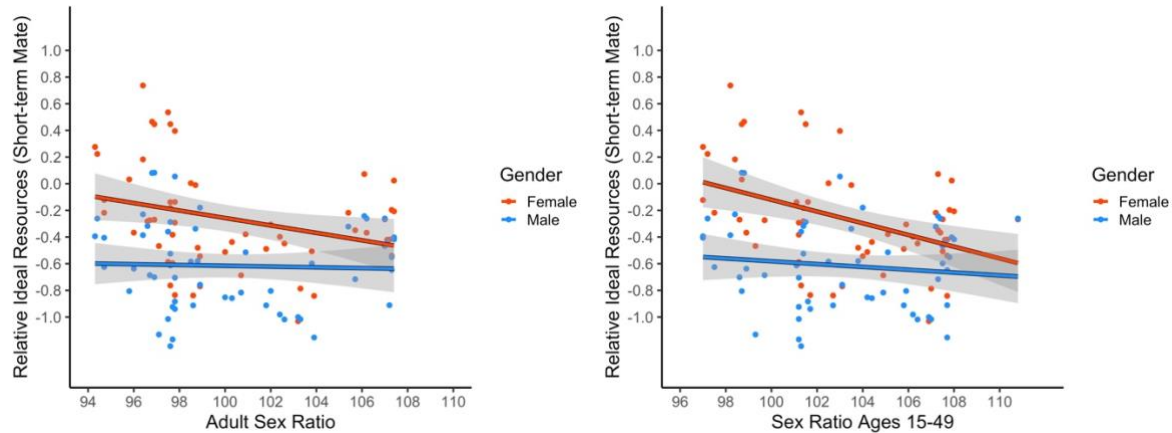


Figure 17. Average relative ideal short-term preference for resources for each country as a function of each country's adult sex ratio (left) and as a function of each country's sex ratio ages 15-49 (right). Sex ratio values are the number of males per 100 females and go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Additionally, sex ratio at birth predicted the gender difference in relative short-term preferences for health (Figure 18). Neither women's nor men's simple slopes were significantly different from zero.

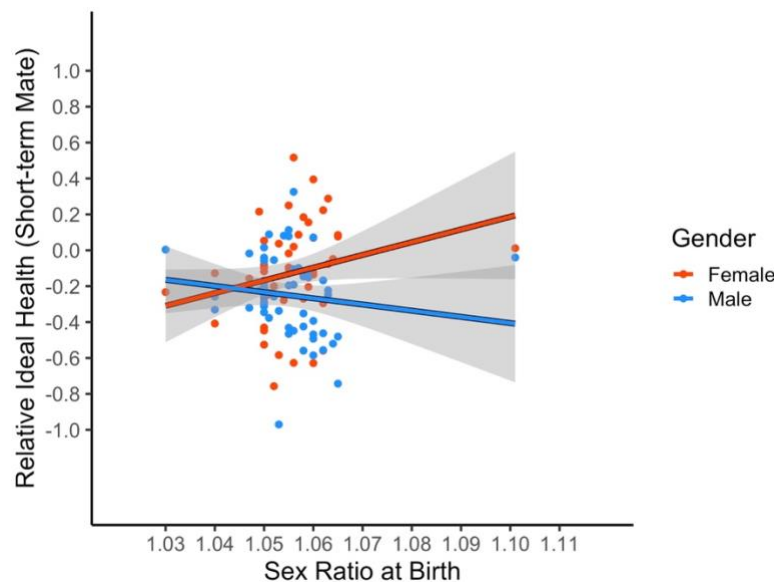


Figure 18. Average relative ideal short-term preference for health for each country as a function of each country's sex ratio at birth. Sex ratio at birth values are the ratio of males born to females born and go from less abundant males to more abundant males, left to right. Results are given separately for females and males. Best fitting regression lines are shown for each gender. The shaded areas indicate 95% confidence intervals.

Relationship Status

Long-term Preferences

Kindness. Across cultures, participants with romantic partners reported preferences for kinder ideal long-term mates than single participants, on average, $b = -0.05$, $SE = 0.02$, $p = .003$ (Figure 19). A positive b value indicates that partnered people have lower ideal preferences than single people, on average. A negative b value indicates that partnered people have higher ideal preferences than single people, on average. The average for partnered participants was 7.70, 95% CI s = [7.68, 7.72], and the average for single participants was 7.57, 95% CI s = [7.55, 7.60]. The difference (b) ranged from -0.19 in Tunisia to 0.18 in Ghana.

Health. Participants with romantic partners also reported preferences for healthier ideal long-term mates than single participants, on average, $b = -0.04$, $SE = 0.01$, $p < .001$. The average for partnered participants was 7.33, 95% CI s = [7.30, 7.35], and the average for single participants was 7.26, 95% CI s = [7.23, 7.28]. The difference (b) ranged from -0.10 in Nigeria to 0.03 in Ghana.

Resources. Across cultures, partnered and single participants did not significantly differ in their reported preferences for resources in an ideal long-term mate. The average preference for partnered participants was 6.33, 95% CI s = [6.31, 6.35], and the average preference for single participants was 6.38, 95% CI s = [6.36, 6.41]. When looking at individual slopes by country, the gender difference (b) ranged from -0.16 in Nigeria to 0.15 in Argentina.

Religiosity. Across cultures, partnered and single participants did not significantly differ in their reported preferences for religiosity in an ideal long-term mate. The average preference for partnered participants was 4.02, 95% CI s = [3.99, 4.06], and the average

preference for single participants was 4.26, 95% CIs = [4.22, 4.29]. When looking at individual slopes by country, the gender difference (b) ranged from -0.25 in Honduras to 0.18 in France.

Attractiveness. Across cultures, partnered and single participants did not significantly differ in their reported preferences for physical attractiveness in an ideal long-term mate. The average preference for partnered participants was 6.62, 95% CIs = [6.60, 6.65], and the average preference for single participants was 6.58, 95% CIs = [6.56, 6.61]. When looking at individual slopes by country, the gender difference (b) ranged from -0.09 in Tunisia to 0.08 in Argentina.

In summary, across cultures, participants in relationships preferred kinder and healthier ideal long-term mates, compared to single individuals. However, single and partnered people preferred the same level of physical attractiveness, religiosity, and good financial prospects in an ideal long-term mate, on average. Both single and partnered people preferred higher levels of kindness, then health, then attractiveness, then resources, then religiosity, on average.

Short-term Preferences

Kindness. Across cultures, participants with romantic partners reported preferences for kinder ideal short-term mates than single participants, on average, $b = -0.09$, $SE = 0.01$, $p < .001$. A positive b value indicates that partnered people have lower ideal preferences than single people, on average. A negative b value indicates that partnered people have higher ideal preferences than single people, on average. The average for partnered participants was 7.32, 95% CIs = [7.29, 7.34], and the average for single participants was 7.15, 95% CIs = [7.13, 7.18]. The difference (b) ranged from -0.17 in Italy to -0.02 in Greece.

Health. Participants with romantic partners also reported preferences for healthier ideal short-term mates than single participants, on average, $b = -0.08$, $SE = 0.01$, $p < .001$. The average for partnered participants was 7.41, 95% CIs = [7.39, 7.44], and the average for single

participants was 7.31, 95% *CI*s = [7.28, 7.33]. The difference (*b*) ranged from -0.16 in Portugal to -0.03 in Chile.

Resources. Participants with romantic partners reported higher preferences for ideal short-term mates with good financial prospects than single participants did, on average, $b = -0.07$, $SE = 0.01$, $p < .001$. The average for partnered participants was 6.03, 95% *CI*s = [6.01, 6.06], and the average for single participants was 6.01, 95% *CI*s = [5.98, 6.03]. The difference (*b*) ranged from -0.16 in Poland to 0.06 in Argentina.

Religiosity. Across cultures, partnered and single participants did not significantly differ in their reported preferences for religiosity in an ideal short-term mate. The average preference for partnered participants was 3.69, 95% *CI*s = [3.66, 3.73], and the average preference for single participants was 3.96, 95% *CI*s = [3.92, 3.99]. When looking at individual slopes by country, the gender difference (*b*) ranged from -0.22 in Honduras to 0.16 in France.

Attractiveness. Participants with romantic partners reported higher preferences for physically attractive ideal short-term mates than single participants did, on average, $b = -0.06$, $SE = 0.01$, $p < .001$. The average for partnered participants was 7.16, 95% *CI*s = [7.14, 7.19], and the average for single participants was 6.99, 95% *CI*s = [6.97, 7.02]. The difference (*b*) ranged from -0.10 in Kazakhstan to -0.01 in Argentina.

In summary, across cultures, people in relationships preferred more of each characteristic — kindness, health, resources, attractiveness— in an ideal short-term mate, on average, than did single individuals. The only exception to this pattern was for religiosity, where both partnered and single individuals reported desiring equal levels of religiosity in an ideal short-term mate. Both single and partner people preferred higher levels of health, then kindness, then attractiveness, then resources, then religiosity, on average.

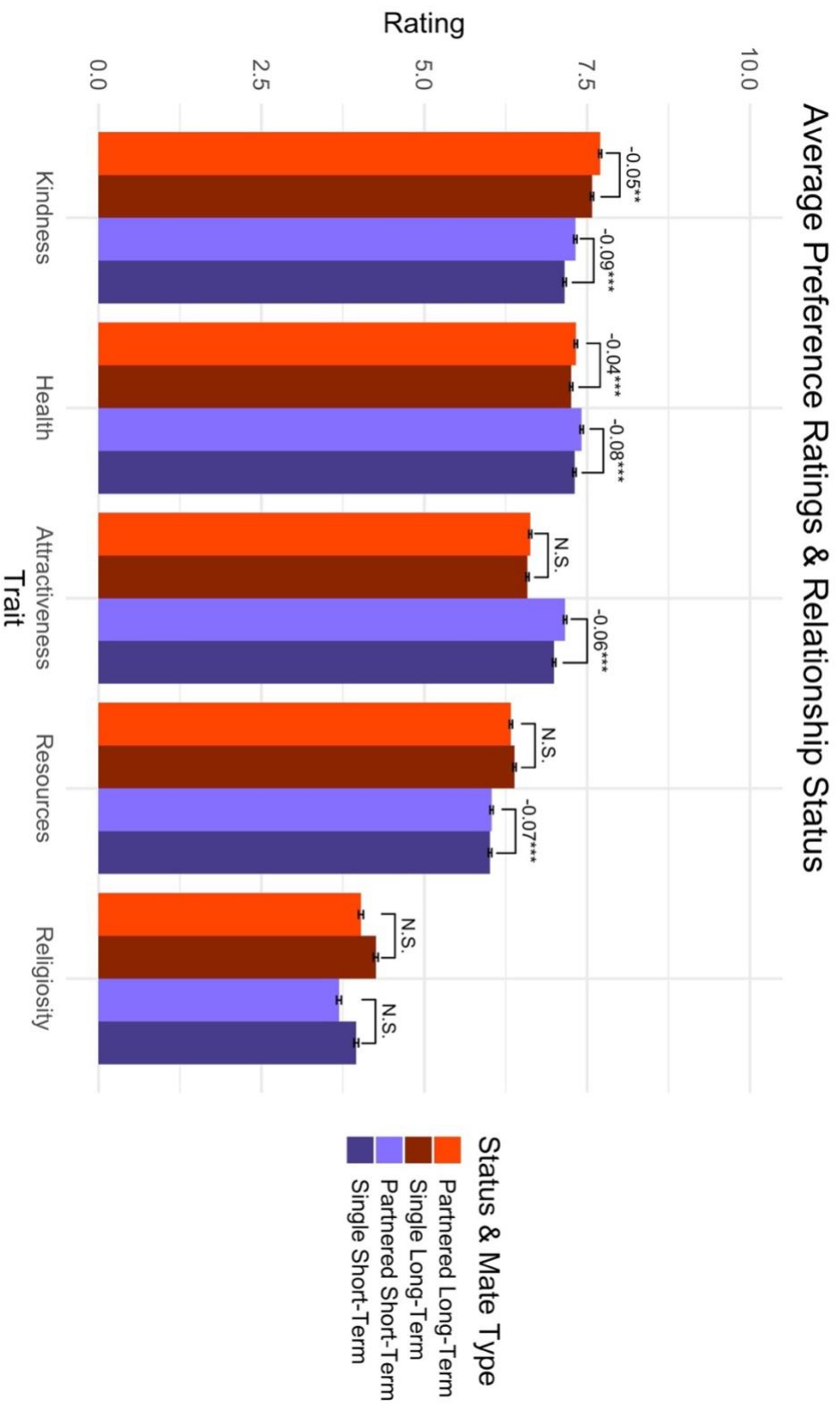


Figure 19. Average preference ratings by type of mate (long-term and short-term) and by relationship status (partnered and single). Error bars represent 95% confidence intervals. Numbers over bars depict average random slope (*b*) values across countries. Negative values indicate that partnered participants had a higher preference for a particular trait compared to single participants. ** indicates $p < .01$, *** indicates $p < .001$

Relative Age Preferences

Across cultures, participants with a romantic partner and single participants reported different preferences for the relative age of an ideal long-term mate on average, $b = 0.21$, $SE = 0.03$, $p < .001$ (Figure 20). Partnered participants preferred a long-term mate close to their own age, $M = 0.07$, 95% CI s = [0.06, 0.09], while single participants preferred a long-term mate older than themselves, $M = 0.33$, 95% CI s = [0.32, 0.34]. The difference (b) ranged from -0.12 in Switzerland to 1.02 in Tunisia.

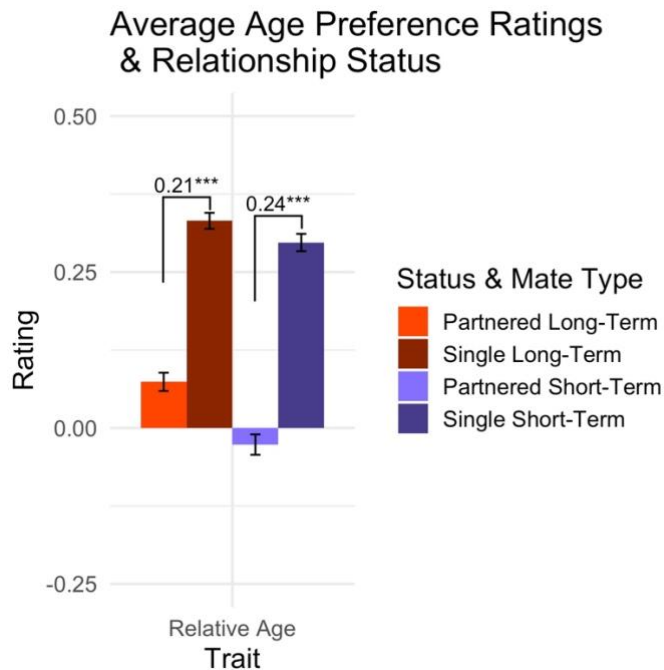


Figure 20. Average relative age preference ratings by type of mate (long-term and short-term) and by relationship status (partnered and single). Error bars represent 95% confidence intervals. Numbers over bars depict average random slope (b) values across countries. Positive values indicate that single participants had an older relative age preference compared to partnered participants. *** indicates $p < .001$

Across cultures, participants with a romantic partner and single participants reported different preferences for the relative age of an ideal short-term mate on average, $b = 0.24$, $SE = 0.03$, $p < .001$ (Figure 20). Partnered participants preferred a short-term mate close to their

own age, $M = -0.03$, 95% CI s = $[-0.04, -0.01]$, while single participants preferred a short-term mate older than themselves, $M = 0.30$, 95% CI s = $[0.28, 0.31]$. The difference (b) ranged from -0.03 in Switzerland to 0.89 in Tunisia.

It is important to note, that the two groups, partnered and single, differ in age. Overall, the average age of partnered individuals was $M = 35$, $Mdn = 32$ and the average age of single individuals was $M = 28$, $Mdn = 23$.

Preferences Across Age

We examined the long-term and short-term mate preferences of men and women across age (Figure 21). Overall, there were not any clear patterns— preferences were relatively stable across the lifespan, on average.

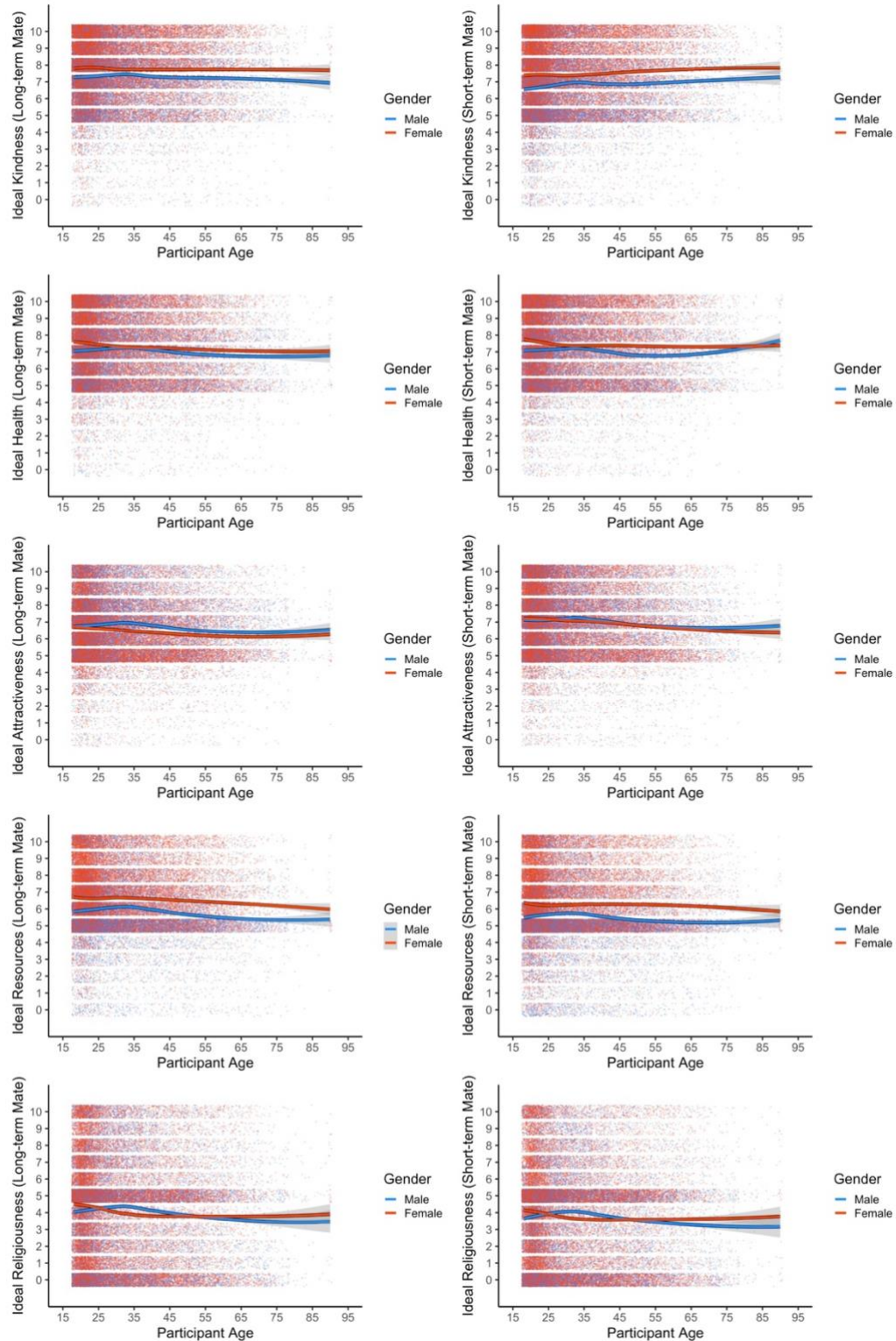


Figure 21. Ideal long-term mate preferences (left column) and ideal short-term mate preferences (right column) plotted across participants' ages, separately for female and male participants. Data are jittered to reduce overplotting. Trend lines were generated by locally estimated scatterplot smoothing to illustrate the pattern of the data. Shaded areas indicate 95% confidence intervals.

Discussion

Patterns of short-term mate preferences have received less attention in the mate preference literature compared to long-term preferences. Part of this gap is likely because people pursuing short-term mating strategies can have a variety of different goals (Buss & Schmitt, 1993). This variation in desired outcomes from short-term mating makes straightforward predictions about the universal patterns of short-term mate preferences challenging to imagine. However, by examining patterns of short-term preferences in a large, cross-cultural sample, we give the short-term mate preference literature a solid empirical foothold. We also replicated prior work examining long-term mate preferences across cultures using improved measures of mate preferences.

Gender Differences in Short-Term Mate Preferences Across Cultures

Overall, we found that across cultures women want kinder, healthier, more religious short-term mates, with better financial prospects, than men do on average. The effect sizes for these differences were small to medium, on average. Additionally, there was variation in the size and direction of the gender difference in different countries. Furthermore, we found that both men and women had the same average preference level for the physical attractiveness of an ideal short-term partner, and that their short-term preferences for physical attractiveness were higher than their long-term preferences for physical attractiveness. These findings correspond to previous findings in the short-term mating literature: first, that women have higher short-term mate standards than men do on average (P. C. Regan, 1998b), and second, that both men and women value high levels of physical attractiveness in a short-term mate (Buunk et al., 2002; Fletcher et al., 2004; Li, 2007; Li et al., 2011; Li & Kenrick, 2006; P. Regan et al., 2000; P. C. Regan & Joshi, 2003).

Additionally, we found that on average women preferred short-term mates older than themselves, while men preferred short-term mates younger than themselves. When we examined age preferences across age, we found that older women (starting around 50) preferred short-term mates younger than themselves, on average. Men (starting around 30) preferred short-term mates younger than themselves, on average. The findings for women's age preferences for a short-term mate, especially for women over 65, are slightly different from prior findings that women prefer short-term partners close to their own age across the lifespan (Antfolk, 2017; Antfolk et al., 2015; Buunk et al., 2001, 2002). However, the current results are difficult to compare to prior studies as previous research only included participants up to age 60. Additionally, prior research used measures of minimum and maximum preferred ages, whereas here we used ideal age categories.

Our measure of ideal age preferences also limits our precision in understanding when exactly women and men prefer younger mates, because we measured ideal age preferences in age categories. For example, a 30-year-old male participant may have selected an ideal preference for a short-term mate in the 27-32 age category, but that might mean the participant wants a partner younger than himself, older than himself, or the same age as himself. However, we can say with some certainty, that that participant desires a short-term mate close to his own age. Overall, our findings of men's and women's age preferences for an ideal short-term mate dovetail with previous findings that men desire increasingly younger short-term mates across the lifespan, and women prefer short-term mates slightly older than men do, and closer to their age across early to mid-life. Older women report desiring increasingly younger short-term mates later in life. However, our sample of participants older than 60 is only 3.8% of the entire sample ($n = 1,996$ participants, 56% female). Therefore, this finding needs additional research,

though older men's and especially, older women's desire for younger short-term sexual partners is an interesting direction for future research.

The gender difference in the multivariate pattern of preferences was large, with above-chance (73%) classification of gender based on short-term mate preferences alone. Compared to long-term preferences, there were slightly smaller overall gender differences in short-term preferences. Classification of gender based on only long-term preferences was 85%, and the overall D was larger for long-term preferences compared to short-term preferences (1.11 vs. 1.05). These findings align with prior research that has found that men and women are more similar in their short-term preferences, compared to their long-term preferences (Li & Kenrick, 2006). However, it should be noted that the gender difference in short-term preferences is still quite large overall. It is unclear whether the gender difference in short-term preferences is a function of unique gender differences in short-term mating psychology or if it reflects similarity between patterns of short-term and long-term preferences among humans. In chapter 3, I will explore these possibilities.

Cross-Cultural Variation in Short-term Preferences

Findings concerning the cross-cultural variability of short-term preferences were somewhat surprising, based on theory and prior literature examining patterns of long-term mate preferences across cultures. First, in countries with high pathogen prevalence, participants preferred higher levels of religiosity in an ideal short-term mate, than in countries with low pathogen prevalence. This was unexpected from an evolutionary perspective, where pathogen prevalence has been predicted to be related to long-term mate preferences for attractiveness, health, and intelligence, but not religiosity (Gangestad et al., 2006; Gangestad & Buss, 1993). While we included extensive control variables in our analyses, it is possible that another

variable, like access to education, quality of medical care, or gender equality explains this relationship. Alternatively, pathogen prevalence may be truly related to short-term preferences for religiosity. Either way, future research is needed to understand this pattern.

Second, in countries with more gender equality, both men and women had lower preferences for kindness in an ideal short-term mate, than in countries with less gender equality, though the relationship was more negative for men. Overall, in more gender equal countries there was a larger gender difference in short-term preferences for kindness. This relationship was unexpected but was found for all three measures of gender equality. One potential explanation could be that in places where men and women are more equal, women are more able to pursue short-term relationships without negative safety or reputation related consequences, so the kindness of a short-term mate might be less important. For men, it might be more acceptable to pursue short-term mating strategies in more gender equal places, so they may not need to worry about choosing a short-term mate with desirable long-term characteristics in case of discovery and/or pregnancy and forced marriage. These are just post-hoc speculations, however, prior research has found that women's sociosexuality, or unrestricted mating, is higher in more gender equal countries (Schmitt, 2005). Alternatively, this relationship between gender equality levels and gender differences in short-term kindness preferences may just be spurious or due to another variable not included here.

Lastly, in places where men were more abundant than women, women had lower preferences for ideal short-term mates with good financial prospects. This is unexpected from a mating market perspective, which predicts that where women are scarce, they hold mating market power and the ability to have more demanding mate preferences (Walter et al., 2021). To understand this relationship further investigation is needed.

We also examined short-term preferences as a function of relationship status: single or partnered. We found that across cultures people in relationships want kinder, healthier, more attractive short-term mates with better financial prospects, than single people do, on average. The effect sizes for these differences were very small, on average. Furthermore, we found that partnered individuals wanted short-term mates close to their own age, while single individuals wanted short-term mates a few years older than themselves, on average. While these differences are interesting, one important limitation to note is that people who were single tended to be younger than people who were in relationships. Therefore, interpretation of these results is somewhat challenging, though the age difference may be why single individuals prefer older short-term mates, as younger individuals tend to have preferences for mates older than themselves.

Furthermore, it is possible that people in relationships have higher preferences because they are potentially higher mate value than single individuals, and higher mate value individuals tend to set higher mate preferences (Conroy-Beam et al., 2019). Alternatively, there may be something about being in a relationship that causes people to increase their preferences. However, previous work has shown that people in relationships are more likely to decrease their preferences toward their current partners trait level rather than increase their preferences (Gerlach et al., 2019). In sum, more research is needed to understand this pattern of results.

Long-Term Mate Preferences Across Cultures

Overall, we replicated findings from previous work examining universal gender differences in long-term mate preferences across cultures (Walter et al., 2020). We found that women desired a kinder, healthier, long-term mate that had better financial prospects, and had stronger religious beliefs, than men did, on average. Men desired a more physically attractive

long-term partner than women did, on average. The gender differences in preference for kindness, health, and resources are larger than those found in Walter et al. (2020), and the gender difference in preference for physical attractiveness is smaller than the one found in Walter et al. (2020). While this might reflect true differences in effect size across time and samples, another possibility is that the size of the gender difference changed because our measure of mate preferences changed. Our scale changed from seven points in the 2016 data to eleven points in the 2021 data. This might be the reason why the effect sizes are different.

On average, women wanted long-term mates older than themselves, and men wanted long-term mates younger than themselves. This pattern as well as the pattern of relative age preferences for an ideal long-term partner across the lifespan align with patterns found in prior research (Buss, 1989; Kenrick & Keefe, 1992; Walter et al., 2020). Overall, very young men preferred long-term mates slightly older than themselves, and then preferred increasingly younger partners as they aged. Younger women wanted partners older than themselves, then women in midlife wanted partners close to their same age, and then older women wanted partners younger than themselves, on average.

Findings regarding sources of cross-cultural variation in preferences were mixed. Results for pathogen prevalence and gender equality replicated the findings in Walter et al. (2020). Variation in long-term preferences for kindness, health, resources, and physical attractiveness was unrelated to pathogen prevalence. Variation in gender differences in long-term preferences for kindness, health, resources, and physical attractiveness was unrelated to gender equality. However, like short-term preferences, long-term preferences for religiosity were higher in places that had more pathogen prevalence. Additionally, the gender differences in preferences for resources varied as a function of sex ratio, but in the opposite direction than

has been previously found (Walter et al., 2021). Here, we found that in places where men were more abundant than women, women had lower preferences for ideal long-term mates with good financial prospects. One potential reason for this lack of replication is that the preference measure here is different than the one we used previously. Additionally, there may be better ways of testing these relationships than using nation-level sources of variation, which may be quite different from each participant's lived experience.

Limitations and Remaining Questions

One thing that is important to note about this dataset is that the data were collected online in the summer of 2021. It is possible that some of our participants were in countries that had lock downs due to Covid-19, and therefore were in unique environments that influenced their mate preferences. Additionally, data collection in our previous studies (Walter et al., 2020, Walter et al., 2021) took place within specific cities, within countries, so participants in each place were more likely experiencing similar environments to each other. As mentioned earlier, variation due to things like pathogen prevalence, gender equality, and sex ratio likely varies from place to place within a country, so participants might have different environments than the nation-level averages we used to examine cross-cultural variation in preferences.

While the results in this chapter provide information about universal gender differences in short-term and long-term preferences, there are still some unanswered questions about long-term and short-term mate preferences that need to be addressed. Previous work found that some men and women prefer well-rounded short-term mates (Li & Kenrick, 2006) and that some men and women also prefer the same qualities in a short-term mate as they do a long-term mate (Li & Kenrick, 2006; Vigil et al., 2006). From the analyses so far it is hard to know whether these patterns emerge in the current data. Therefore, in chapter three I explore differences in

short-term and long-term preferences and discover whether short-term and long-term preferences are actually distinct.

Chapter 3

Do humans have distinct long-term and short-term mate preferences?

The evolutionary psychology literature treats short-term and long-term mating strategies as distinct, each accompanied by their own set of adaptive problems faced by men and women (Buss and Schmitt, 1993). For instance, as mentioned in chapter 2, women face the problem of finding a long-term partner willing and able to invest in them and their children. Additionally, this long-term partner would need to be healthy and able to assist in parenting offspring. For a short-term mate, however, women potentially faced different set of problems. Since the relationship would be brief, women faced the problem of finding a short-term partner with high quality genes or who was able to provide immediate resources. Alternatively, women could use short-term mating strategies to secure a short-term mate that could be a potential back-up mate, or to gather information to determine whether a potential mate could be long-term mate (Buss & Schmitt, 1993).

Depending on the goals of her short-term mating strategy, a woman may look for different ideal qualities in a short-term partner. If she is looking for immediate resources, she may look for a generous mate or a wealthy mate. If she is looking for a back-up mate, she might look for qualities like kindness and access to resources. If she is looking for good genes, she might look for someone attractive and healthy. Therefore, information about a woman's mate preferences can help us make inferences about her mating strategies.

Men faced a partially different set of long-term and short-term adaptive problems. Also, as mentioned in chapter 2, men face the problem of finding a long-term partner that is able to have many children. Additionally, the partner would need to be kind and be able to help care for offspring. For a short-term mate, however, men faced a different set of problems. Since men have a lower initial minimum investment in offspring in comparison to women, men can potentially increase their reproductive success by increasing the number of fertile women they have short-term relationships with, and reducing the amount of resources and time they invest in each relationship (Buss & Schmitt, 1993).

Like women, depending on the goals of his short-term mating strategy, a man might look for different ideal qualities in a short-term partner. If he is looking to increase the number of short-term mates, he may lower his mate preference standards, so that more options meet his criteria. If he is looking for a fertile short-term partner, he may be interested in women who are young and physically attractive (Buss & Schmitt, 1993). Again, information about a man's mate preferences can help us make inferences about his mating strategies.

In the human mating literature, there is a perception that due to these different adaptive problems for different types of mates, long-term vs. short-term, humans have evolved specific and different preference psychologies that they use in the process of evaluating the desirability

of potential mates as long-term vs. short-term partners. However, when we look at the prior theoretical and empirical work on mate preferences, the picture is more complex. Due to the number reasons a person can pursue short-term strategies, it is challenging to make straightforward predictions about the pattern of short-term preferences we should expect to see in a general sense.

Correspondingly, previous work has mixed findings. For instance, some men and women prefer well-rounded short-term mates (Li & Kenrick, 2006). Some men and women also prefer the same qualities in a short-term mate as they do a long-term mate (Li & Kenrick, 2006; Vigil et al., 2006). Additionally, as found in chapter two, men and women have the same preference for the physical attractiveness level of an ideal short-term mate, on average. Therefore, there seems to be overlap, both for men's and women's short-term preferences, as well as between short-term and long-term preferences in general.

Furthermore, work in social psychology posits that short-term relationships are relationships that failed to become long-term relationships, and thus are not the result of distinct long-term and short-term mating strategies (Eastwick et al., 2018). What follows from this perspective, is that humans may just have one preference psychology that they use to evaluate potential mates and some relationships last longer than others. This aligns with some evidence that short-term and long-term mate preferences overlap.

The lack of theoretical clarity surrounding mating strategies emerges when we try to interpret the varied patterns of short-term and long-term mate preferences in the literature (Li & Kenrick, 2006). Adding to the challenge of interpretation is the fact that there are very few studies that examine short-term mate preferences, and fewer still that examine short-term and long-term mate preferences simultaneously.

Here, I wanted to examine patterns of short-term mate preferences and long-term mate preferences around the world. First, I wanted to know if people around the world indicate that they want different qualities in a short-term sexual partner vs. a long-term romantic partner. Second, I wanted to know whether these preferences correspond to the different proposed adaptive problems faced by men and women in pursuing long-term and short-term mates.

Methods

Participants

Participants were the same $n = 52,010$ (66.30% female) participants from 56 countries that comprised the sample analyzed in chapter 2.

Measures

Measures were the same as those described in chapter 2. We used short-term mate preferences for kindness, health, physical attractiveness, resources, and religiosity, as well as long-term mate preferences for the same traits. We also used relative age preferences for a short-term and long-term mate, participant gender, and the traits of participants' mates, for those who had mates.

Analyses

Differences in long-term and short-term preferences across countries

Multilevel models were used to assess within gender differences in types of mate preferences across cultures. Six multilevel models, one for each mate preference trait (physical attractiveness, resources, kindness, health, religiousness, and relative age) assessed within participant differences in long-term and short-term mate preferences. Six multilevel models assessed within women differences in short-term and long-term mate preferences for the same traits. Six multilevel models assessed within men differences in short-term and long-term mate

preferences for the same traits. In these models, the preference variable was the outcome variable, and the type of relationship (short-term or long-term) was the predictor. Participants were nested under countries, and mate preferences were nested under participants. Mate preference variables were standardized across countries prior to analyses to provide slope values comparable with Cohen's d .

K-means Clustering

I used K-means cluster analyses to determine if participants wanted different types of mates for long-term and short-term relationships. K-means clustering is a type of machine learning and data reduction technique that groups similar observations in a dataset. K-means clustering divides observations into groups such that observations in the same group are as similar as possible, and observations in different groups are as different to each other as possible. I determined the number of clusters using a scree plot. The goal is to have the fewest number of clusters that capture most of the variation in the data.

One way to think about clustering is to think of data points existing in multidimensional space and that the data could be distributed in a lot of different ways. It could be evenly distributed across all dimensions, or groups of data points could clump together in various areas in n -dimensional space. If the data fall into different distinct groups, K-means clustering will pick up on this pattern and allow us to make sense of this pattern in the data. I can then compare each group.

Here, I am using participants' ideal long-term and short-term mate preferences and determining if the data separates into distinct clusters. If each participant's ideal short-term mate and long-term mate tend to be categorized in different clusters, that would be evidence that people want different "types" of mates for short-term and long-term mates. If each

participant's ideal short-term and long-term partner tend to be categorized into the same clusters, then that would be evidence that people want the same "type" of mate for short-term and long-term relationships.

Distance between ideals and actual partner traits

As another test, I also took advantage of the data I had about participants' actual long-term romantic partner's traits, for those that had a romantic partner. I examined whether long-term mate preferences, compared to short-term mate preferences, were a better predictor of the traits of people's actual long-term partners. Essentially, I examined the distance in Euclidean space between a participant's long-term preferences and their long-term partner's traits and compared that to the distance between a participant's short-term preferences and their long-term partner's traits. If the distance between a participant's long-term preferences and their partner's traits is shorter than the distance between their short-term preferences and their partner's traits, that is additional evidence that long-term preferences correspond to long-term mate choice, and that short-term preferences are distinct from long-term preferences.

Results

Differences in long-term and short-term preferences across countries

Kindness

Across cultures, participants reported preferences for kinder ideal long-term mates than short-term mates, on average, $b = -0.19$, $SE = 0.02$, $p < .001$ (Figure 1). The average ideal long-term preference for kindness was 7.64, 95% CI s = [7.62, 7.65], and the average ideal short-term preference for kindness was 7.23, 95% CI s = [7.22, 7.25]. The difference (b) ranged from -0.51 in the United Kingdom to 0.09 in Tunisia. The difference between long-term and short-

term preferences for kindness was larger for men, $b = -0.26$, $SE = 0.03$, $p < .001$, than for women, $b = -0.16$ $SE = 0.02$, $p < .001$.

Health

Across cultures, participants reported preferences for healthier ideal short-term mates than long-term mates, on average, $b = 0.03$, $SE = 0.01$, $p = .028$. The average ideal short-term preference for health was 7.36, 95% CI s = [7.34, 7.38], and the average ideal long-term preference for health was 7.29, 95% CI s = [7.27, 7.31]. The difference (b) ranged from -0.23 in Japan to 0.26 in Georgia. The difference between short-term and long-term preferences for health was not significant for men, $b = -0.009$, $SE = 0.01$, $p = .530$. Therefore, this pattern was driven by women's preferences for a healthier short-term mate, compared to long-term mate, $b = 0.05$ $SE = 0.01$, $p = .001$.

Attractiveness

Across cultures, participants reported preferences for more physically attractive ideal short-term mates than long-term mates, on average, $b = 0.23$, $SE = 0.02$, $p < .001$. The average ideal short-term preference for attractiveness was 7.08, 95% CI s = [7.06, 7.09], and the average ideal long-term preference for attractiveness was 6.60, 95% CI s = [6.59, 6.62]. The difference (b) ranged from -0.17 in Thailand to 0.44 in Hungary. The difference between short-term and long-term preferences for attractiveness was larger for women, $b = 0.27$, $SE = 0.02$, $p < .001$, than for men, $b = 0.16$ $SE = 0.01$, $p < .001$.

Resources

Across cultures, participants reported preferences for ideal long-term mates with better financial prospects than ideal short-term mates, on average, $b = -0.18$, $SE = 0.02$, $p < .001$. The average ideal long-term preference for resources was 6.36, 95% CI s = [6.34, 6.37], and the

average ideal short-term preference for resources was 6.02, 95% *CI*s = [6.00, 6.04]. The difference (*b*) ranged from -0.43 in France to 0.08 in Algeria. The difference between short-term and long-term preferences for resources was similar for men, $b = -0.19$, $SE = 0.02$, $p < .001$, than for women, $b = -0.18$ $SE = 0.02$, $p < .001$.

Religiosity

Across cultures, participants reported preferences for more religious ideal long-term mates than short-term mates, on average, $b = -0.09$, $SE = 0.01$, $p < .001$. The average ideal long-term preference for religiosity was 4.14, 95% *CI*s = [4.12, 4.17], and the average ideal short-term preference for religiosity was 3.83, 95% *CI*s = [3.80, 3.85]. The difference (*b*) ranged from -0.39 in Morocco to -0.002 in Malaysia. The difference between short-term and long-term preferences for religiosity was similar for men, $b = -0.08$, $SE = 0.01$, $p < .001$, and women, $b = -0.10$ $SE = 0.01$, $p < .001$.

Relative Age

Across cultures, participants reported preferences for younger ideal short-term mates than long-term mates, on average, $b = -0.07$, $SE = 0.01$, $p < .001$. The average ideal short-term preference for relative age was 0.14, 95% *CI*s = [0.13, 0.15], and the average ideal long-term preference for relative age was 0.21, 95% *CI*s = [0.20, 0.22]. The difference (*b*) ranged from -0.47 in Malaysia to 0.38 in Morocco. The difference between short-term and long-term preferences for relative age was similar for men, $b = -0.08$, $SE = 0.02$, $p < .001$, and women, $b = -0.07$ $SE = 0.02$, $p < .001$.

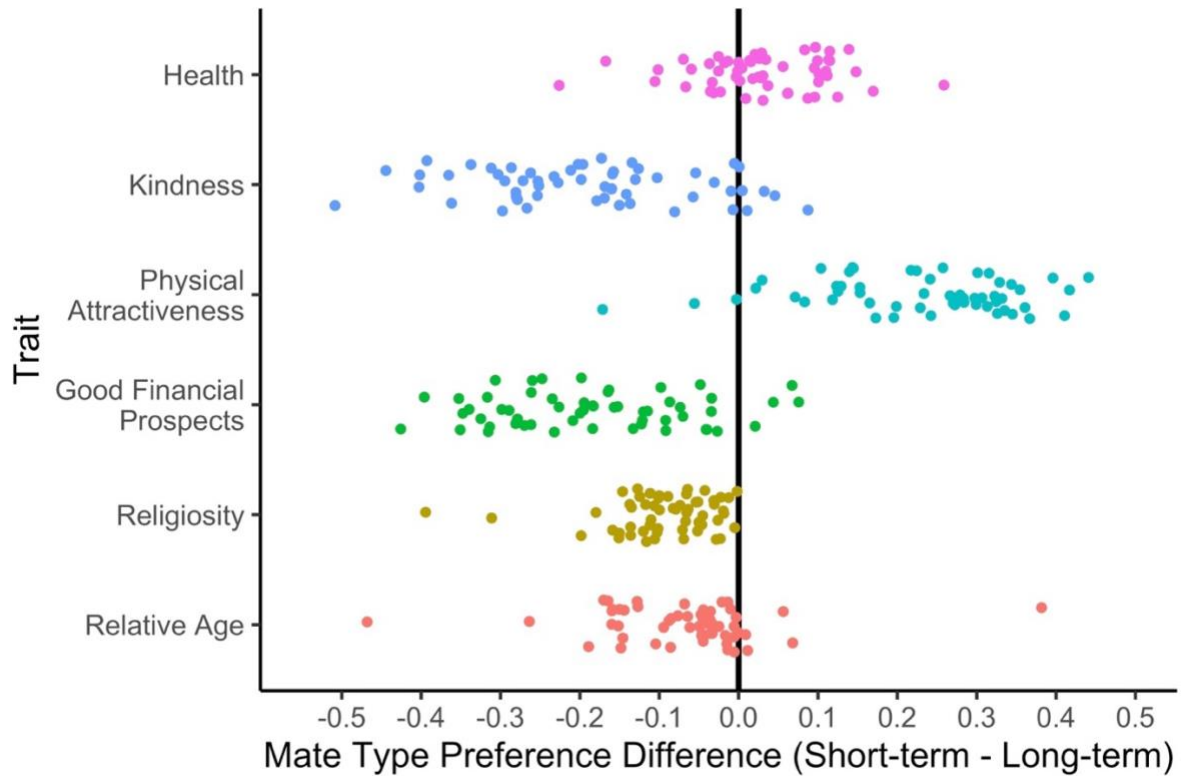


Figure 1. Mate type preference differences (short-term vs. long-term) for the six mate preferences across countries. Dot position reflects the random slope value (b) for each country. The black line depicts where values would fall if there were no difference between average short-term and long-term mate preferences in that country. For health, kindness, physical attractiveness, good financial prospects and religiosity, positive values indicate that people in that country had a higher preference for that trait for an ideal short-term mate, compared to an ideal long-term mate. Negative values indicate that people in that country had a higher preference for that trait for an ideal long-term mate, compared to an ideal short-term mate. For relative age preference, negative values indicate that people in that country preferred younger short-term mates than long-term mates, and positive values indicate that people in that country preferred older short-term mates than long-term mates. Data are jittered to reduce overplotting, and data for each trait are colored differently for easier readability.

K-means Clustering

Version 1

When I incorporated all six preference dimensions—kindness, health, attractiveness, resources, religiosity, and relative age—into the K-means analysis, three clusters emerged (Figure 2). Clusters corresponded to different overall mate values, high, medium, and low. Two clusters were also high in religiosity, and the other was low in religiosity.

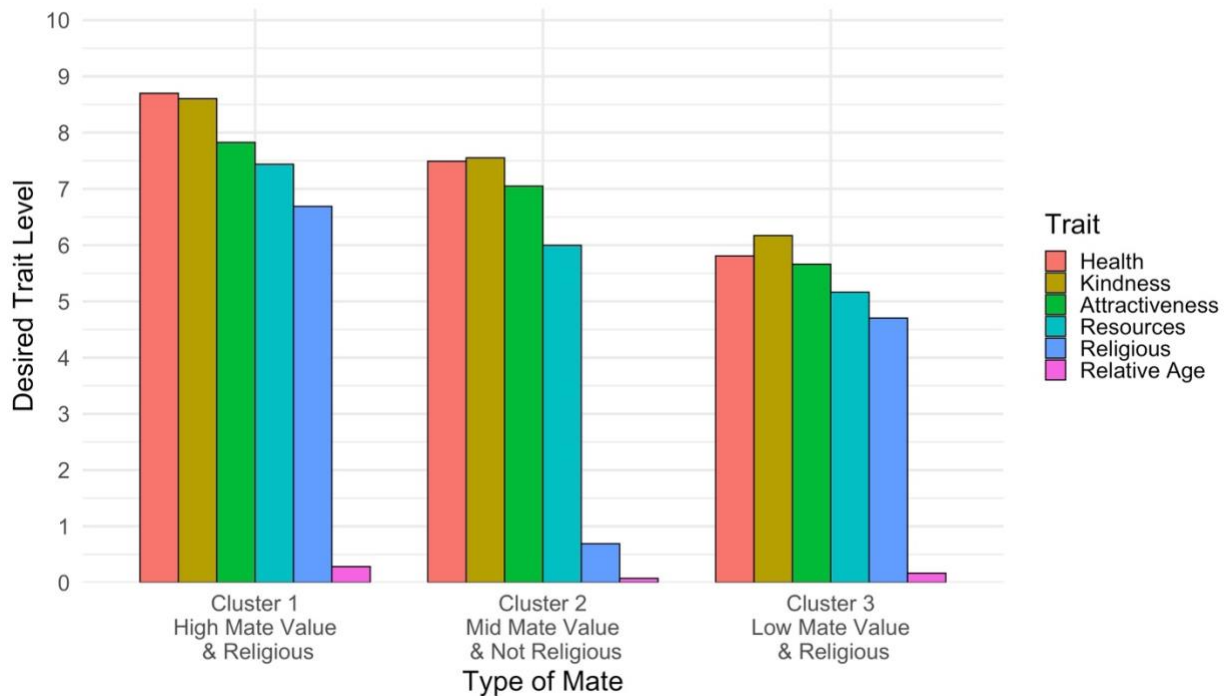


Figure 2. Average preference ratings by cluster types and by trait dimension for K-means analysis version 1.

Overall, when the data were separated into these three clusters, 77% of participants had ideal-long term mates and ideal short-term mates in the same cluster. Looking at the pattern more closely, people were fairly evenly divided across choosing both partners in either high, medium, and low mate value clusters (Table 1). This pattern is fairly typical, since participants vary in terms of their own mate value, and mate preference levels correspond to mate value (e.g. those with higher mate values can have more demanding ideal preferences).

Additionally, by looking at Table 1 we can see whether people tended to have a high mate value partner for an ideal long-term mate and low mate value partner for an ideal short-term mate, (a combination of cluster 1 and cluster 3) or vice versa (combination of cluster 3 and cluster 1). Overall, the frequency of mismatched mate value short-term and long-term ideal mate combinations is low. Most people ideally want mates of the same mate value for long-term and short-term relationships.

Table 1

Frequency of Cluster Combinations in K-means Analyses Version 1

Ideal Long-Term Mate	Ideal Short-Term Mate		
	Cluster 1- High Mate Value & Religious	Cluster 2- Med Mate Value & Not Religious	Cluster 3- Low Mate Value & Religious
Cluster 1- High Mate Value & Religious	24.15%	4.42%	4.36%
Cluster 2- Med Mate Value & Not Religious	5.61%	25.23%	3.35%
Cluster 3- Low Mate Value & Religious	4.01%	1.45%	27.43%

Version 2

As there was not strong evidence that people have different ideal short-term and long-term mate preferences in terms of mate value, I changed the format of the data to reduce chances of this type of clustering in version two. To examine what traits participants value more than others, I ipsatized the five preferences traits, kindness, health, attractiveness, resources, and religiosity. To do so, I calculated each participant's mean preference level across their short-term and long-term ideal preferences for these five traits and calculated their individual trait preference levels relative to their own mean. That way I can tell, for example, if a person wanted higher levels of attractiveness compared to kindness levels, irrespective of overall mate value. Also, because relative age was on a different scale, I then z-scored each preference dimension, including relative age, so that all preference dimensions were on comparable scales.

When I incorporated all six preference dimensions— kindness, health, attractiveness, resources, religiosity, and relative age— into the K-means analysis after these data

transformations, two clusters emerged (Figure 3). Clusters corresponded mainly to different age and religious preferences. One cluster was high preference for religiosity and indicated preference for older age, but low preferences for all other traits. The other cluster was low in preference for religiosity and indicated preference for younger age, and high preferences for all other traits. Overall, when the data were separated into these two clusters 80% of participants had ideal long-term and short-term mates in the same cluster.

Looking at the pattern more closely, people mostly preferred both partners in cluster 1 or in cluster 2, though most people around the world wanted both long-term and short-term partners who were religious (Table 2). Participants had similar preferences for religion and age across mate types. People who want a religious long-term mate relative to other traits, also want a religious short-term mate relative to other traits. People who do not want a religious long-term mate relative to other traits, also do not want a religious short-term mate relative to other traits. Overall, the frequency of mismatched religious and age preferences is low.

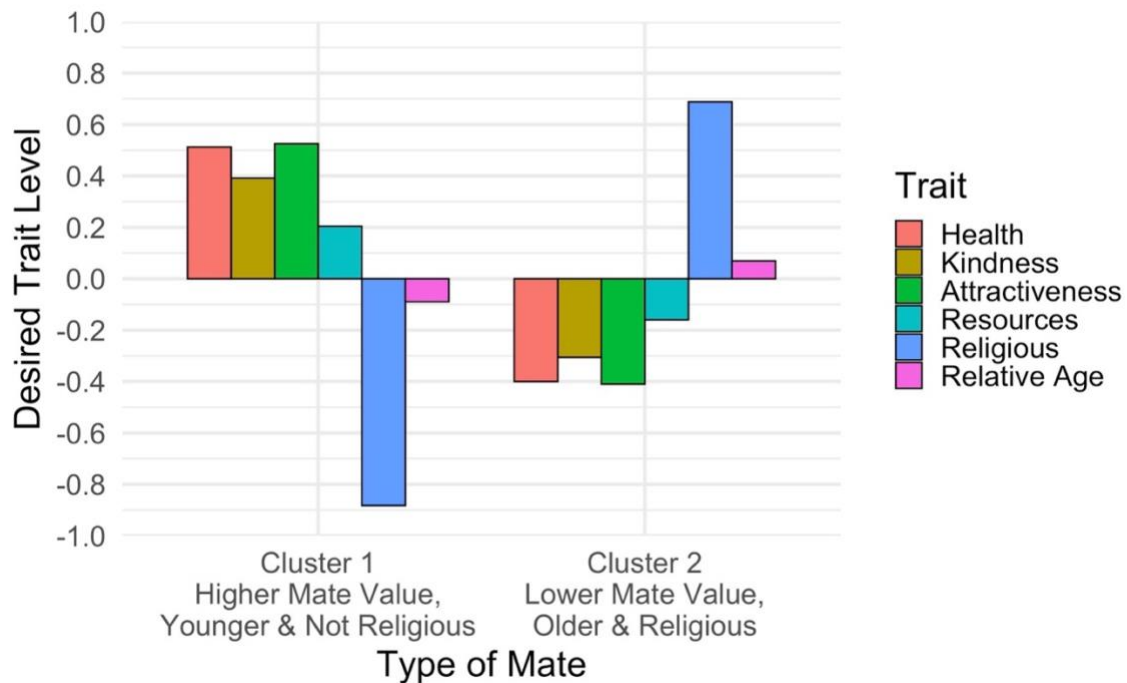


Figure 3. Average preference ratings by cluster types and by trait dimension for K-means analysis version 2.

Table 2

Frequency of Cluster Combinations in K-means Analyses Version 2

Ideal Long-Term Mate	Ideal Short-Term Mate	
	Cluster 1- Higher Mate Value, Younger & Not Religious	Cluster 2- Lower Mate Value, Older & Religious
Cluster 1- Higher Mate Value, Younger & Not Religious	33.81%	9.84%
Cluster 2- Lower Mate Value, Older & Religious	10.19%	46.15%

Version 3

Because age and religiousness seemed to dominate the structure of the clusters in this version of the K-means analysis, and I am interested in mate type tradeoffs between kindness, health, physical attractiveness, and resources, I conducted a third version of the K-means cluster analysis just using these four preference dimensions. Again, I ipsatized these preferences so I could examine relative preferences for different traits.

When I incorporated these four preference dimensions— kindness, health, attractiveness, and resources— into the K-means analysis, three clusters emerged (Figure 4). Overall, when the data were separated into these three clusters, 59% of participants had ideal-long term and ideal short-term mates in the same cluster. When we removed religion and age, a well-rounded cluster emerged, where participants had ideal preferences for close to equal levels of health, kindness, attractiveness and resources.

Looking at the pattern more closely, the most frequent mate type combination was preferences for well-rounded short-term mates and well-rounded long-term mates (Table 3).

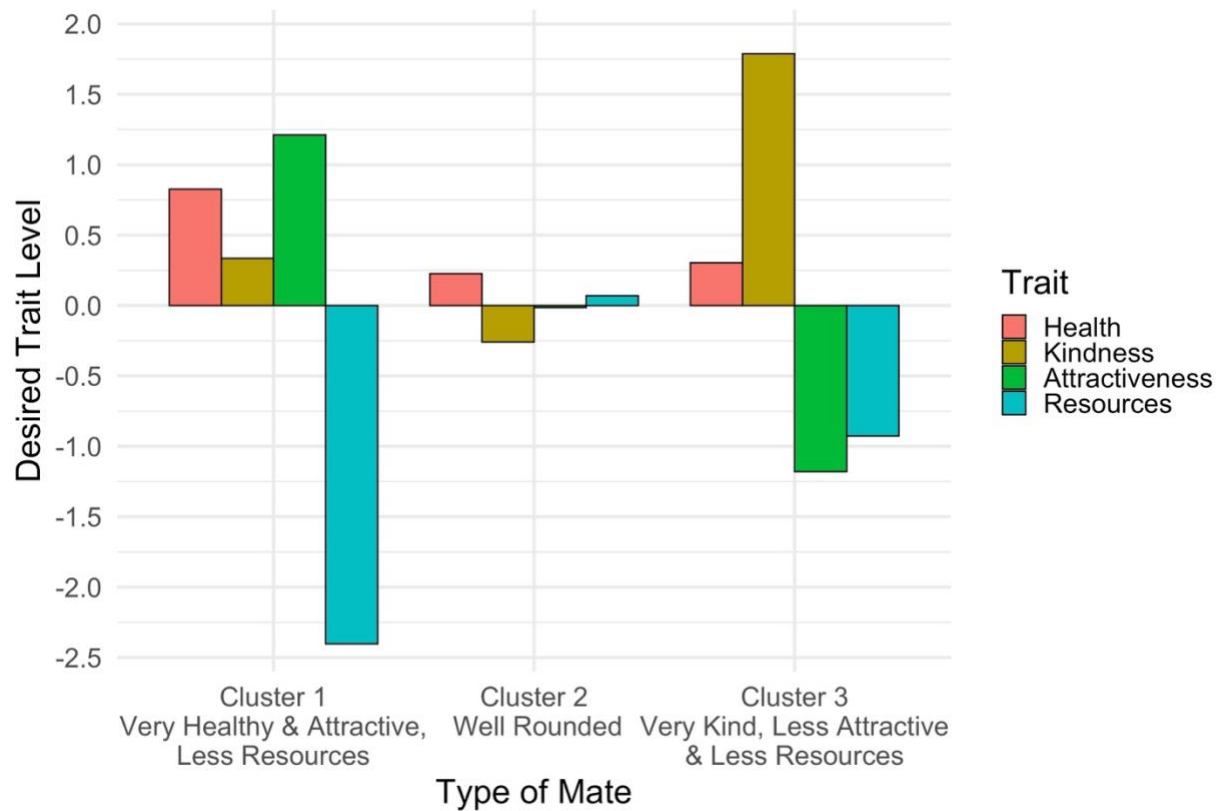


Figure 4. Average preference ratings by cluster types and by trait dimension for K-means analysis version 3.

Table 3

Frequency of Cluster Combinations in K-means Analyses Version 3

Ideal Long-Term Mate	Ideal Short-Term Mate		
	Cluster 1- Very Healthy & Attractive, Less Resources	Cluster 2- Well Rounded	Cluster 3- Very Kind, Less Attractive & Less Resources
Cluster 1- Very Healthy & Attractive, Less Resources	9.21%	3.60%	1.74%
Cluster 2- Well Rounded	9.17%	33.51%	6.27%
Cluster 3- Very Kind, Less Attractive & Less Resources	9.59%	10.78%%	16.14%

Additionally, well-rounded was the most frequent cluster for both long-term mates (48.95%), and short-term mates (47.89%). Cluster 3 (Very Kind) was the second most frequent classification for ideal long-term mate (36.51%), while Cluster 1 (Very Healthy & Attractive) was the second most frequent classification for ideal short-term mate (27.97%).

Distance between ideals and actual partner traits

On average, the distance, out of a possible distance of 0-10, between a participant's long-term preferences and their partner's traits (long-term mate preference fulfillment) was 1.82. A distance of zero means that a partner meets their ideal preferences perfectly. On average, the distance between a participant's short-term preferences and their partner's traits (short-term mate preference fulfillment) was 2.02. The difference between long-term preference fulfillment and short-term preference fulfillment was statistically significant, $b = 0.17$, $SE = 0.01$, $p < .001$. The difference (b) ranged from 0.05 in Malaysia to 0.24 in Italy.

Overall, on average, the distance between long-term mate preference fulfillment and short-term mate preference fulfillment for each participant was 0.20 (Figure 5). For 54% of participants, their actual partner's traits were closer to their ideal long-term preferences than their ideal short-term preferences.

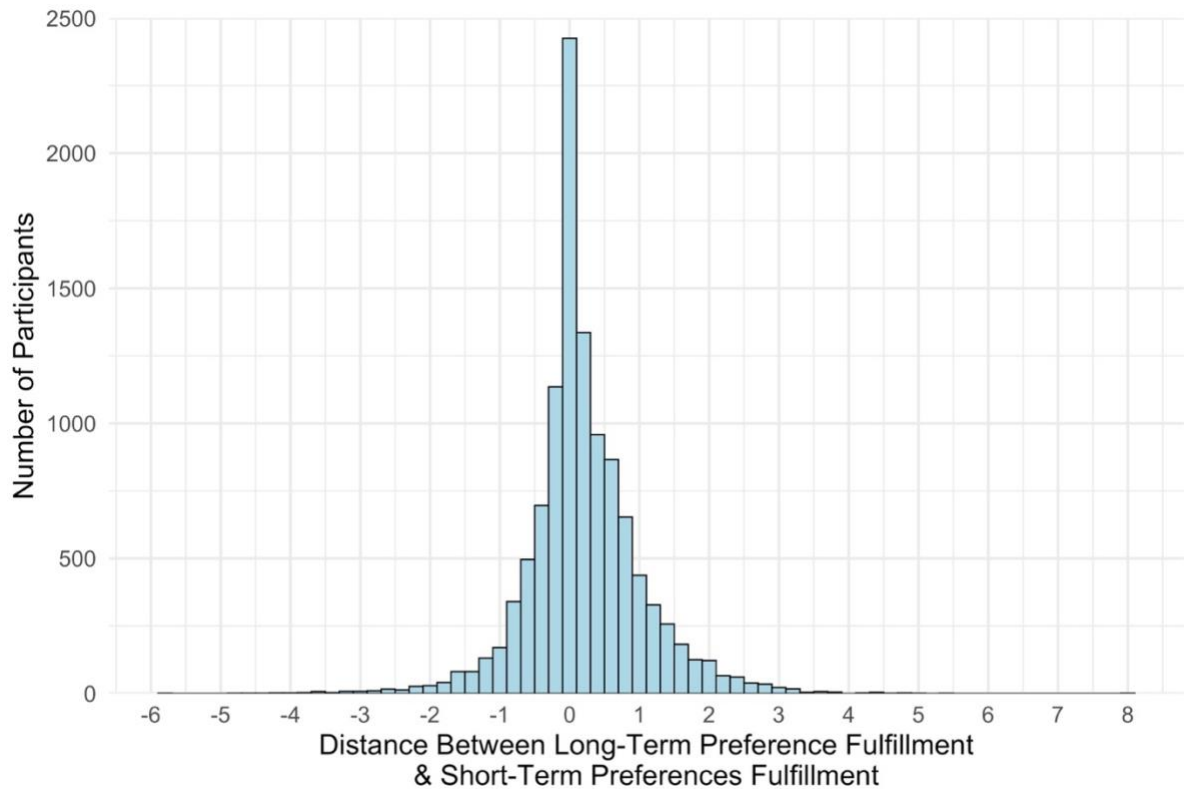


Figure 5. Histogram showing the distance between long-term preference fulfillment and short-term preference fulfillment by number of participants. The average distance was 0.20. Positive values indicate that the participant’s long-term preferences were closer to their actual partner’s traits than their short-term preferences. Negative values indicate that the participant’s short-term preferences were closer to their actual partner’s traits than their long-term preferences.

Discussion

Short-term and long-term mating strategies are often considered distinct approaches to mating. If this is the case, we should expect to see different patterns of short-term and long-term mate preferences. The prior literature, however, has found mixed support for distinct long-term and short-term mate preferences, finding an overall higher preference for physical attractiveness in a short-term mate compared to a long-term mate, but also finding that people prefer both well-rounded long-term and short-term mates, and also that men, in particular, have lower preferences for short-term mates (Li & Kenrick, 2006; P. C. Regan, 1998a). Here, I used a variety of analyses to examine the differences between short-term and long-term ideal mate preferences.

Overall, I found that on average people had ideal short-term preferences for kindness, resources, and religiosity, that were lower than their ideal long-term preferences. I also found that people preferred more attractive and younger ideal short-term mates, compared to ideal long-term mates. However, when I did a K-means cluster analysis and included all the preferences dimensions measured here (kindness, health, resources, attractiveness, religiosity, and relative age), I found that 77% of participants wanted the same type of mate for both long-term and short-term relationships. Because the clusters in this version of the analyses varied by overall mate value (separated into high, medium, and low mate value clusters), I was able to examine whether people had different standards for short-term and long-term mates. Overall, there was little evidence in support of the prediction that people have qualitatively meaningful lower ideal preferences for a short-term mate compared to a long-term partner. Most people wanted ideal short-term and long-term mates that had the same overall mate value.

When I included just the four trait dimensions, kindness, health, resources, and physical attractiveness, in my cluster analysis, I found that 59% of participants wanted the same type of mate for short-term and long-term relationships. The most common preferred short-term and long-term mate types were well-rounded mates. However, around a quarter of participants (27%) wanted a short-term mate that was very healthy and very attractive. This fits with predictions that some people prioritize traits that may indicate good genes or fertility in a short-term mate, but others prefer well-rounded mates for both mate types.

Furthermore, I found that participants' long-term mate preferences were a better predictor of participants' long-term partner's traits compared to their short-term mate preferences, on average. However, the difference was relatively small, and long-term

preferences only predicted their long-term mate's traits better than short-term preferences for 54% of participants.

In summary, a large portion of people seem to have similar preferences for long-term and short-term mates. However, this pattern might be due to the particular preference dimensions measured here. Certain traits, like religiosity and relative age, seemed to be preferred similarly by many participants for ideal short-term and long-term mates. Other traits, like kindness, physical attractiveness, and resources had larger on average differences between mate types. Additionally, it seems like there is a subset of participants that have qualitatively different preferences for ideal long-term and short-term mates. One variable that could help explain these individual differences could be sociosexuality, or the tendency to desire and engage in unrestricted or short-term mating. It's possible that people with more distinct long-term and short-term preferences score higher on measures of sociosexuality.

There are also differences in how acceptable short-term mating behavior is across cultures, which may have influenced some participants' short-term mate preferences as well. Additionally, one limitation of this cross-cultural study might be our short-term mate preference measure. While we specified in the directions that we were asking about short-term mates in particular, in our question stem we asked about ideal preferences for a sexual partner. This might have led to some confusion because sexual partners are not always short-term—long-term partners are usually sexual partners too.

Part of the challenge of interpreting the pattern of results found here is due to a lack of clarity about what these different relationship types (“long-term” and “short-term”) mean. Mating relationships do not vary on just one dimension, but several. First, there is a temporal dimension, which is the dimension that is typically used to categorize different types of

relationships (Buss & Schmitt, 2016). And yes, relationships do vary in the length of time that they last, from short to long durations. However, there are potentially other additional important dimensions of variation in relationship types that have implications for mate preferences. For example, there is likely an investment dimension—the proportion of a person’s energy and resources that are going towards the relationship partner over the relationship time period. A potential mate that one plans to invest in or cooperate with over time may be considered differently than a potential mate that one plans to spend very little energy and resources on. Additionally, there are differences in the types of interpersonal dynamic between partners— whether the relationship is platonic, romantic, sexual, or some combination of these. Again, a potential sexual partner may be considered differently than a potential platonic partner. While short-term and long-term mating may seem intuitive as categories, they are not necessarily fully capturing all the dimensions of human mating strategies. Additionally, it is unclear what assumptions participants are making when they answer questions about short-term and long-term mates. The additional dimensions discussed here likely influence variation in mate preferences across mate types.

Furthermore, the reliance on short-term vs. long-term categorization has limited how we conceptualize the problems our ancestors faced—namely whether and how they pursued different types of relationships across evolutionary history. For example, there is not a clear picture of what short-term mating relationships were like ancestral environments, though there is evidence that humans did not pursue only monogamous long-term pair bonds (Scelza, 2011; Symons, 1979). Other research has shown that it was unlikely for an individual to meet and interact with another person only one time in ancestral environments (Delton et al., 2011; Krasnow et al., 2013). There are relationships that occur the modern mating environment, for

instance, one-night sexual relationships with an unknown stranger, that may not have even been possible in ancestral environments. Future work could consider what short-term relationships looked like and how short-term relationships differed from long-term relationships like marriages over evolutionary history. Theoretical work considering ancestral environments can help us gain a better understanding about how preferences might shift when people are pursuing different kinds of mates.

Overall, while there are on average differences between reported short-term and long-term mate preferences, most participants preferred the same type of ideal mate for short-term and long-term relationships. However, there is a subset of participants that have distinct preferences for long-term and short-term mates. On average, people prefer higher levels of physical attractiveness in an ideal short-term mate, similar levels of health, and lower levels of kindness and resources, compared to the level of these traits they prefer in an ideal long-term mate. Future work could examine individual differences sociosexuality, explore short-term mating goals, and outline the problems our ancestors faced in choosing different types of mates across more than just a temporal dimension to help explain these different patterns of short-term mate preferences.

Conclusion

What we know about dealbreakers and mate preferences

In this dissertation, I set out to answer a series of questions about dealbreakers and mate preferences. I attempted to go beyond intuition and prior assumptions to uncover what is happening with dealbreakers in the mind and examine short-term and long-term mate preferences around the world. As with any scientific inquiry, there are limitations to what I was able to discover and what I can say with certainty. In fact, the only thing I know for certain is that more research is needed. However, I can share a few pieces of knowledge gleaned from these research projects, with the caveat that some healthy skepticism is encouraged until replications can be done.

Research Questions 1 & 2: What are dealbreakers? How do dealbreakers influence attraction and mate choice?

Dealbreakers can either be disqualifiers, that is, traits that cause us to eliminate people as potential mates, or preferences, that is, traits that influence how attractive we find a potential mate. Here, I found evidence that we use a person's sex as a disqualifier. For example, if a person is not our preferred sex, we do not consider them to be a potential mate and do not calculate our attraction to them. Here, I also found evidence that other traits that are commonly referred to as dealbreakers, like smoking status, height, and religion, influence how attractive we find a person. For example, if a person does not meet our height preference, their overall attractiveness goes down by some amount.

Overall, some remaining questions to explore include how dealbreakers influence mating behavior at later stages in the mating process (e.g. when one is already committed to a partner), and which dealbreaker traits we use to make mating decisions. I did not find strong evidence that every dealbreaker trait I tested was used in people's mate choices. However, that could be due to the methodology I used or reflect reality—only future research will be able to determine the answer.

Research Question 3: Do universal patterns of long-term mate preferences and gender differences in long-term mate preferences across cultures replicate?

Yes, I found that men and women, on average, prefer long-term romantic partners who are kind and healthy. Women, more so than men, prefer ideal long-term romantic partners with better financial prospects. Men, more so than women, prefer more physically attractive ideal long-term romantic partners. Overall, women had higher ideal preferences than men did, on average. I also found that gender differences in preferences were unrelated to national-level

gender equality indices. Additionally, pathogen prevalence did not predict long-term mate preferences for health, kindness, resources, or attractiveness. These patterns replicate prior findings in the long-term mate preference literature (Walter et al., 2020). In contrast, prior findings that women's and men's long-term mate preferences for resources are higher in places where they are scarce, compared to where they are abundant did not replicate in the current dataset (Walter et al., 2021). One potential reason for this lack of replication could be the different measure of mate preferences I used in the current study. Another potential reason could be that participants were distributed throughout countries and sex ratio may differ in different towns and cities. Prior research has examined variation in preferences as a function of sex ratio using data drawn from cities (Munro et al., 2014; Walter et al., 2021). Therefore, the country-wide sampling method used here may not provide the best test of this relationship.

Research Question 4: What are the patterns of short-term mate preferences across cultures?

Overall, I found that men and women, on average, prefer short-term sexual partners who are kind, healthy, and physically attractive. Overall, women had higher ideal short-term preferences for kindness, health, and resources than men did. Both men and women preferred the same level of physical attractiveness in a short-term mate, on average. Men preferred short-term mates younger than themselves on average, while women preferred short-term mates older than themselves on average.

In terms of sources of cross-cultural variation, pathogen prevalence did not predict short-term mate preferences for health, kindness, resources, or attractiveness. Gender differences in ideal short-term preferences for kindness were related to national-level gender equality indices. Specifically, both men's and women's ideal short-term preferences for

kindness were lower in more gender equal countries and this relationship was more negative for men. Furthermore, like the findings for long-term preferences, women's and men's short-term mate preferences for resources are lower in places where they are scarce, compared to where they are abundant, which is contrary to what was predicted. As this was the first large-scale study of short-term mate preferences across cultures, future work will be needed to see if this pattern of results replicates.

Research Question 5: Are short-term mate preferences distinct from long-term mate preferences?

Yes, and no. There are on average differences between short-term and long-term preferences. However, cluster analyses revealed that the majority of participants (59-80%) preferred the same type of ideal mate for short-term and long-term relationships. On average, people prefer higher levels of physical attractiveness in an ideal short-term mate, similar levels of health, and lower levels of kindness and resources, compared to the amount they prefer in an ideal long-term mate. However, these on average differences may be driven by only a portion of participants in the sample. It is possible that there are individual differences in short-term mating goals and interest in short-term mating that explain these different patterns of short-term mate preferences. Overall, while the projects presented in this dissertation have added additional knowledge about dealbreakers and mate preferences, there is still more research to be done.

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Appendix

Measures

Disqualifiers

Below is the disqualifier measure for Chapter 1, Study 2. Participants also reported their own traits using the same measures.

Directions: Here, we are interested in factors that cause people to **rule someone out** as a potential romantic partner.

Everyone has some requirements that they expect a romantic partner to meet.

Below are some of the factors that many people use to determine whether someone is acceptable or unacceptable for them as a romantic partner.

Please consider each factor and tell us what would be **acceptable** to you in a romantic partner.

Which of the following would be an **acceptable number of children** for a potential romantic partner to have?

Please select as many or as few options as are applicable for you.

- ☐ 0 children
 - ☐ 1 children
 - ☐ 2 children
 - ☐ 3 children
 - ☐ 4 or more children
-

Which of the following **sexual orientations** would be **acceptable** in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Heterosexual
 - ☐ Bisexual
 - ☐ Gay/Lesbian
 - ☐ Asexual
-

Which of the following **racess/ethnicities** would be **acceptable** in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Asian/Pacific Islander
 - ☐ Black or African American
 - ☐ Hispanic or Latino
 - ☐ Native American or American Indian
 - ☐ Middle Eastern or North African
 - ☐ White
-

Which of the following **religious affiliations** would be **acceptable** in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Christian (Protestant)
 - ☐ Christian (Catholic)
 - ☐ Christian (Mormon)
 - ☐ Jewish (Orthodox)
 - ☐ Jewish (Reform)
 - ☐ Jewish (Conservative)
 - ☐ Muslim
 - ☐ Buddhist
 - ☐ Hindu
 - ☐ Atheist
 - ☐ Agnostic
-

Which of the following **heights** would be **acceptable** to you in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Under 5 feet, 0 inches
 - ☐ 5 feet, 1 inch -- 5 feet, 3 inches
 - ☐ 5 feet, 4 inches -- 5 feet, 6 inches
 - ☐ 5 feet, 7 inches -- 5 feet, 9 inches
 - ☐ 5 feet, 10 inches -- 6 feet, 0 inches
 - ☐ 6 feet, 1 inch -- 6 feet, 3 inches
 - ☐ Over 6 foot, 4 inches
-

Which of the following **weights** would be **acceptable** to you in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Very light (Bottom 5 out of 100 people)
 - ☐ Somewhat light (Bottom 14 out of 100 people)
 - ☐ Slightly light (Bottom 29 out of 100 people)
 - ☐ Average (Top 50 out of 100 people)
 - ☐ Slightly heavy (Top 29 out of 100 people)
 - ☐ Somewhat heavy (Top 14 out of 100 people)
 - ☐ Very heavy (Top 5 out of 100 people)
-

Which of the following **cigarette smoking habits** would be **acceptable** to you in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Regularly smokes
 - ☐ Rarely smokes
 - ☐ Doesn't smoke
-

Which of the following **levels of education** would be **acceptable** to you in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Less than a high school diploma or equivalent
 - ☐ High school diploma or equivalent
 - ☐ Some college
 - ☐ Associate's degree
 - ☐ Bachelor's degree
 - ☐ Advanced degree
-

Which of the following **social classes** would be **acceptable** to you in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Lower class
 - ☐ Lower-Middle Class
 - ☐ Middle Class
 - ☐ Upper-Middle Class
 - ☐ Upper-Class
-

Which of the following **political orientations** would be **acceptable** to you in a potential romantic partner?

Please select as many or as few options as are applicable for you.

- ☐ Very conservative
- ☐ Conservative
- ☐ Slightly conservative
- ☐ Center
- ☐ Slightly liberal
- ☐ Liberal
- ☐ Very liberal

Mate Preference Measure, Chapter 1

Below is an example preference question. All had the same format. We asked about 31 qualities. Participants additionally stated their own qualities, and their mates qualities using these same set of questions. The 31 qualities were: romantic, cuddly, driven, motivated, artistic, creative, positive, optimistic, healthy, healthy lifestyle, how often laughs, comical, intelligent, knowledgeable, like kids, parenting skills, generous, considerate, attractive face, attractive body, religious, involved with religion, financially stable, earning potential, good in bed, strength of sexual desire, respected by others, looked up to, quality of relationship with family, involved with family, age.

Directions: For the following questions, we are interested in what you desire in an **ideal long-term partner (e.g. committed, romantic relationship)**.

Below are a number of qualities a potential long-term partner might possess. Please think about your ideal long-term partner in comparison to all adults (ages 18-75) within your country.

For some questions, you might prefer your ideal partner to possess a lot the quality compared to the average person. For other questions, you might prefer your ideal partner to be similar to the average adult. And for some questions, you might prefer your ideal partner to possess much less of the quality than the average person in your country.

To clarify how common or rare these qualities are, we have included for reference the rough numbers of people (out of 100) who are higher or lower than each value on each quality.

Please consider each quality below and rate how much of each quality you would prefer in an **ideal long-term (committed, romantic) partner**.

How **romantic** should your ideal romantic partner be?

- ☐ **Extremely unromantic** (Bottom 1 out of 100 people)
- ☐ (Bottom 3 out of 100 people)
- ☐ (Bottom 8 out of 100 people)
- ☐ (Bottom 18 out of 100 people)
- ☐ (Bottom 32 out of 100 people)
- ☐ **Average** (Top 50 out of 100 people)
- ☐ (Top 32 out of 100 people)
- ☐ (Top 18 out of 100 people)
- ☐ (Top 8 out of 100 people)
- ☐ (Top 3 out of 100 people)
- ☐ **Extremely romantic** (Top 1 out of 100 people)

Disqualifiers

Below is the disqualifier measure for Chapter 1, Study 3. Participants also reported their own traits using the same measures.

Directions: Here, we are interested in factors that cause people to **rule someone out** as a potential romantic partner.

Everyone has some requirements that they expect a romantic partner to meet.

Below are some of the factors that many people use to determine whether someone is acceptable or unacceptable for them as a romantic partner.

Which of the following would be an **unacceptable number of dependent children** for a potential romantic partner to have from a previous relationship?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ 0 children
 - ☐ 1 children
 - ☐ 2 children
 - ☐ 3 children
 - ☐ 4 or more children
-

Which of the following **rac**es/**ethn**icities would be **unacceptable** in a potential romantic partner?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ Asian/Pacific Islander
 - ☐ Black or African American
 - ☐ Hispanic or Latino
 - ☐ Native American or American Indian
 - ☐ Middle Eastern or North African
 - ☐ White
-

Which of the following **religious affiliations** would be **unacceptable** in a potential romantic partner?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ Christian (Protestant)
 - ☐ Christian (Catholic)
 - ☐ Christian (Mormon)
 - ☐ Jewish (Orthodox)
 - ☐ Jewish (Reform)
 - ☐ Jewish (Conservative)
 - ☐ Muslim
 - ☐ Buddhist
 - ☐ Hindu
 - ☐ Atheist
 - ☐ Agnostic
 - ☐ Spiritual, but not religious
-

Which of the following **heights** would be **unacceptable** to you in a potential romantic partner?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ Under 5 feet, 0 inches
 - ☐ 5 feet, 1 inch -- 5 feet, 3 inches
 - ☐ 5 feet, 4 inches -- 5 feet, 6 inches
 - ☐ 5 feet, 7 inches -- 5 feet, 9 inches
 - ☐ 5 feet, 10 inches -- 6 feet, 0 inches
 - ☐ 6 feet, 1 inch -- 6 feet, 3 inches
 - ☐ Over 6 foot, 4 inches
-

Which of the following **weights** would be **unacceptable** to you in a potential romantic partner?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ Very light (Bottom 5 out of 100 people)
 - ☐ Somewhat light (Bottom 14 out of 100 people)
 - ☐ Slightly light (Bottom 29 out of 100 people)
 - ☐ Average (Top 50 out of 100 people)
 - ☐ Slightly heavy (Top 29 out of 100 people)
 - ☐ Somewhat heavy (Top 14 out of 100 people)
 - ☐ Very heavy (Top 5 out of 100 people)
-

Which of the following **cigarette smoking habits** would be **unacceptable** to you in a potential romantic partner?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ Regularly smokes
 - ☐ Rarely smokes
 - ☐ Doesn't smoke
-

Which of the following **amounts of education** would be **unacceptable** to you in a potential romantic partner?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ Grade school only
 - ☐ Grade school through Middle school/Junior high
 - ☐ Grade school through High school
 - ☐ Grade school through Some college
 - ☐ Grade school through Associate's degree
 - ☐ Grade school through Bachelor's degree
 - ☐ Grade school through Master's degree
 - ☐ Grade school through PhD, MD, JD or other doctorate degree
-

Think of this ladder as representing where people stand in the United States. At the **top** of the ladder are the people who are the best off – those who have the most money, the most education, and the most respected jobs. At the **bottom** are the people who are the worst off – those who have the least money, least education, the least respected jobs, or no job. The higher up you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the very bottom.

Which rungs of the ladder would be **unacceptable** in a potential romantic partner? Click once on each rung that you find unacceptable in a potential romantic partner. Please select as many or as few options as you like. If you click a rung by mistake, click it again to remove your selection.



Which of the following **political orientations** would be **unacceptable** to you in a potential romantic partner?

Please select **each** option that would be unacceptable to you; you can select **as many or as few options** as you like.

- ☐ Very conservative
 - ☐ Conservative
 - ☐ Slightly conservative
 - ☐ Center
 - ☐ Slightly liberal
 - ☐ Liberal
 - ☐ Very liberal
-

Which of the following **political party affiliations** would be **unacceptable** to you in a potential romantic partner?

Please select each option that would be unacceptable to you; you can select as many or as few options as you like.

- ☐ Republican
- ☐ Democrat
- ☐ Libertarian
- ☐ Green
- ☐ No party affiliation

Chapters 2 & 3 Short-term and Long-term Mate Preference Measures

Long-Term Preference Measure

Directions: For the following questions, we are interested in what you **ideally desire** in a **long-term partner (e.g. committed, romantic relationship)**.

Below are a number of qualities a potential long-term partner might possess. Please think about your ideal long-term partner in comparison to all adults (ages 18-75) within your country.

For some questions, you might prefer your ideal partner to possess a lot of the quality compared to the average person. For other questions, you might prefer your ideal partner to be similar to the average adult. And for some questions, you might prefer your ideal partner to possess much less of the quality than the average person in your country.

To clarify how common or rare these qualities are, we have included for reference the rough numbers of people (out of 100) who are higher or lower than each value on each quality.

Please consider each quality below and rate how much of each quality you would prefer in an **ideal long-term (committed, romantic) partner**.

If you find no answer applicable or don't know, you can leave it empty and go to the next question.

How **physically attractive** should your ideal romantic partner be (**i.e. your most preferred value**)?

- ☐ **Extremely physically unattractive**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely physically attractive**(Top 1 out of 100 people)
-

How good should your ideal romantic partner's **financial prospects** be (**i.e. your most preferred value**)?

- ☐ **Extremely poor financial prospects**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely good financial prospects**(Top 1 out of 100 people)
-

How **kind** should your ideal romantic partner be (**i.e. your most preferred value**)?

- ☐ **Extremely unkind**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely kind**(Top 1 out of 100 people)
-

How **healthy** should your ideal romantic partner be (**i.e. your most preferred value**)?

- ☐ **Extremely unhealthy**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely healthy**(Top 1 out of 100 people)
-

How strong should your ideal romantic partner's religious belief be (i.e. your most preferred value)?

- ☐ **Extremely weak religious belief**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely strong religious belief**(Top 1 out of 100 people)
-

How **old** should your ideal romantic partner be in years (**i.e. your most preferred value**)?

- ☐ Under 20
- ☐ 21 - 26
- ☐ 27 - 32
- ☐ 33 - 38
- ☐ 39 - 44
- ☐ 45 - 50
- ☐ 51 - 56
- ☐ 57 - 62
- ☐ 63 - 68
- ☐ 69 - 74
- ☐ Over 75

Short-term Mate Preferences

Directions: For the following questions, we are interested in what you **ideally desire** in a **short-term partner (e.g. uncommitted, sexual relationship)**.

Below are a number of qualities a potential short-term partner might possess. Please think about your ideal short-term partner in comparison to all adults (ages 18-75) within your country.

For some questions, you might prefer your ideal partner to possess a lot the quality compared to the average person. For other questions, you might prefer your ideal partner to be similar to the average adult. And for some questions, you might prefer your ideal partner to possess much less of the quality than the average person in your country.

To clarify how common or rare these qualities are, we have included for reference the rough numbers of people (out of 100) who are higher or lower than each value on each quality.

Please consider each quality below and rate how much of each quality you would prefer in an **ideal short-term (uncommitted, sexual) partner**.

If you find no answer applicable or don't know, you can leave it empty and go to the next question.

How **physically attractive** should your ideal sexual partner be (**i.e. your most preferred value**)?

- ☐ **Extremely physically unattractive**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely physically attractive**(Top 1 out of 100 people)
-

How good should your ideal sexual partner's **financial prospects** be (**i.e. your most preferred value**)?

- ☐ **Extremely poor financial prospects**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely good financial prospects**(Top 1 out of 100 people)
-

How **kind** should your ideal sexual partner be (**i.e. your most preferred value**)?

- ☐ **Extremely unkind**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely kind**(Top 1 out of 100 people)
-

How **healthy** should your ideal sexual partner be (**i.e. your most preferred value**)?

- ☐ **Extremely unhealthy**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely healthy**(Top 1 out of 100 people)
-

How strong should your ideal sexual partner's religious belief be (i.e. your most preferred value)?

- ☐ **Extremely weak religious belief**(Bottom 1 out of 100 people)
 - ☐ (Bottom 3 out of 100 people)
 - ☐ (Bottom 8 out of 100 people)
 - ☐ (Bottom 18 out of 100 people)
 - ☐ (Bottom 32 out of 100 people)
 - ☐ **Average** (Top 50 out of 100 people)
 - ☐ (Top 32 out of 100 people)
 - ☐ (Top 18 out of 100 people)
 - ☐ (Top 8 out of 100 people)
 - ☐ (Top 3 out of 100 people)
 - ☐ **Extremely strong religious belief**(Top 1 out of 100 people)
-

How **old** should your ideal sexual partner be in years (**i.e. your most preferred value**)?

- ☐ Under 20
- ☐ 21 - 26
- ☐ 27 - 32
- ☐ 33 - 38
- ☐ 39 - 44
- ☐ 45 - 50
- ☐ 51 - 56
- ☐ 57 - 62
- ☐ 63 - 68
- ☐ 69 - 74
- ☐ Over 75

Chapter 2 Results of Models without Controls

Pathogen Prevalence Results (No Controls)

Table A. Results of Multilevel Models Predicting Each of Six Long-Term Mate Preferences
From Pathogen Prevalence (No Controls)

Trait	Pathogen Prevalence Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Est. Deaths	0.046	0.024	.055
	Years Life Lost	0.058	0.023	.015*
Attractiveness	Est. Deaths	0.023	0.023	.338
	Years Life Lost	0.033	0.024	.165
Health	Est. Deaths	0.019	0.029	.525
	Years Life Lost	0.033	0.029	.265
Kindness	Est. Deaths	-0.040	0.023	.086
	Years Life Lost	-0.031	0.023	.188
Religion	Est. Deaths	0.161	0.038	<.001***
	Years Life Lost	0.180	0.036	<.001***
Relative Age	Est. Deaths	0.035	0.024	.141
	Years Life Lost	0.040	0.023	.092

p*<.05. *p*<.01. ****p*<.001

Table B. Results of Multilevel Models Predicting Each of Six Short-Term Mate Preferences
From Pathogen Prevalence (No Controls)

Trait	Pathogen Prevalence Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Est. Deaths	0.070	0.026	.008**
	Years Life Lost	0.084	0.025	.001**
Attractiveness	Est. Deaths	-0.029	0.024	.232
	Years Life Lost	-0.022	0.024	.366
Health	Est. Deaths	0.010	0.028	.709
	Years Life Lost	0.025	0.028	.363
Kindness	Est. Deaths	-0.010	0.018	.567
	Years Life Lost	-0.001	0.019	.942
Religion	Est. Deaths	0.165	0.035	<.001***
	Years Life Lost	0.180	0.034	<.001***
Relative Age	Est. Deaths	0.042	0.024	.087
	Years Life Lost	0.052	0.024	.032*

p*<.05. *p*<.01. ****p*<.001

Gender Equality Results (No Controls)

Table C. Results of Multilevel Models Predicting Each of Six Long-Term Mate Preferences

From Gender and Gender Equality (No Controls)

Trait	Gender Equality Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	GGI	-0.014	0.031	0.645
	GDI	0.057	0.030	0.062
	GII	0.002	0.028	0.940
Attractiveness	GGI	-0.011	0.020	0.582
	GDI	-0.010	0.020	0.627
	GII	0.011	0.018	0.536
Health	GGI	-0.019	0.026	0.453
	GDI	0.036	0.025	0.151
	GII	-0.027	0.023	0.252
Kindness	GGI	0.015	0.019	0.444
	GDI	0.027	0.019	0.162
	GII	-0.003	0.018	0.855
Religion	GGI	-0.026	0.019	0.197
	GDI	0.018	0.019	0.346
	GII	0.037	0.017	0.037*
Relative Age	GGI	0.024	0.042	0.571
	GDI	-0.054	0.041	0.194
	GII	-0.031	0.037	0.404

Table D. Results of Multilevel Models Predicting Each of Six Short-Term Mate Preferences

From Gender and Gender Equality (No Controls)

Trait	Gender Equality Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	GGI	-0.017	0.029	0.553
	GDI	0.051	0.028	0.073
	GII	0.0005	0.026	0.985
Attractiveness	GGI	0.015	0.018	0.408
	GDI	0.028	0.017	0.111
	GII	-0.039	0.015	0.016*
Health	GGI	-0.010	0.023	0.658
	GDI	0.037	0.022	0.101
	GII	-0.039	0.020	0.054
Kindness	GGI	0.036	0.024	0.131
	GDI	0.062	0.021	0.006**
	GII	-0.041	0.020	0.050
Religion	GGI	-0.040	0.021	0.065

Relative Age	GDI	0.002	0.021	0.926
	GII	0.054	0.018	0.005**
	GGGI	0.048	0.040	0.237
	GDI	-0.035	0.040	0.383
	GII	-0.057	0.035	0.109

Sex Ratio Results (No Controls)

Table E. Results of Multilevel Models Predicting Each of Six Long-Term Mate Preferences
From Gender and Sex Ratio (No Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.037	0.025	.148
	Adult	-0.053	0.027	.056
	15 to 49	-0.066	0.027	.017*
Attractiveness	Birth	0.022	0.016	.191
	Adult	-0.029	0.018	.117
	15 to 49	-0.029	0.018	.121
Health	Birth	0.046	0.020	.028*
	Adult	-0.046	0.022	.045*
	15 to 49	-0.051	0.022	.029*
Kindness	Birth	0.011	0.016	.493
	Adult	0.022	0.018	.216
	15 to 49	0.013	0.018	.489
Religion	Birth	0.016	0.016	.345
	Adult	0.003	0.018	.852
	15 to 49	-0.006	0.018	.723
Relative Age	Birth	-0.047	0.034	.178
	Adult	0.021	0.038	.593
	15 to 49	0.034	0.038	.381

Table F. Results of Multilevel Models Predicting Each of Six Short-Term Mate Preferences
From Gender and Sex Ratio (No Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.032	0.024	.184
	Adult	-0.065	0.025	.011*
	15 to 49	-0.083	0.024	.001**
Attractiveness	Birth	0.024	0.015	.114
	Adult	-0.016	0.016	.348
	15 to 49	-0.016	0.017	.327
Health	Birth	0.035	0.018	.061

Kindness	Adult	-0.03	0.020	.203
	15 to 49	-0.029	0.021	.170
	Birth	0.005	0.020	.817
Religion	Adult	0.015	0.022	.503
	15 to 49	0.008	0.022	.706
	Birth	0.021	0.018	.257
Relative Age	Adult	-0.009	0.020	.639
	15 to 49	-0.022	0.020	.276
	Birth	-0.048	0.034	.160
	Adult	-0.004	0.038	.931
	15 to 49	0.007	0.038	.863

Relative Preferences Results (No Controls)

Table G. Results of Multilevel Models Predicting Each of Five Relative Long-Term Mate Preferences From Gender and Sex Ratio (No Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.055	0.031	.077
	Adult	-0.077	0.033	.025*
	15 to 49	-0.091	0.033	.008**
Attractiveness	Birth	0.021	0.029	.479
	Adult	-0.031	0.032	.338
	15 to 49	-0.040	0.032	.224
Health	Birth	0.079	0.034	.024*
	Adult	-0.076	0.038	.051
	15 to 49	-0.077	0.038	.050
Kindness	Birth	0.034	0.026	.193
	Adult	0.002	0.029	.958
	15 to 49	0.005	0.029	.853
Religion	Birth	0.036	0.042	.398
	Adult	-0.003	0.046	.947
	15 to 49	-0.030	0.046	.528

Table H. Results of Multilevel Models Predicting Each of Five Relative Short-Term Mate Preferences From Gender and Sex Ratio (No Controls)

Trait	Sex Ratio Measure	<i>b</i>	<i>SE</i>	<i>p</i>
Resources	Birth	0.045	0.027	.103
	Adult	-0.083	0.028	.005**
	15 to 49	-0.100	0.028	<.001***
Attractiveness	Birth	0.023	0.026	.385

Health	Adult	-0.016	0.028	.582
	15 to 49	-0.023	0.029	.433
	Birth	0.066	0.031	.041*
Kindness	Adult	-0.054	0.035	.129
	15 to 49	-0.053	0.036	.141
	Birth	0.024	0.030	.433
Religion	Adult	-0.004	0.033	.910
	15 to 49	0.004	0.033	.912
	Birth	0.044	0.039	.257
	Adult	-0.012	0.043	.779
	15 to 49	-0.037	0.043	.391