

Willingness to protect from violence, independent of strength, guides partner choice

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ABSTRACT

Ancestrally, physical violence from conspecifics was a recurrent adaptive problem. Did selection favor preferences for partners who are both *strong* (highly able) and *willing* to protect us from violence? Strength and willingness are interrelated, so dissociating their effects is necessary. Here we assessed both inferences and preferences. In 7 experiments ($N = 4,508$ U.S. adults recruited via MTurk), we systematically varied the willingness of a date or friend to physically protect you from an attack, compared to scenarios where you do not have this information. We also varied that person's strength. Discovering that a person is willing to protect greatly increased their attractiveness as a romantic partner or friend, regardless of their strength. This held for both women and men raters, and when evaluating both opposite- and same-sex dates and friends. In fact, partners who were willing to protect were attractive even if they tried to do so but failed, and even if you were harmed because of their failure. Discovering that a partner is unwilling to protect decreased their attractiveness, and was a deal-breaker for women evaluating a male date. Unwillingness decreased attractiveness more when the rater was a woman, when the target was a man, and when the target was being evaluated as a date versus friend. Women placed some importance on a male date's strength, but this was mostly due to inferences about his willingness to protect them. Surprisingly, we found only weak evidence that differences in strength, independent of willingness, increased the attractiveness of a partner.

1. Introduction

Imagine you are on a date downtown when someone tries to mug you. On seeing the mugger, your date runs away, leaving you behind. How attractive is this date to you as a potential long-term romantic partner? Now imagine a different date who, on seeing the mugger, steps up to protect you. How attractive is this date to you?

The *ability* of a potential partner to protect you from violence—often operationalized as physical strength—is among the factors examined in studies of what women value in potential mates and male friends (e.g., mates: Braun & Bryan, 2006; Buss & Schmitt, 2019; Ellis et al., 2002; Sell et al., 2017; friends: Bleske & Buss, 2000; Bleske-Rechek & Buss, 2001;

Lewis et al., 2011; Lewis et al., 2012). But very few studies investigate how the *willingness* of a potential partner to protect you from violence regulates how attractive you find him—or her (Bleske & Buss, 2000; Bleske-Rechek & Buss, 2001; Ellis, 1998). Moreover, none of these studies cleanly dissociate willingness from strength. Yet it stands to reason that people who are willing to protect you are physically stronger, and that stronger people will be more willing to protect you, holding all else equal. The effects of strength and willingness need to be disentangled to discover the extent to which each has effects independent of the other. Considering extreme cases shows that both are relevant: Your risk of harm is unlikely to be reduced by an invincible partner who is unwilling to protect you *or* by a willing but feeble partner. Since most

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cases fall between such extremes, one wants to know the relative importance of willingness and ability. Are our partner choice mechanisms designed to weigh willingness and/or ability to protect heavily, lightly, or not at all?

During hominin evolution, rates of violence were orders of magnitude higher than they are today. If this ancestral risk shaped partner preferences, discovering that a partner is willing and able to protect you may make them very attractive, even in safe modern environments.

Comparing rates of lethal violence provides a window into the risk of being physically attacked in modern, historical, and ancestral societies (Daly & Wilson, 1988). In the U.S. today, average rates of death due to interpersonal violence are less than 1 in 10,000 (Daly & Wilson, 1988; Pinker, 2011, Fig. 2-4, p. 55). But archeological and ethnographic data suggest that in hunter-gatherer and hunter-horticulturalist societies, rates of death due to interpersonal violence, particularly inter-group violence (Wrangham, 2019), averaged 15 %, and ranged upwards to 60 % (Pinker, 2011, Fig. 2-2, p. 49). At the upper end of the range of lethal violence, among the Waorani hunter-gatherers of Ecuador, 50–64 % of all deaths were due to interpersonal violence, primarily homicides and warfare with neighboring groups (Larrick et al., 1979). At the lower end of the range, homicide rates among the so-called “harmless people” (Thomas, 1958/1989)—Kung hunter-gatherers in southern Africa—were comparable to current rates in Detroit and New Orleans, both high crime American cities (Lee, 1979). Among chimpanzees, our closest phylogenetic relatives, there are troops in which about one-third of males died by violence, primarily due to intergroup aggression (Wilson & Wrangham, 2003; Wrangham, 1999; Wrangham et al., 2006).

These ancestral social ecologies left their fingerprints on the design of our modern psychology: There are many examples of cognitive adaptations for wielding physical violence and for mitigating the threat and negative consequences of physical violence. We readily estimate men’s physical strength—that is, their ability to inflict costs using physical aggression and violence—from their face, their body, and their voice, and these estimates closely track men’s actual physical strength (Sell et al., 2009, 2010). We can do this from very brief observations—as fast as 100 ms in duration—and may even do it spontaneously (Durkee et al., 2018). Further, men’s psychology is facultatively calibrated by their ability to inflict physical violence on others: Physically stronger men are more anger prone, feel more entitled, and are more likely to support the use of aggression to settle conflicts of interest (Sell et al., 2009); physical strength also predicts men’s attitudes toward political policies in modern mass societies (Petersen et al., 2013; Price et al., 2017; Sell et al., 2017). Finally, we are particularly sensitive to cues of possible physical aggression and violence, which is reflected in our preferential attention to anger expressions on male faces (Becker et al., 2007) and memory for anger expressions on outgroup faces (Ackerman et al., 2006; Becker et al., 2007, 2010).

Here we investigate the hypothesis that ancestral violence favored the evolution of preferences for mates and friends who are willing and able to physically protect us from violent attacks (Buss & Schmitt, 1993, 2019; Ellis, 1992; Mesnick, 1997; Symons, 1979; Wilson & Mesnick, 1997).

Social life was highly cooperative during human evolution (Foley & Gamble, 2009; Kelly, 1995; Wrangham, 2009). Our ancestors cooperated not only in foraging and caring for offspring, but in defense; in the social ecologies in which they evolved, coalitional allies, friends, and mates were their only source of protection from aggression. Under those conditions, affiliating with people who were willing and able to protect you would have been highly advantageous—a factor that was likely to have shaped the psychology of partner choice.

A few studies have explored women’s self-reported preferences for physical protection in potential mates (e.g., see the “Physically Protective” factor in Ellis, 1998, and the “Physical Prowess” factor in Ellis et al., 2002) and friends (e.g., Bleske & Buss, 2000; Bleske-Rechek & Buss, 2001; Lewis et al., 2011; Lewis et al., 2012). But these studies either focused solely on physical strength (or related capacities such as

height or athleticism; see, e.g., Buss & Schmitt, 1993, 2019) or they used items and factors that conflate physical strength with willingness to physically protect.² That is, these studies do not clearly distinguish between the physical strength of potential partners and their willingness to protect you from violence.

The physical strength of potential partners certainly contributes to their ability to physically protect themselves and others from violence. But there are important reasons to distinguish between physical strength and willingness to protect, and to evaluate preferences for willingness to protect independently of strength.

First, because strength predicted many fitness-relevant traits in ancestral environments (and to some extent today), a preference for physically strong mates and friends could have been a target of selection for reasons having nothing to do with providing protection. For example, Roney et al. (2006) suggested that strength predicted present and future health, and/or heritable fitness-relevant traits such as resistance to pathogens. Hunting ability and status are also possibilities. Among foragers, physical strength predicts a man’s hunting ability (Apicella, 2014; see, e.g., Buss, 1989; Li et al., 2002; Eisenbruch et al., 2016), and it predicts a man’s ability to rise in social status in both forager and industrialized societies (e.g., Durkee et al., 2020; Lukaszewski et al., 2016; von Rueden et al., 2014).³

Second, the strength of a potential mate or friend does not benefit you, the chooser, unless this person is willing to protect you. And individuals are expected to be selective in who they protect, because fighting always entails the potential cost of serious injury or death.⁴

Third, strength and willingness to protect are causally interrelated. Because strength lowers the cost of physically protecting others, stronger individuals should, all else equal, be more willing to provide protection (Hammerstein & Parker, 1982). Therefore, strength should support inferences about willingness, and willingness should, in principle, be used to back-infer strength. If these inferences are made, then a preference for physical strength could reflect preferences for partners who are willing to protect you, who are able to protect you, or both. Teasing these possibilities apart requires empirical methods that assess the inferences that choosers make, as well as their preferences.

The aim of the research reported here is to examine whether a potential partner’s willingness to protect you from violence is valued independently of his or her strength. To disentangle willingness from strength, we systematically varied information about both, and assessed women’s and men’s inferences as well as their preferences.

Doing so brings new questions into sharp focus. When a woman is judging a man, does discovering that he was willing to protect her from violence make him more attractive as a long-term mate even if he is of average strength? What if he is weaker than average? What if he tries to protect her, but fails? No one knows the answer even to these first order questions about women’s mate preferences. And what happens when a woman discovers that a man was *unwilling* to protect her—is this a

² As another recent example, Buss et al. (2020) explored predictors of social status across societies. Of the 14 items constituting their “ability and willingness to physically protect” cluster (which itself is made up of 3 subclusters: bravery, formidability, and physical dominance), all have to do with physical strength (e.g., “being physically strong”, “being a good fighter”), ability to physically protect (e.g., “being able to protect others”), or tangentially related capacities (e.g., tolerance of physical pain, boldness); none had to do with willingness to physically protect.

³ That physical strength can index resource acquisition as well as physical protection is implicit in some scales, where both contribute to the same composite variable. See for example items constituting “Physical Prowess” in Lewis et al., 2011, and Lewis et al., 2012.

⁴ That willingness to physically protect has not been differentiated from the ability to do so in the mating psychology literature is surprising considering that a similar distinction—between willingness versus ability to provision material resources—is central in that literature (e.g., see the review of female preferences in long-term mates in Buss & Schmitt, 2019).

trifling discovery in our now pacified world, or does it torpedo his attractiveness as a long-term romantic partner? Moreover, no one knows whether men's mate preferences are influenced by a woman's strength or her willingness to protect them from violence. When a man discovers that a woman was willing or able to protect him from violence, does that make her more attractive to him—or less? Nor do we know the effects of strength and willingness to protect when either sex chooses same-sex or opposite-sex friends. The research we report investigates these questions and more.

1.1. The present study

Here, we report a series of seven experiments with U.S. adults designed to disentangle the effects of willingness and ability to physically protect in friend and mate choice. You, as the participant, are asked to imagine an altercation with a drunk in the presence of a partner—depending on the experiment, a date or a friend. In the situation described, you do not see the threat in time to react, but your partner does: Your partner sees the drunk just as he swings his clenched fist toward your head. In one condition your partner steps in to protect you; in another, your partner steps away instead. There is also a control condition where neither you nor your partner see the drunk in time, so you have no behavioral evidence that speaks to his/her willingness to protect you (baseline condition).

With this design, we are moving away from self-reported preferences (asking people to introspect on the traits they find attractive) and toward revealed preferences (e.g., Samuelson, 1938). In real life, traits are inferred from observations of a person and his/her behavior in concrete situations, so we asked participants to imagine themselves in a concrete situation in which their companion's willingness to protect them was revealed.⁵ With this design, we could assess what inferences participants made from their companion's behavior, including his/her willingness and ability to provide them with physical protection from violence. We also asked them to judge how attractive they found their companion as a friend or as a mate.

Instances in which individuals are physically attacked are relatively rare in modern industrialized societies, and even rarer are opportunities to discover how a potential mate or friend will respond in such instances. We therefore compared the conditions where your partner is willing or unwilling to physically protect you to a baseline condition in which your partner does not see the drunk in time and, therefore, does not have an opportunity to reveal his/her willingness to protect you. With this, we can evaluate what inferences people make about their partner in the presence versus the absence of revelatory behavior.

The date/friend was always described as of average physical attractiveness. Physical strength was varied across participants in our early experiments: the date/friend was described as of average strength, or as much stronger or much weaker than average. Doing so varies physical strength using the same format as the date/friend's behavior—which was described in words, not depicted through a visual action sequence.⁶

The same scenario, with slightly modified details, was used in all experiments reported here, allowing nuanced comparisons. The scenario was written with a few important features in mind. First, the aggressor is always described as a drunk, to make the unprovoked act of physical violence reasonable without having to specify a personal motive.

Second, the encounter as written precludes alternative behavioral responses, such as calling the police, negotiating with the aggressor, or running away. When the date/friend sees what is happening, the drunk's fist is already swinging toward your head.

Our primary aim was to test five first-order predictions about willingness to protect. As a secondary aim, we also tested the effect of strength—a component of ability to protect—on attractiveness, when controlling for the partner's willingness to protect you.

Discovering that a person was *willing* to physically protect you (compared to having no information about willingness), while controlling for their ability to do so, should be very attractive in both mates and friends, and regardless of your sex or the mate's/friend's sex (**Prediction 1**).

What about discovering that someone was *unwilling* to protect you? Women are less physically formidable than men because of the substantial sexual dimorphism in size and musculature in humans, particularly upper body muscularity (Lassek & Gaulin, 2009). Women are, consequently, particularly vulnerable to physical violence. Women are also much more likely than men to be targeted by sexual violence (Buss, 2021; Daly & Wilson, 1988; Smuts, 1992; Smuts & Smuts, 1993).

The “bodyguard hypothesis” argues that ongoing protection, especially from male physical aggression, was a crucial fitness benefit men could provide to women, favoring the evolution of long-term heterosexual pair bonds (Mesnick, 1997; Wilson & Mesnick, 1997; see also Wrangham, 2009; Wrangham & Rubenstein, 1986; see Bshary et al., 2022, on the “hired gun” hypothesis).⁷ If the psychology of long-term mating was shaped by this selection pressure, then a woman's discovery that a man is unwilling to protect her from male aggression should make him extremely unattractive as a long-term romantic partner—it may even disqualify him from consideration as a mate (**Prediction 2**).

The sexual dimorphism in physical formidability and concomitant difference in vulnerability to violence led us to examine two further predictions. First, do attractiveness judgments of mates and friends who are unwilling to protect you from violence depend on the sex of raters? Specifically, we predicted that women would judge unwillingness more harshly than men, in targets of either sex (**Prediction 3**). Second, given that women take a much larger risk than men when physically protecting others, we asked whether attractiveness judgments depend on the sex of targets. Specifically, we predicted that women who are unwilling to physically protect will not be judged as harshly—by either sex—as men who are unwilling to do so (**Prediction 4**).

Finally, we explored whether attractiveness judgments depend on whether you are evaluating a potential friend or mate. Discovering that a friend was willing to protect you should always be a plus—allies who have your back can be lifesaving for both sexes. Bleske-Rechek and Buss (Bleske & Buss, 2000; Bleske-Rechek & Buss, 2001) found that women report that opposite-sex friends take precautionary actions on their behalf (e.g., walk them to their car at night), and consider these actions important benefits from friends of both sexes. But the absence of such actions need not be the mirror image of their presence: Friends serve different functions for us—they are chosen for many reasons (Hruschka, 2010; Tooby & Cosmides, 1996)—so, it is less clear how being *unwilling* to physically protect you should affect how attractive a person is as a friend. If you discover that a friend is unwilling to protect you from an attack, is that person judged less harshly than a date who is unwilling to do so? (**Prediction 5**).

We dissociated willingness and ability in two ways. In our initial

⁵ It would be unethical to orchestrate attacks on participants—the situation that would most cleanly meet the input conditions for the proposed adaptations. But the human appetite for stories—which present revelatory behavior—is evidence that narratives can engage attention and stir emotions.

⁶ Indeed, photographs varying musculature while holding all else equal risk looking contrived (especially for clothed female targets), and showing men's body musculature could saliently conflate in the minds of observers physical strength with health or heritable fitness (e.g., Roney et al., 2006).

⁷ According to Mesnick's bodyguard hypothesis, protecting a female and her offspring from male aggression “is an important—and, under certain circumstances, perhaps the primary—criterion in female mate-choice decisions” (Mesnick, 1997, p. 217). Wrangham (2009) argues that cooperative pair bonds in humans arose from the coevolution of cooking by women, high-variance hunting, and men protecting women against the aggressive appropriation of their labor.

experiments we manipulated willingness to physically protect and physical strength in a fully crossed design, in both mate choice (Exp. 1A) and friend choice (Exp. 1C). We also investigated willingness to protect in homosexual and bisexual men and women (mate choice)—an understudied population (Exp. 1B). Comparing mate choice in heterosexual and homosexual men and women holds the sex of romantic partners constant while varying the sex of raters, thereby providing a window on whether preferences differ as a function of the sex of the raters or the targets.

Our later experiments were designed to explore preferences for willingness to physically protect using even more stringent criteria. In our initial experiments, partners who tried to protect you succeeded in doing so; in these later experiments, there were conditions in which partners try to protect you but fail (they are pushed to the ground by the drunk). When their attempt fails, are they still attractive as mates (Exp. 2A) or friends (Exp. 2B)? What if you are harmed as a consequence of their failure (the drunk hits you in the head): Are they still attractive as mates (Exp. 3)?

2. Experiment 1A: mate choice (opposite-sex)

2.1. Methods

2.1.1. Participants

U.S. adults who identify as primarily heterosexual were recruited via Amazon Mechanical Turk (MTurk) ($N = 712$; 57 % women; $M_{age} = 37$, $SD_{age} = 13$, range 18 to 77). Eighty percent of participants identified as White, 6 % as Latino or Hispanic, 7 % as Black, 5 % as East Asian, and 2 % with a variety of other races/ethnicities or backgrounds. The racial/ethnic breakdown was about the same across all experiments.

All experiments reported herein were designed to last approximately 5–10 min, and participants were paid a standard rate. The experiment duration and payment were about the same across all experiments. Additionally, in all experiments, participants were excluded if they failed any of several attention and English language comprehension checks. The sample sizes reported throughout are for participants who passed these checks.

2.1.2. Design

Participants rated the attractiveness of an opposite-sex date who varied in his/her physical strength and willingness to protect the participant from a violent attack. Three levels of date physical strength (weaker, average, stronger) were crossed with three date willingness conditions: willing to protect, control (no information about willingness), and unwilling to protect. Participants were randomly assigned to one of these nine conditions, which, crossed with participant sex, yielded 18 between-subjects cells.

2.1.3. Materials & procedure

Participants were asked to imagine being on a date with an opposite-sex person and then rate the attractiveness of that person. The vignettes for women and men were the same, except for the sex of the date; for simplicity, we describe the vignettes presented to female participants. First, the vignette provided information about the date's physical strength (underlined in the original):

Average strength: "Imagine a man who is average in attractiveness and in physical strength."

High/Low strength: "Imagine a man who is average in attractiveness, and who is physically much [stronger/weaker] than average."

Second, the vignette described the threat:

"Now, imagine that you are out on a date with this man. The two of you are leaving a restaurant where you had dinner. As you leave, an obviously drunk man, stumbling out of a nearby bar, approaches the two of you from behind. You don't notice the drunk, but your date

does, right as the drunk lifts his clenched fist and swings it toward your head."

Last, the vignette described the date's reaction to the threat. The difference between the willing and unwilling conditions are underlined below (but not in the original). In the *willing* to protect condition, the last paragraph said:

"Seeing you are in danger, your date grabs the drunk's arm, shielding you from the blow, and forcefully pushes him to the ground. The drunk, surprised, quickly gets up and runs away."

In the *unwilling* to protect condition, the last paragraph said:

"Seeing you are in danger, your date steps away from you and the drunk. Fortunately, the drunk aims poorly and misses your head, swinging at the air instead and falling to the ground. The drunk, surprised, quickly gets up and runs away."

The difference between the willing and unwilling condition is how your date, who sees the threat, reacts to it. Your date does not see the danger until the drunk's fist is swinging toward your head, so that reactions like calling for help or alerting you to the threat are not possible. The only way your date can protect you from this act of aggression is by interceding physically. Note that no harm comes to you (or your date) in any of these conditions: Neither of you suffer negative consequences. (We vary harm in Exp. 2 and 3.)

To better interpret how attractiveness varies with information about willingness to protect, there was also a control condition, in which participants had no information about the date's willingness (because the date does not see the threat in time). After the sentence about the date's strength, the control condition continued as follows:

"Now, imagine that you are out on a date with this man. The two of you are leaving a restaurant where you had dinner. As you leave, an obviously drunk man, stumbling out of a nearby bar, approaches the two of you from behind. You don't notice the drunk and neither does your date. The drunk lifts his clenched fist and swings it toward your head. Fortunately, the drunk aims poorly and misses your head, swinging at the air instead and falling to the ground. The drunk, surprised, quickly gets up and runs away."

After reading the vignette, all participants rated the date's attractiveness as a mate. Two mate attractiveness dependent variables (DVs) appeared in random order on the same page (not underlined in the original).

- How attractive is this [man/woman] to you as a long-term romantic partner (e.g., for a committed relationship such as marriage)? Please rate [him/her] relative to other [men/women]. (0 = *Not at all attractive* to 10 = *Very attractive*)
- How attractive is this [man/woman] to you as a short-term romantic partner (e.g., for a brief affair)? Please rate [him/her] relative to other [men/women]. (0 = *Not at all attractive* to 10 = *Very attractive*)

Alongside these DVs there also appeared, in random order and on the same page, a question about the desirability of this date as a friend. However, because the primary question for the present experiment is how your date's ability and willingness to physically protect you influences his/her attractiveness to you as a mate, we defer consideration of the date's desirability as a friend to Experiment 1C, where this question is examined in detail.

The function of manipulating vignette information about strength and willingness to protect was to vary the magnitude of cognitive variables that, by hypothesis, are used to compute attractiveness. As an index of these cognitive variables, participants were asked to estimate the date's ability and willingness to protect them (presented on the same

page and in random order, after the attractiveness DVs).

Estimated ability:

- If someone was physically threatening you, would [he/she] be able to physically help you (if you needed help)? Please rate [him/her] relative to other [men/women]. (0 = *Not at all able*, and 10 = *Very able*)

Estimated willingness:

- If someone was physically threatening you, would [he/she] be willing to physically help you (if you needed help)? Please rate [him/her] relative to other [men/women]. (0 = *Not at all willing* and 10 = *Very willing*)

These estimates had three functions. First, they served as checks of the willingness and strength manipulations. Second, they allowed us to assess back-inferences, from willingness to strength and strength to willingness. Third, they allowed us to explore indirect links between inferences about ability and willingness to the focal DV (attractiveness ratings).

Finally, in this experiment and all others reported in this study, participants answered demographic questions and surveys that were included for a separate study and are not reported here. The survey was administered via Qualtrics.

2.2. Results

2.2.1. Manipulation checks

Date physical strength. We first checked that participants were registering the date's strength as described in the vignette, which varied from *much weaker than average*, to *average*, to *much stronger than average*. If they were, then vignette-described strength will be correlated with participants' estimates of the date's ability to provide physical help in response to a physical threat (*estimated ability*).

The control conditions provide the cleanest manipulation check because they lack behavioral evidence that could be used to make back-inferences about strength from behavioral evidence of willingness. Vignette-described strength was positively correlated with participants' estimates of their date's ability to physically help in response to a physical threat, both for women rating men: $r = 0.49$ ($p < 10^{-8}$, $N = 132$), and for men rating women: $r = 0.66$ ($p < 10^{-13}$, $N = 100$).

Date willingness to protect. Varying behavioral evidence across vignettes strongly influenced participants' estimates of how willing their date would be to physically protect them in response to a physical threat (*estimated willingness*). We averaged across physical strength conditions for this manipulation check. In the control conditions, which had no behavioral evidence of willingness or unwillingness, estimates of the date's willingness to protect were intermediate (women rating men: 6.27 (SD = 2.64); men rating women: 5.25 (SD = 2.27)). Compared to the control condition, estimates were lower in the *unwilling* conditions (women rating men: 2.09 (SD = 3.05), $t_{269} = 12.15$, $p < 10^{-16}$, $d = 1.48$; men rating women: 3.90 (SD = 2.81), $t_{193} = 3.73$, $p = .0002$, $d = 0.54$), and higher in the *willing* conditions (women rating men: 8.96 (SD = 1.59), $t_{214} = 10.10$, $p < 10^{-16}$, $d = 1.38$; men rating women: 8.56 (SD = 2.01), $t_{196} = 10.96$, $p < 10^{-16}$, $d = 1.57$).

2.2.2. Do people estimate willingness to protect from strength and ability to protect from willingness?

They do. To evaluate whether willingness supports inferences about ability, we focus on the average strength conditions. For both sexes, estimates of ability to protect were highest for willing dates, intermediate when no willingness information was given, and lowest for unwilling dates. For women rating male dates: 9.09, 5.96, 4.24, respectively ($p < .01$ for all comparisons); for men rating female dates: 8.46, 4.89, 3.36 ($p < .001$ for all comparisons). To evaluate whether

strength supports inferences about willingness, we focus on the no willingness information conditions. Both men and women inferred that the stronger their (opposite sex) dates were, the more willing they would be to protect them (women rating male dates: $r = 0.30$, $p < .001$; men rating female dates: $r = 0.39$, $p < 10^{-4}$). These inferences demonstrate the need to see how willingness influences mate attractiveness while controlling for strength, and vice versa.

2.2.3. Do people value willingness and ability to physically protect in dates (opposite-sex)?

The main variable for analysis was how attractive the date was rated as a potential long-term mate because the average consequences of choosing a mate who is willing to protect you (or not) are larger for long-term relationships than for short-term ones. Although it has been proposed that men, and perhaps also women, have distinct long- and short-term mating psychologies (Buss & Schmitt, 1993; Kenrick et al., 1990), ratings of mate attractiveness were highly correlated for the long- and short-term romantic partner questions in all experiments reported here (e.g., in Exp. 1 A, $r = 0.81$, $p < 10^{-16}$ for women rating male dates and $r = 0.69$, $p < 10^{-16}$ for men rating female dates). We checked whether, in all experiments reported here, participants responded differently when rating dates as long-term versus short-term romantic partners. Although there were some differences, mostly consistent with the evolutionary psychology mating literature (e.g., Buss & Schmitt, 1993; Kenrick et al., 1990), none substantively changed any of our conclusions.

To examine how behavioral evidence of willingness or unwillingness to protect compares to having no behavioral evidence (the *control* condition), willingness to protect was represented by two separate dummy coded variables: *Willing*, created by coding the *willing* condition as 1 and the *control* and *unwilling* conditions as 0, and *Unwilling*, created by coding the *unwilling* condition as 1 and the *control* and *willing* conditions as 0. In this way, when these dummy coded variables are regressed on attractiveness together, we can see how positive behavioral evidence—actions in which your date protects you—compares to having no behavioral evidence (the *control* condition), and how negative behavioral evidence—actions in which your date saw the threat but did not protect you—compares to having no behavioral evidence.

The fit of three hierarchical (nested) statistical models was sequentially compared using log-likelihood tests: (1) the main effects of Participant Sex (−1 = Male, 1 = Female), Date Strength (entered as a continuous variable coded as −1 = weak, 0 = average, 1 = strong), and the Willing and Unwilling dummy-coded variables (with the no-information condition as the reference group) (Model 1), (2) the main effects and two-way interactions (Model 2), and (3) the main effects, two-way, and three-way interactions (Model 3).

Model 2 showed the best fit (in terms of reduction in Residual Sum of Squares between models), revealing that (i) discovering that a date was willing to protect increased his/her attractiveness ($b = 2.24$, $b_{SE} = 0.21$, $p < 10^{-16}$), and (ii) discovering that a date was unwilling to protect decreased his/her attractiveness ($b = -2.01$, $b_{SE} = 0.21$, $p < 10^{-16}$). However, this was qualified by a *Participant Sex x Unwilling* interaction ($b = -1.29$, $b_{SE} = 0.21$, $p < 10^{-8}$). Unpacking this with a simple slope analysis revealed that (iii) when they were unwilling to physically protect, women judged their male dates much more harshly ($b = -3.30$, $b_{SE} = 0.27$, $p < 10^{-16}$) than men judged their female dates ($b = -0.73$, $b_{SE} = 0.32$, $p = .023$).

Further, (iv) stronger dates were viewed as more attractive than weaker dates ($b = 0.58$, $b_{SE} = 0.18$, $p = .002$), however, this was qualified by a *Participant Sex x Strength* interaction ($b = 0.23$, $b_{SE} = 0.11$, $p = .027$). Unpacking this with a simple slope analysis revealed that (v) women viewed stronger dates as more attractive ($b = 0.56$, $b_{SE} = 0.14$, $p < 10^{-4}$), but men did not ($b = 0.10$, $b_{SE} = 0.16$, $p > .250$).

As a whole, this model explained 46.2 % of the variance in participants' ratings of their dates' attractiveness as long-term mates ($F_{9, 702} = 67.05$, $p < 10^{-16}$). See Fig. 1.

See SM-B for model comparisons and full model details for all

experiments reported in this paper.

2.2.4. Why did women find physically stronger dates more attractive?

In aggressive conflicts, the risk of injury is smaller for stronger individuals than for weaker ones. Therefore, all else equal, stronger individuals should be more willing to risk injury by protecting others. Do participants spontaneously infer that stronger people will be more willing to protect them? We examined results in the baseline condition, where participants had no behavioral evidence about the date's willingness to physically protect them.

Both women and men made this inference: The date's physical strength (as described in the vignette) predicted their estimates of that person's willingness to protect them (see Section 2.2.2). We found even larger correlations between the two cognitive variables: participants' estimates of the date's ability and willingness to physically protect (women: $r = 0.75, p < 10^{-16}, N = 132$; men: $r = 0.70, p < 10^{-15}, N = 100$).

Results from the baseline condition confirm that information about the date's physical strength supports inferences about their *willingness* to provide protection as well as their *ability* to do so. Additionally, vignette-manipulated willingness very strongly predicted how attractive women found the male date. Taken together, these effects raise an interesting question: Did women find physical strength attractive because it supported inferences about how willing the date would be to physically protect them?

We investigated this question with a mediation analysis (using the lavaan library in R). We tested two indirect paths from vignette-manipulated physical strength to mate attractiveness across all nine vignette-manipulated strength and willingness conditions in women raters ($N = 408$). Three dependent measures—estimated ability, estimated willingness, and attractiveness—were each sampled 5000 times with replacement, using the adjusted bootstrap percentile method. The mediation model is reported with unstandardized betas and bias corrected 95 % CIs.

Fig. 2 displays the two indirect paths tested: The indirect path from vignette-manipulated strength to estimated ability to attractiveness ($b = 0.14$ [0.01, 0.29], $p = .046$) and the indirect path from vignette-manipulated strength to estimated ability to estimated willingness to attractiveness ($b = 1.07$ [0.84, 1.31], $p < 10^{-16}$). Both were supported by the data, but the effect sizes were very different. The main reason women judge stronger men as more attractive is that stronger men are thought to be more willing to protect them. Although physically stronger men were also thought to be more able to do so, and women did find this attractive, this indirect effect was only 1/8th the size of the indirect effect via estimated willingness. After controlling for these two indirect paths, vignette-manipulated strength had no direct effect on attractiveness ratings ($b = -0.04$ [-0.26, 0.19], $p > .250$).⁸

See SM-B for full model details, and SM-A for additional mediation analyses considered.

2.3. Interim summary: Predictions 1 and 2 were supported

Seeing that your date was *willing* to step in to physically protect you

from an aggressor (willing condition) greatly increased his or her attractiveness as a possible mate, compared to having no behavioral information about willingness ($b = 2.24$) (**Prediction 1**). In fact, willingness to protect increased attractiveness by similar amounts for women rating men and men rating women (2.52 and 1.96, respectively).

In contrast, seeing that your date was *unwilling* to protect you (unwilling condition) decreased his or her attractiveness as a possible mate as compared to having no behavioral information about willingness. The decrease was relatively small for men rating female dates ($b = -0.73$), but very large for women rating male dates (more than four times the size: $b = -3.30$).

In fact, discovering the male date was unwilling to protect you was a deal-breaker for women (**Prediction 2**). As Fig. 1 shows, when there was no information about willingness, attractiveness ratings for both male and female dates hovered around the middle of the 10-point scale. However, seeing that the male date was unwilling to protect dropped his ratings down near the bottom of the scale. Although the female dates who were unwilling to protect were also rated as less attractive, their drop from baseline was much smaller.

We cannot adjudicate, however, whether these effects are driven by participant sex, the sex of the date, or both. That is, maybe men, compared to women, are especially lenient in their ratings, maybe female dates are rated more leniently than male dates, or maybe both. We return to this question in the next experiment where, using a sample of same-sex attracted participants, we fully cross participant sex and date sex.

Physical strength—or the *ability* to physically protect—also increased the attractiveness of a date, for women rating male dates ($b = 0.56$). However, when we further explored this effect, it was mediated primarily by an inference that stronger dates were more able to physically protect and, in turn, were more willing to do so than weaker dates; this inference through estimated willingness was the primary path leading women to find stronger men more attractive.

3. Experiment 1B: mate choice (same-sex)

3.1. Methods

3.1.1. Participants

U.S. adults who identify as bisexual or homosexual were recruited via MTurk ($N = 350$; 67 % women; $M_{age} = 27$, $SD_{age} = 11$, range 18 to 74).

3.1.2. Design

Participants rated the attractiveness of a same-sex date who varied in his/her willingness to physically protect the participant from an aggressor. Participants were randomly assigned to one of three date willingness conditions: willing to protect, control, and unwilling to protect (which, crossed with participant sex, yielded 6 between-subjects cells).

We were not sure how many same-sex attracted participants we could recruit—recruitment for this experiment continued alongside recruitment for the other experiments reported in this manuscript, with eligible participants from those experiments directed to this one. We therefore prioritized assigning participants to the three willingness conditions over the three ability levels. However, because same-sex attracted women were being recruited at about double the rate of same-sex attracted men, midway through data collection we started assigning women to three additional willingness conditions crossed with the high date strength level. That is, all the same-sex attracted men imagined dates who were described as average in strength, whereas same-sex attracted women imagined dates whose strength was described as either average or stronger than average. We did not find a main effect of strength, nor did it enter into any two-way interactions, so it is not discussed further in this experiment.

⁸ Additionally, it is worth considering a mediation analysis in the three control willingness conditions only (where only strength was manipulated). As we noted, the scenario where social observers lack behavioral evidence of willingness but must infer it from physical strength is a common one in the real world; it also sheds light on existing findings in the literature that ask about preferences for physical strength when willingness to physically protect is not specified. When we do this, we find that the indirect path from vignette-manipulated strength to estimated ability to estimated willingness to attractiveness is significant ($b = 0.66$ [0.36, 0.96], $p < 10^{-16}$), but that the indirect path from vignette-manipulated strength to estimated ability to attractiveness is not significant ($b = 0.12$ [-0.24, 0.56], $p > .250$). After controlling for these two indirect paths, strength had no direct effect on attractiveness ($b = 0.08$ [-0.40, 0.61], $p > .250$). See SM-B for full model details.

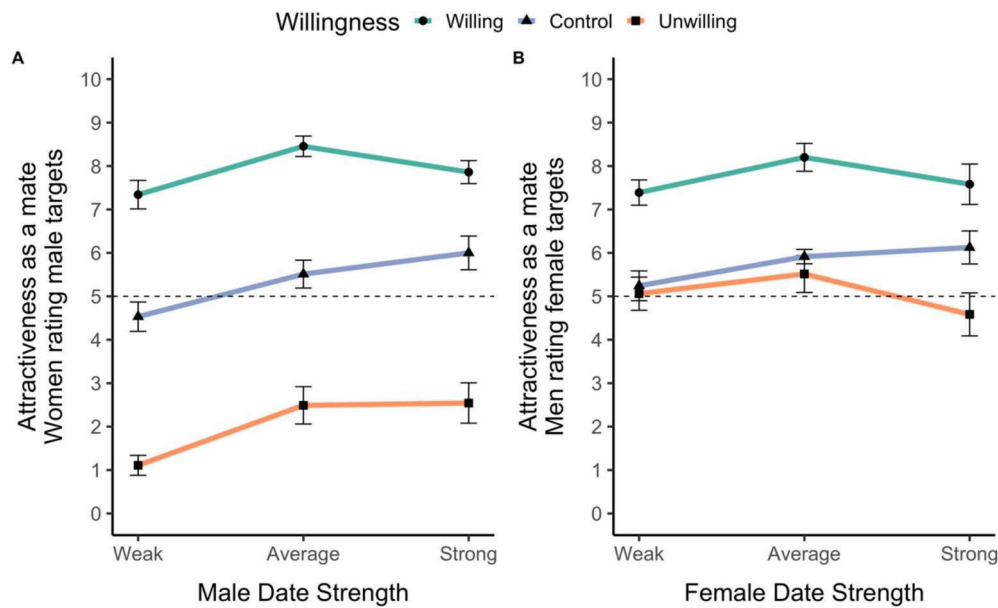


Fig. 1. Experiment 1A. Women and men rating opposite-sex dates on their attractiveness as long-term mates in each of the three willingness to protect and physical strength conditions. (A) Women rating a male date. (B) Men rating a female date. Whiskers are standard errors.

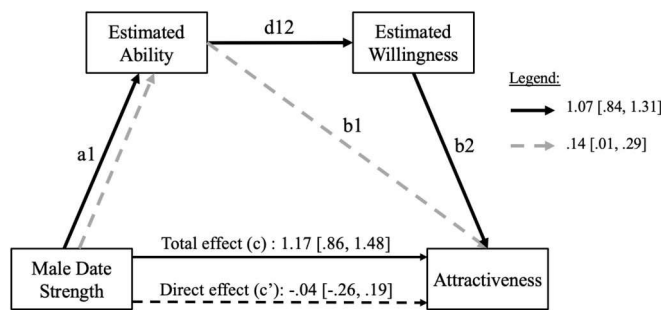


Fig. 2. A mediation analysis testing two indirect paths from vignette-manipulated physical strength to attractiveness as a long-term mate in all nine willingness and ability to physically protect conditions. Women rating a male date across all conditions ($N = 408$). The path marked by a solid black line goes from vignette-manipulated strength to estimated ability to estimated willingness to attractiveness; the path marked by a dashed gray line goes from vignette-manipulated strength to estimated ability to attractiveness. The paths are reported with unstandardized betas and bias corrected 95 % CIs (in brackets). See SM-B for full model details including the labeled path coefficients.

3.1.3. Materials & procedure

The materials and procedure were identical to Experiment 1 A, except that the target was described as a same- rather than opposite-sex date.

3.2. Results

3.2.1. Do people value willingness to physically protect in same-sex dates?

The fit of two hierarchical statistical models was sequentially compared using log-likelihood tests: (1) the main effects of Participant Sex ($-1 = \text{Male}$, $1 = \text{Female}$) and the Willing and Unwilling dummy-coded variables (with the no-information condition as the reference group) (Model 1), and (2) the main effects and two-way interactions (Model 2).

Model 1 showed the best fit, revealing that (i) women gave their dates higher attractiveness ratings than men gave their dates ($b = 0.45$, $b_{SE} = 0.13$, $p < .001$), (ii) discovering that a date was willing to protect increased his/her attractiveness ($b = 2.05$, $b_{SE} = 0.30$, $p < 10^{-10}$), and

(iii) discovering that a date was unwilling to protect decreased his/her attractiveness ($b = -1.87$, $b_{SE} = 0.30$, $p < 10^{-9}$).

As a whole, this model explained 33.9 % of the variance in participants' ratings of their dates' attractiveness as long-term mates ($F_{3, 346} = 59.03$, $p < 10^{-16}$). See Fig. 3.

3.2.2. Is valuing willingness to physically protect sex-dependent?

As raters, do men, as compared to women, have relaxed expectations about willingness to protect? And are expectations about willingness to protect relaxed when judging a female as compared to a male date? We answer these questions by comparing this experiment to Experiment 1A, thereby fully crossing participant sex and date sex. (We include all three strength conditions from Experiment 1A in the analyses reported below, but our conclusions are the same if we only include the average strength conditions.)

The fit of three hierarchical statistical models was sequentially compared using log-likelihood tests: (1) the main effects of Participant Sex ($-1 = \text{Male}$, $1 = \text{Female}$), Date Sex ($-1 = \text{Male}$, $1 = \text{Female}$), and the Willing and Unwilling dummy-coded variables (with the no-information condition as the reference group) (Model 1), (2) the main effects and two-way interactions (Model 2), and (3) the main effects, two-way, and three-way interactions (Model 3).

Model 2 showed the best fit, revealing that (i) female dates were viewed as more attractive than male dates ($b = 0.41$, $b_{SE} = 0.13$, $p = .002$), (ii) discovering that a date was willing to protect increased his/her attractiveness ($b = 2.24$, $b_{SE} = 0.18$, $p < 10^{-16}$), and (iii) discovering that a date was unwilling to protect decreased his/her attractiveness ($b = -1.94$, $b_{SE} = 0.18$, $p < 10^{-16}$). However, the main effect of unwillingness was qualified by a *Participant Sex* $\times$ *Unwilling* interaction ($b = -0.68$, $b_{SE} = 0.19$, $p < .001$) and a *Date Sex* $\times$ *Unwilling* interaction ($b = 0.59$, $b_{SE} = 0.18$, $p = .001$).

Unpacking these interactions with simple slope analyses revealed that (iv) women judged dates who were unwilling to protect them more harshly than men did, regardless of the sex of those dates (women rating unwilling dates: $b = -2.60$, $b_{SE} = 0.23$, $p < 10^{-16}$ versus men rating unwilling dates: $b = -1.20$, $b_{SE} = 0.30$, $p < 10^{-4}$, respectively), and (v) when they were unwilling to protect, male dates were judged more harshly than female dates, regardless of the sex of raters (ratings of unwilling male dates: $b = -2.64$, $b_{SE} = 0.26$, $p < 10^{-16}$ versus ratings of unwilling female dates: $b = -1.47$, $b_{SE} = 0.25$, $p < 10^{-9}$, respectively).

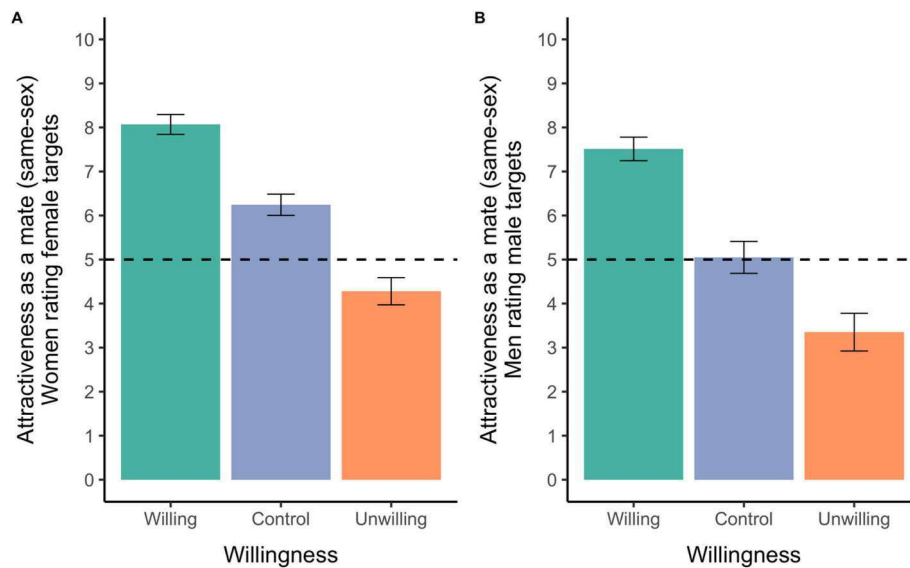


Fig. 3. Experiment 1B. Women and men rating same-sex dates on their attractiveness as long-term mates in each of the three willingness to protect conditions. (A) Women rating a female date. (B) Men rating a male date. Whiskers are standard errors.

As a whole, this model explained 41.7 % of the variance in participants' ratings of their dates' attractiveness as long-term mates ($F_{9, 1052} = 83.67, p < 10^{-16}$).

3.3. Interim summary: Predictions 3 and 4 were supported

The current experiment replicated and expanded on Experiment 1A (opposite-sex attracted participants) with same-sex attracted participants. When judging same-sex dates, same-sex attracted men and women strongly valued dates who were willing to protect them ($b = 2.05$) and strongly devalued dates who were unwilling to do so ($b = -1.87$).

By comparing ratings of same-sex dates from this experiment with ratings of opposite-sex dates from Experiment 1A, we could test whether the value placed on willingness to protect is sex-dependent. Supporting **Prediction 3**, women judged dates—either opposite-sex or same-sex—who were unwilling to protect them more than twice as harshly as men did ($b = -2.60$ versus $b = -1.20$). Supporting **Prediction 4**, when they were unwilling to protect, male dates were judged much more harshly—nearly twice as much—as female dates were, by raters of either sex ($b = -2.64$ versus $b = -1.47$).

The combined effects of participant sex and date sex can be clearly seen when carefully examining the differences in ratings between the control and unwilling conditions of Experiment 1A and 1B. When women rated male dates who were unwilling to protect them, the decrease in attractiveness for those dates from baseline was largest: 3.25 scale points (see Fig. 1 in Exp. 1A). When women rated female dates (from whom they plausibly had lower expectations of protection than from male dates) this decrease was smaller (1.96 scale points; see Fig. 3 in Exp. 1B). The decrease in attractiveness was also smaller (1.70 scale points) when male dates were rated by men (Fig. 3 in Exp. 1B), suggesting that men might have had lower expectations than women did that their male date *should* protect them. Finally, when these effects are combined—when men rated female dates (Fig. 1 in Exp. 1A)—this decrease was smallest: 0.72 scale points.

4. Experiment 1C: friend choice (same- and opposite-sex)

4.1. Methods

4.1.1. Participants

U.S. adults who identify as primarily heterosexual were recruited via MTurk ($N = 1283$; 50 % women; $M_{age} = 37$, $SD_{age} = 12$; range 18 to 79).

4.1.2. Design

Participants rated how much they would want to have the target as a friend. The design was otherwise the same as in Experiment 1A, with one exception: Participants were randomly assigned to read about a same-sex or an opposite-sex target, yielding a 3 (Target Physical Strength) x 3 (Target Willingness) x 2 (Target Sex) design for male and female participants (36 cells in total).

4.1.3. Materials & procedure

The materials and procedure were the same as in Experiment 1A, with two exceptions. (i) The target was described as a friend rather than a date. (ii) The vignette did not mention the target's physical attractiveness, only his/her physical strength. After reading the vignette, participants rated the desirability of this target as a friend on the following DV:

- How much would you want to have this [man/woman] as a friend? Please rate [him/her] relative to other [men/women]. (0 = *Not at all* and 10 = *Very much*)

4.2. Results

The analysis strategy was the same as before, with Target Strength entered as a continuous variable ($-1 = \text{Weak}$, $0 = \text{Average}$, $1 = \text{Strong}$), and willingness to protect entered as two dummy-coded variables: *Willing* and *Unwilling*, which compared having positive or negative behavioral evidence of willingness to protect to having no information.

To simplify analyses, and because we previously found no willingness-by-strength interactions, we separately examine willingness and ability to physically protect.

4.2.1. Do people value willingness to physically protect in friends (same- and opposite-sex)?

The fit of three hierarchical statistical models was sequentially compared using log-likelihood tests: (1) the main effects of Participant Sex ($-1 = \text{Male}$, $1 = \text{Female}$), Target Sex ($-1 = \text{Male}$, $1 = \text{Female}$), and the Willing and Unwilling dummy-coded variables (with the no-information condition as the reference group) (Model 1), (2) the main effects and two-way interactions (Model 2), and (3) the main effects, two-way, and three-way interactions (Model 3).

Model 2 showed the best fit, revealing that (i) female targets were rated as more desirable as friends than male targets (Target Sex: $b = 1.30$, $b_{SE} = 0.12$, $p < 10^{-16}$), (ii) discovering that a target was willing to protect increased his/her attractiveness (Willing: $b = 3.59$, $b_{SE} = 0.16$, $p < 10^{-16}$), and (iii) discovering that a target was unwilling to protect decreased his/her attractiveness (Willing: $b = -0.75$, $b_{SE} = 0.16$, $p < 10^{-5}$). However, these main effects were qualified by two-way interactions which we unpack with simple slope analyses.

Although desirability as a friend was near ceiling for willing targets of both sexes, there was a *Target Sex $\times$ Willing* interaction ($b = -1.23$, $b_{SE} = 0.16$, $p < 10^{-13}$) whereby (iv) the boost for male targets ($b = 4.82$, $b_{SE} = 0.23$, $p < 10^{-16}$) was twice the size of the boost for female targets ($b = 2.36$, $b_{SE} = 0.23$, $p < 10^{-16}$). However, this reflects the fact that male targets had much worse friend ratings in the control condition than female targets did (such that their relative increase from the control condition to the willing condition was much higher), rather than a higher absolute rating of willingness to protect for male versus female targets.

Further, there was a *Target Sex $\times$ Unwilling* interaction ($b = -0.42$, $b_{SE} = 0.16$, $p = .010$), revealing that (v) whereas women who were unwilling to protect were judged harshly by raters ($b = -1.16$, $b_{SE} = 0.23$, $p < 10^{-6}$), men who were unwilling to protect were not ($b = -0.33$, $b_{SE} = 0.22$, $p = .143$). However, this, too, needs to be interpreted in light of the control condition. In the absence of behavioral evidence, both sexes rated female targets more desirable as friends than male targets—ratings of female targets in the control condition were above the midpoint of the scale, whereas ratings of male targets in the control condition were at or below the midpoint. In fact, even when they were unwilling to protect, ratings of female friends were still at or above the midpoint of the scale.

Finally, there was a *Participant Sex $\times$ Unwilling* interaction ($b = -0.77$, $b_{SE} = 0.16$, $p < 10^{-5}$), revealing that (vi) women judged targets who were unwilling to protect them more harshly than when they had no behavioral evidence ($b = -1.52$, $b_{SE} = 0.23$, $p < 10^{-10}$), but men did not ($b = 0.03$, $b_{SE} = 0.23$, $p > .250$).

As a whole, this model explained 46.2 % of the variance in ratings of how much participants would want the targets as friends ($F_{9, 1273} = 121.5$, $p < 10^{-16}$). See Fig. 4.

4.2.2. Do people value ability to physically protect in friends (same- and opposite-sex)?

No. The fit of three hierarchical statistical models was sequentially compared using log-likelihood tests: (1) the main effects of Participant Sex ($-1 = \text{Male}$, $1 = \text{Female}$), Target Sex ($-1 = \text{Male}$, $1 = \text{Female}$), and Strength ($-1 = \text{weak}$, $0 = \text{average}$, $1 = \text{strong}$) (Model 1), (2) the main effects and two-way interactions (Model 2), and (3) the main effects, two-way, and three-way interactions (Model 3).

Model 1 showed the best fit, revealing only a main effect of Target Sex—participants rated female targets as more desirable as friends than male targets ($b = 0.79$, $b_{SE} = 0.09$, $p < 10^{-16}$). As a whole, this model explained only 6.3 % of the variance in ratings of the attractiveness as friends of the male and female targets ($F_{3, 1279} = 28.71$, $p < 10^{-16}$).

4.2.3. Is valuing willingness to physically protect relationship-dependent?

Do social observers have relaxed expectations about willingness to physically protect from friends as compared to romantic partners? We answer this question by comparing friend ratings in this experiment to

long-term mate ratings in Exp. 1A-B.

The fit of two hierarchical statistical models was sequentially compared using log-likelihood tests: (1) the main effects of Relationship ($-1 = \text{Mate}$, $1 = \text{Friend}$) and the Willing and Unwilling dummy-coded variables (with the no-information condition as the reference group) (Model 1), (2) the main effects and two-way interactions (Model 2).

Model 2 showed the best fit, revealing that (i) discovering that a target was willing to protect increased his/her attractiveness ($b = 2.94$, $b_{SE} = 0.13$, $p < 10^{-16}$), and (ii) discovering that a target was unwilling to protect decreased his/her attractiveness ($b = -1.41$, $b_{SE} = 0.13$, $p < 10^{-16}$). However, these main effects were qualified by interactions with relationship type (*Relationship $\times$ Willing*: $b = 0.71$, $b_{SE} = 0.13$, $p < 10^{-7}$; *Relationship $\times$ Unwilling*: $b = 0.68$, $b_{SE} = 0.13$, $p < 10^{-7}$).

Unpacking these interactions with simple slope analyses revealed that (iv) when they were willing to protect, the increase in attractiveness over baseline was larger for friends ($b = 3.65$, $b_{SE} = 0.17$, $p < 10^{-16}$) than for mates ($b = 2.22$, $b_{SE} = 0.19$, $p < 10^{-16}$), and (v) when they were unwilling to protect, the decrease in attractiveness from baseline was more precipitous for mates ($b = -2.08$, $b_{SE} = 0.18$, $p < 10^{-16}$) than for friends ($b = -0.73$, $b_{SE} = 0.17$, $p < 10^{-4}$).

As a whole, this model explained 36.8 % of the variance in ratings of the attractiveness as a mate versus friend of the male and female targets ($F_{5, 2339} = 271.9$, $p < 10^{-16}$).

4.3. Interim summary: Prediction 5 was supported

When comparing the present experiment (same- and opposite-sex friend choice) to our earlier ones (same- and opposite-sex mate choice), we find that friends are held to a more lenient standard than mates—thereby supporting **Prediction 5**. When targets were willing to protect, the rise in attractiveness was larger for friends than it was for mates; when they were unwilling to protect, the drop in attractiveness for mates was much more precipitous than it was for friends.

When they were willing to protect, both male and female targets were more desirable as friends, but this boost in attractiveness was higher for male targets than for female targets. When they were unwilling to protect, male targets were not judged more harshly than when there was no behavioral evidence, but female targets were. Although these findings seem to be opposite to our prediction (and earlier findings), it is important to interpret them in light of absolute ratings: Willing male targets were not more desirable as friends than willing female targets (compare the green lines with circles in the left and right panels of Fig. 4), and unwilling male targets were less desirable as friends than unwilling female targets (compare the red lines with squares in the left and right panels of Fig. 4).

Why this discrepancy between the relative (willing or unwilling conditions compared to baseline) and absolute ratings? When rated by both women and men, male targets in the baseline conditions got especially low ratings on desirability as a friend—they were rated below the midpoint of the scale (and were less desirable as friends than female targets in those conditions). Compared to these baseline conditions, the *relative* boost in friend desirability was larger for male targets than for female targets, and the *relative* decrease in friend desirability was larger for female targets than for male targets (whose already low desirability did not decrease by discovering they were unwilling to protect). In other words, participants took a dim view of male friends *unless* they demonstrated they were willing to protect.

We were curious whether these low ratings of male targets in the baseline willingness conditions were a fluke, so we collected an additional sample of participants ($N = 454$) across the three willingness conditions (all targets were described as of average physical strength, yielding 12 cells in total; Exp. 1C-R). Although in this new sample friend ratings for male targets were still lower than for female targets, male target ratings—by both women and men—were not as low as in the baseline willingness conditions of Exp. 1C (women rating male targets: 3.84 versus 5.71; men rating male targets: 3.21 versus 4.69).

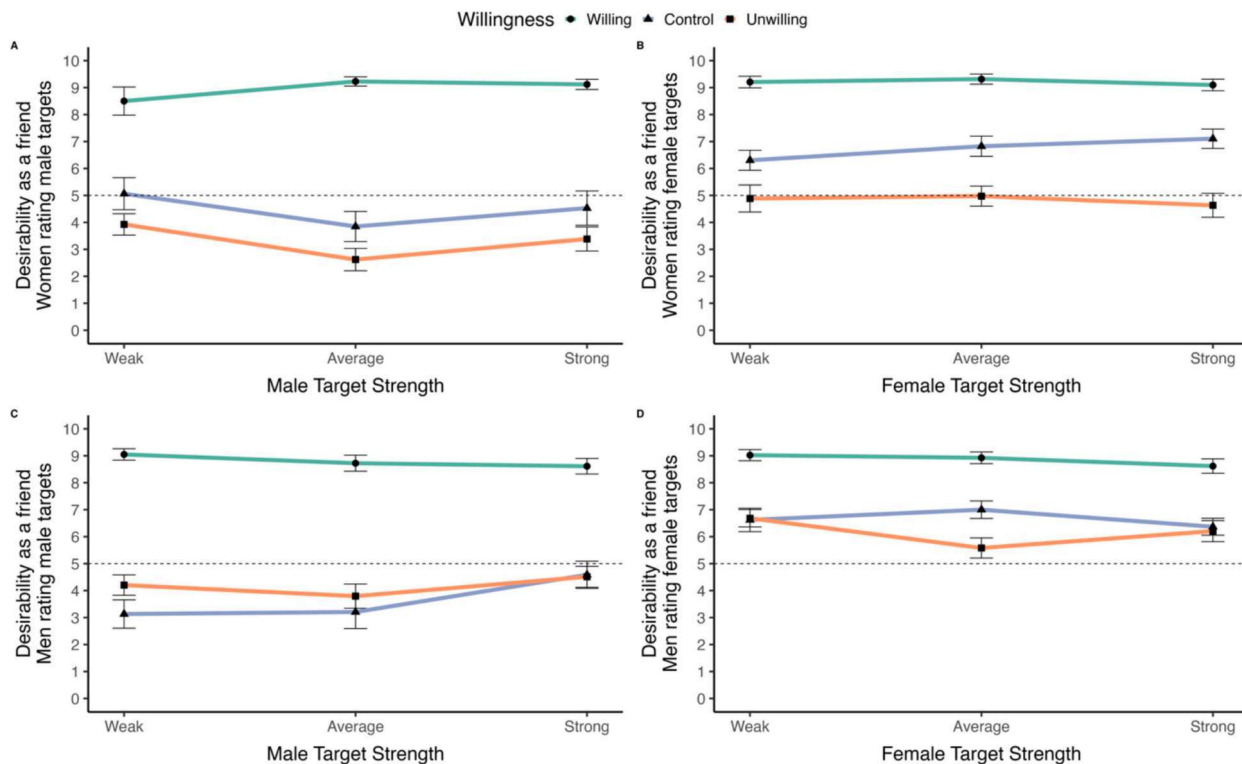


Fig. 4. Experiment 1C. Women and men rating same- and opposite-sex targets on their attractiveness as friends in each of the three willingness to protect and physical strength conditions. (A) Women rating male friends. (B) Women rating female friends. (C) Men rating male friends. (D) Men rating female friends. Whiskers are standard errors.

Nevertheless, most of the effects reported here replicated. The only exception was that in Exp. 1C-R, the friend desirability ratings decreased for both women and men who were unwilling to protect, as one would expect. See SM-A and SM-B for details.

Finally, extending our Experiment 1A findings about the relative unimportance of differences in strength to long-term romantic partner attractiveness, we found no evidence that physically stronger targets—whether males or females—were more desirable as friends than physically weaker targets.

5. Experiment 2A: willing to protect you but fails (opposite-sex mate choice)

Why, in our earlier experiments, did people find the date who was willing to protect them more attractive? Was it because the date *tried* to protect them or because the date *succeeded* in protecting them (thereby demonstrating both his or her willingness and ability to protect)?

Experiment 2A was designed to disentangle these two factors that were confounded in our initial experiments: willingness to physically protect versus success in doing so. If success is the main factor, then attractiveness should drop when the date tries to protect you but is overpowered by the attacker (compared to a date about whom no willingness information is available or a date who tries to protect you and succeeds).

5.1. Methods

5.1.1. Participants

U.S. adults who identify as primarily heterosexual were recruited via MTurk ($N = 405$; 60 % women; $M_{age} = 38$, $SD_{age} = 13$, range 18 to 79).

5.1.2. Design

The design included the same three conditions as in the previous experiments reported herein—*willing (and succeeds)*, *control (original)*,

and *unwilling*—along with two more conditions: *willing but fails* and a control condition slightly modified to match it (*push control*). The date was always described as of average physical strength and physical attractiveness. Participants were randomly assigned to one of these five conditions, yielding 10 between-subjects cells (crossed with participant sex).

5.1.3. Materials & procedure

The *willing but fails* condition started like *willing (and succeeds)*, but after the date sees the drunk swing his fist toward your head, it reads (in the version presented to women):

“Seeing you are in danger, your date grabs the drunk’s arm to shield you from the blow, but the drunk forcefully pushes him to the ground. The drunk tries again to hit you. Fortunately, he aims poorly and misses your head, swinging at the air instead and falling to the ground. The drunk, surprised, quickly gets up and runs away.”

Because being pushed to the ground could change the date’s attractiveness, a new control condition was created that has that same modification: The date is overpowered by the assailant. The *push control* condition starts like *original control*, by stating that neither you nor your date noticed the drunk in time. But it continues:

“The drunk forcefully pushes your date to the ground. Then he lifts his clenched fist and swings it toward your head. Fortunately, the drunk aims poorly and misses your head, swinging at the air instead and falling to the ground. The drunk, surprised, quickly gets up and runs away.”

The remainder of the materials and procedure were identical to the other experiments reported herein. Note that in all conditions the attacker’s punch misses, so, as in the earlier experiments, you are not hurt.

5.2. Results

We first tested whether the *willing and succeeds*, *original control*, and *unwilling* conditions replicate our Experiment 1A findings. They do. See Section 5.2.1. in SM-A.

5.2.1. Does behavioral evidence that a date is willing to protect increase his/her attractiveness as a potential mate—even when s/he is overpowered by the assailant?

Yes. We computed two new variables: *Willing*, where the two conditions in which your date is willing to protect you (*willing and succeeds* and *willing but fails*) were coded as “1” and the two control conditions (*original control* and *push control*) were coded as “0”; and (ii) *Push*, where the two new conditions where your date gets pushed to the ground (*willing but fails* and *push control*) were coded as “1” and the two old conditions where this does not happen (*willing and succeeds* and *original control*) were coded as “0”.

By entering these variables simultaneously into a multiple regression, we can evaluate whether dates are attractive if they are willing to protect, regardless of whether this succeeds or fails (a main effect of *Willing*), or if willingness does make dates more attractive, but less so—or perhaps not at all—when they are pushed to the ground and their attempt to protect fails (a *Willing* x *Push* interaction).

The fit of three hierarchical statistical models was sequentially compared using log-likelihood tests: (1) the main effects of Participant Sex ($-1 = \text{Male}$, $1 = \text{Female}$), *Willing* ($1 = \text{willing and succeeds}$ and *willing and fails*, $0 = \text{original control}$ and *push control*), and *Push* ($1 = \text{willing and fails}$ and *push control*, $0 = \text{willing and succeeds}$ and *original control*) (Model 1), (2) the main effects and two-way interactions (Model 2), and (3) the main effects, two-way, and three-way interactions (Model 3).

Model 2 showed the best fit, revealing that (i) women found their dates less attractive than men did ($b = -0.59$, $b_{SE} = 0.19$, $p = .002$), and (ii) discovering that a date was willing to protect—whether s/he succeeded or failed—increased his/her attractiveness (*Willing*: $b = 2.01$, $b_{SE} = 0.29$, $p < 10^{-10}$). However, these effects were qualified by a *Participant Sex* x *Willing* interaction ($b = 0.74$, $b_{SE} = 0.22$, $p < .001$), whereby (iii) the increase in attractiveness was much larger for women rating male dates who were willing to protect ($b = 2.37$, $b_{SE} = 0.27$, $p < 10^{-16}$) than for men rating female dates who were willing to protect ($b = 0.88$, $b_{SE} = 0.35$, $p = .012$).

The date being pushed to the ground did not change his or her attractiveness for either female or male participants—i.e., there were no statistically significant main effects or interactions for *Push*. (We do note that the *Willing* x *Push* interaction was marginally significant in this model at $p = .051$, and descriptively, the differences between *willing and succeeds* and *original control* were larger than the differences between *willing and fails* and *push control*: for women rating male dates: 2.91 versus 1.77; for men rating female dates: 1.02 versus 0.74.)

As a whole, this model explained 22.2 % of the variance in participants' ratings of their dates' attractiveness as long-term mates ($F_{6, 323} = 15.38$, $p < 10^{-14}$). See Fig. 5.

In sum, we found no strong evidence that a date who tried but failed to thwart an attack was less attractive than a date who tried and succeeded. A deflationary account, however, would be that participants did not register that the date was overwhelmed by the drunk or make inferences about ability to protect from this information. We next ask whether this was the case.

5.2.2. Did participants infer that the date who was overpowered by the drunk was less able to protect them?

They did. Using *estimated ability* to physically protect as the dependent variable, we sequentially compared the fit of three hierarchical statistical models using log-likelihood tests: (1) the main effects of Participant Sex, *Willing*, and *Push* (Model 1), (2) the main effects and two-way interactions (Model 2), and (3) the main effects, two-way, and

three-way interactions (Model 3).

Model 1 showed the best fit, revealing that (i) dates who were willing to protect—whether they succeeded or failed—were viewed as more able to protect (main effect of *Willing*: $b = 2.45$, $b_{SE} = 0.22$, $p < 10^{-16}$), and (ii) dates who were overpowered by the assailant were viewed as less able to protect than dates who were not overpowered (main effect of *Push*: $b = -0.63$, $b_{SE} = 0.22$, $p = .005$).⁹ (We do note that the *Willing* x *Push* interaction was marginally significant in models 2 and 3, and descriptively, the differences in inferred ability between *willing and succeeds* and *original control* were larger than the those between *willing and fails* and *push control*: for women rating male dates: 3.05 versus 2.34; for men rating female dates: 2.50 versus 1.46.)

Thus, although we found no strong evidence that being pushed to the ground made dates less attractive, such dates were nonetheless seen as less able to protect than dates who were not pushed. The deflationary account fails: Although participants registered that the date was overwhelmed by the drunk and used that information to estimate his or her ability to protect, the date who was willing to protect but failed was seen as very attractive.

5.3. Interim summary: willingness to protect is valued even if the attempt fails

The current experiment was designed to disentangle two factors that were confounded in our initial experiments: whether the date tries to protect versus whether s/he succeeds in doing so. We show that as long as a date tries to protect—even if the date is overpowered by the assailant—s/he is judged as much more attractive than when no willingness information is available, by both female raters ($b = 2.37$) and male raters ($b = 0.88$). The boost in attractiveness for male dates was more than twice the size of the boost in attractiveness for female dates; this should be interpreted cautiously, however, considering that we did not find a similar sex difference in Experiment 1A ($b = 2.52$ for women rating male dates versus $b = 1.96$ for men rating female dates).

Surprisingly, success versus failure to protect was not a statistically significant predictor of attractiveness. That is, compared to their respective no-information conditions, we did not find strong evidence that dates who were willing to protect but failed because they were overpowered by the assailant were judged as less attractive than dates who were willing to protect and succeeded.

We were curious whether these null findings regarding success versus failure to protect with romantic partner choice would extend to friend choice. We therefore collected an additional sample of participants ($N = 802$) who saw a friend choice version of this experiment. Is success versus failure to physically protect important in friend choice? It is not. See SM-A for details of this experiment (Experiment 2B).

6. Experiment 3: willing to protect you but fails and you are harmed (opposite-sex mate choice)

We showed that willingness to physically protect is attractive in both male and female dates, and that it is attractive even if the date tries to protect you but fails. However, you—the rater—were not harmed by the assailant; failure to protect meant the date was overpowered, but this did not carry any negative consequences for you. Here, we aimed to

⁹ Was failure to protect mentally registered as a lack of effort and, therefore, willingness? As a further check, we repeated this model comparison with estimated willingness to protect as the dependent variable. Model 1 showed the best fit, revealing that discovering the date stepped in to protect you increased estimates of his or her willingness to protect ($b = 2.98$, $b_{SE} = 0.21$, $p < 10^{-16}$). Notably, there was no effect of the date being overpowered by the assailant on estimated willingness (neither a main effect of *Push* nor a *Willing* x *Push* interaction), suggesting that raters were not making an inference about willingness from whether the date succeeded or failed.

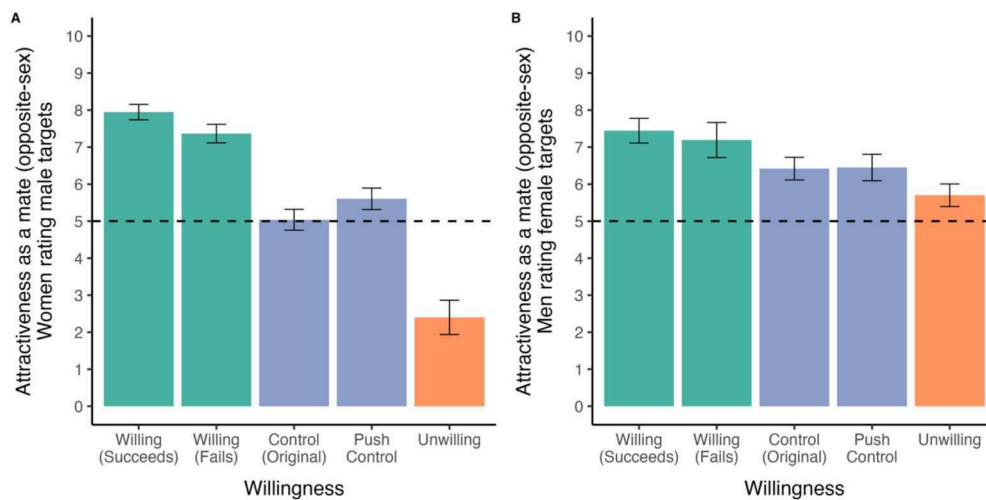


Fig. 5. Experiment 2A. Women and men rating opposite-sex dates on their attractiveness as long-term mates in each of five conditions, including the new *willing but fails* and *push control* conditions. (A) Women rating a male date. (B) Men rating a female date. Whiskers are standard errors.

Table 1

Experiment 3 design summary.

Condition	Is there evidence date is willing to protect you? (<i>Willing</i>)	Is date pushed to the ground by the assailant? (<i>Push</i>)	Is the date harmed? (<i>Harm</i>)	Are you harmed? (<i>Harm</i>)
Willing and Succeeds	Yes	No	No	No
Willing and Succeeds + You Fall	Yes	No	No	Yes (fall to the ground)
Willing but Fails	Yes	Yes	Yes	No
Willing but Fails + You are Hit	Yes	Yes	Yes	Yes (knocked down)
Original Control + You Fall	No	No	No	Yes (fall to the ground)
Push Control + You are Hit	No	Yes	Yes	Yes (knocked down)

provide the most stringent test of the importance of willingness to physically protect: Is a date who is willing to protect you still attractive if s/he fails to prevent the attack and you are consequently harmed (the assailant hits you in the head and knocks you to the ground)?

6.1. Methods

6.1.1. Participants

U.S. adults who identify as primarily heterosexual were recruited via MTurk ($N = 502$; 56 % women; $M_{age} = 40$, $SD_{age} = 13$, range 18 to 87).

6.1.2. Design

The design is summarized in Table 1. In addition to the same two conditions as in Experiment 2A—*willing and succeeds*, and *willing but fails*— it includes four new conditions in which you—the participant—are harmed. In two the drunk hits you: *willing but fails + hit* and *control + hit*. In the other two conditions you fall by accident: *willing and succeeds + fall*, and *control + fall*. The date was always described as of average physical strength. Participants were randomly assigned to one of these six conditions, yielding 12 between-subjects cells (crossed with participant sex).

6.1.3. Materials & procedure

The *willing and succeeds* and *willing but fails* conditions were identical to the same two conditions in Experiment 2A. Although in one of these conditions your date is pushed to the ground by the assailant, you are not harmed (*willing but fails*). The four new conditions change that. In *willing and succeeds + fall*, after the date sees the drunk swing his fist toward your head, it reads (in the version presented to women):

“Seeing you are in danger, your date grabs the drunk’s arm, shielding you from the blow, and forcefully pushes him to the ground. The drunk quickly gets up and runs away. However, in your surprise you accidentally fall to the ground and hit your head.”

Because falling to the ground and hitting your head could change your judgment of the date’s attractiveness, the *control + fall* condition reads like the original control but concludes with the same final sentence as in the *willing and succeeds + fall* condition: “However, in your surprise you accidentally fall to the ground and hit your head.”

In *willing but fails + hit* you are harmed by the drunk. Unlike the *willing but fails* condition, in which your date is pushed to the ground but you are unharmed by the attack, your date’s failure to prevent the attack now has negative consequences for you too:

“Seeing you are in danger, your date grabs the drunk’s arm to shield you from the blow, but the drunk forcefully pushes him to the ground. The drunk swings at you again, hitting your head and knocking you to the ground. Fortunately, with a look of surprise, the drunk then quickly runs away.”

The *push control + hit* condition, in which the date has no opportunity to protect you, reads like the *push control* condition (from Exp. 2A). But after the drunk pushes your date to the ground, the final two sentences are like those in the *willing but fails + hit* condition: “The drunk hits your head and knocks you to the ground. Fortunately, with a look of surprise, the drunk then quickly runs away.”

The remainder of the materials and procedure were identical to the other experiments reported herein.

6.2. Results

6.2.1. Does behavioral evidence that a date is willing to protect increase his/her attractiveness as a potential mate—even when s/he is overpowered by the assailant and/or you get hurt?

Yes. We computed three new variables: (1) *Willing*, where the four conditions where your date is willing to protect were coded as “1” [*willing and succeeds*, *willing and succeeds + harm (by fall)*, *willing but fails*, and *willing but fails + harm (hit by drunk)*] and the two control conditions were coded as “0” [*control + harm (by fall)* and *push control + harm (hit by drunk)*];

(2) *Push*, where the three conditions where your date gets pushed to the ground are coded as “1” [*willing but fails*, *willing but fails + harm (hit by drunk)*, and *push control + harm (hit by drunk)*] and the three conditions where this does not happen are coded as “0” [*willing and succeeds*, *willing and succeeds + harm (by fall)*, and *control + harm (by fall)*];

(3) *Harm*, where the four conditions where you are harmed are coded as “1” [*willing and succeeds + harm (by fall)*, *willing but fails + harm (hit by drunk)*, *control + harm (by fall)*, and *push control + harm (hit by drunk)*] and the two conditions where this does not happen are coded as “0” [*willing and succeeds* and *willing but fails*].

The fit of two hierarchical statistical models was sequentially compared using log-likelihood tests. Model 1 tested the main effects of *Willing*, *Push*, and *Harm*. Model 2 tested the main effects of these variables and two-way interactions between *Willing x Push* and *Push x Harm*. Note that in this design we cannot test the two-way interaction between *Willing x Harm* (nor the three-way interaction between *Willing x Harm x Push*) because in both control conditions (where there is no information about willingness) you are harmed.

To avoid having to look for four-way interactions, we separately examined ratings by male and female participants. For women rating male dates, Model 1 showed the best fit, revealing that (i) discovering that a date was willing to protect you made him more attractive ($b = 1.83$, $b_{SE} = 0.32$, $p < 10^{-7}$), (ii) your date being pushed to the ground by the drunk made him less attractive ($b = -0.56$, $b_{SE} = 0.25$, $p = .028$), and (iii) you being harmed during this altercation (accidentally falling to the ground or getting hit by the drunk) made the date less attractive ($b = -0.66$, $b_{SE} = 0.31$, $p = .033$). As a whole, this model explained 21.9 % of the variance in women’s ratings of their dates’ attractiveness as long-term mates ($F_{3278} = 25.99$, $p < 10^{-14}$). See panel A in Fig. 6.

For men rating female dates, Model 1 showed the best fit, revealing only one main effect: (i) Discovering that a date was willing to protect you made her more attractive ($b = 1.12$, $b_{SE} = 0.34$, $p < .001$). Men did not view female dates who were pushed to the ground by the drunk as less attractive, nor did being harmed during the altercation make men view their dates as less attractive. As a whole, this model explained 7.1 % of the variance in men’s ratings of their dates’ attractiveness as long-term mates ($F_{3216} = 5.50$, $p = .001$). See panel B in Fig. 6.

6.3. Interim summary: willingness to protect is valued even if it fails and you get hurt

The current experiment was designed to be the most stringent investigation of preferences for willingness to protect. We show that as long as a date tries to protect you—even if s/he fails to do so (and is pushed to the ground by the assailant), and even if you are harmed by the assailant as a consequence of this failure—s/he is judged as more attractive than a date about whom no willingness information is given.

Note that in this experiment women—but not men—were influenced by whether the date was overpowered by the drunk (*Push*) and by

whether they were harmed in the interaction (*Harm*). The male date was slightly less attractive if he was overpowered by the drunk, even if he had no opportunity stop the attack. He was also slightly less attractive if you were harmed during the altercation, even if he was willing to protect you and regardless of the cause of the harm—accidentally falling to the ground or getting hit in the head by the drunk.

The fact that there was no *Willing x Push* interaction suggests that the willing date who failed to successfully protect you was not less attractive by virtue of his failed attempt to protect you. Further, the fact that there was no *Push x Harm* interaction suggests that you being harmed decreased the date’s attractiveness, but being pushed to the ground did not make the date less attractive by virtue of your being harmed.

Taken as a whole, our findings show that willingness to protect is highly valued in mates, by both men and women, even if it fails and/or even if you are harmed because of this failure.

7. General discussion

The risk of physical violence from conspecifics was a recurrent selection pressure in ancestral human life (Pinker, 2011, e.g., Fig. 2-2, p. 49). In contrast to modern societies, protection from violence could not be outsourced to police and courts but came only from your social allies: romantic partners, family, friends, and coalitional allies. Here, we proposed that this selection pressure shaped human preferences for romantic partners and friends, and that these preferences continue to influence social decision-making today. We tested the prediction that, all else equal, people prefer romantic partners and friends who are willing and able to provide them with physical protection (Bleske & Buss, 2000; Bleske-Rechek & Buss, 2001; Buss & Schmitt, 1993, 2019; Ellis, 1992; Symons, 1979; Wilson & Mesnick, 1997).

Across a series of seven vignette experiments—five reported in the main text and two in the supplements ($N = 4508$ U.S. adults recruited via MTurk)—we systematically manipulated willingness and ability to physically protect in scenarios describing an altercation with a drunk in the presence of a date or a friend. Instead of asking about physical protection in the abstract, we grounded people in a narrative describing the date or friend’s actual behavior, and then asked them how attractive they found this person as a long-term romantic partner or how much they would want to have this person as a friend.

We also examined inferences based on the scenarios. As expected, participants inferred that stronger individuals would be more willing to protect them than weaker ones, and that behavior demonstrating willingness to protect implies more ability to do so. Because we assessed these inferences in the same individuals who rated attractiveness, we could disentangle the effects of ability and willingness to protect.

As a primary aim, we tested five first-order predictions about a partner’s willingness and unwillingness to protect you against aggression.

Our main predictions were supported across all seven experiments. Discovering that a person is willing to physically protect you (compared to having no information about their willingness to do so) was very attractive to both women and men, in both opposite- and same-sex dates, and in friends of both sexes (Prediction 1). The boost in attractiveness from discovering the partner was willing to protect you was independent of information about their physical strength or whether they have succeeded or failed in protecting you. In fact, partners who were willing to protect you were attractive even if they tried to protect you but failed—they were overpowered by the assailant (dates in Exp. 2A and friends in Exp. 2B)—and even if they tried but failed to protect you and you were harmed because of this failure (Exp. 3).

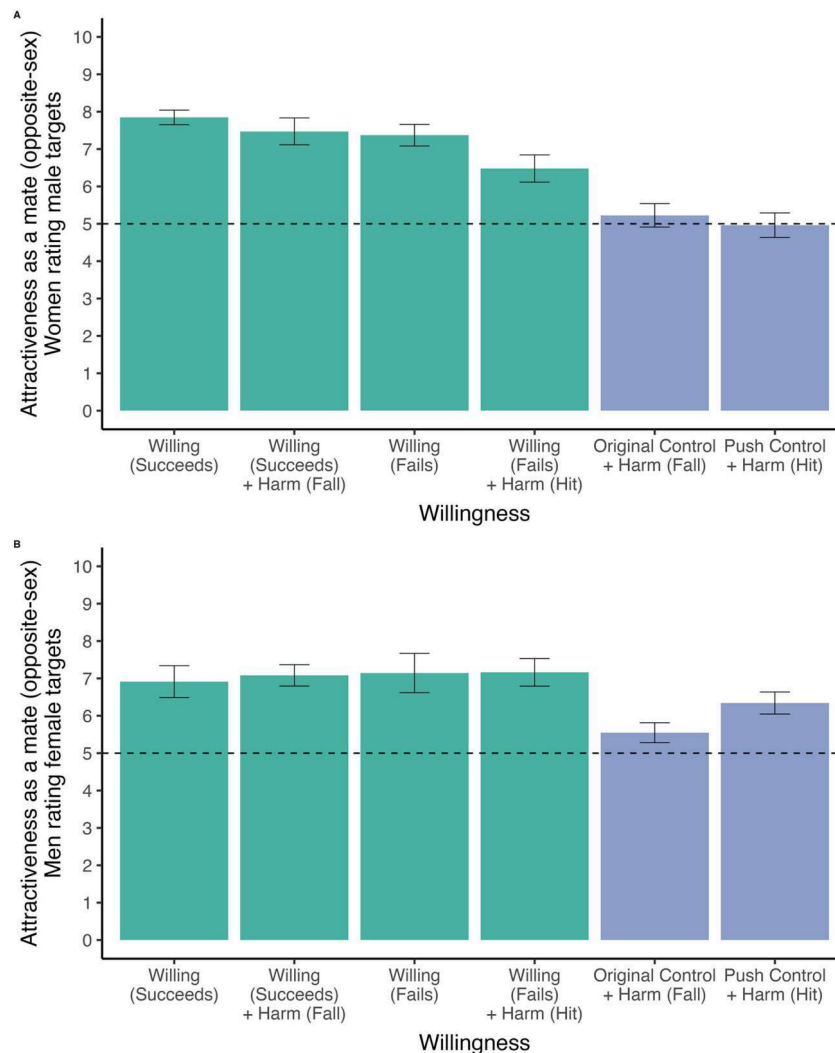


Fig. 6. Experiment 3. Women and men rating opposite-sex dates on their attractiveness as long-term mates in each of six conditions, including three conditions where the date is pushed to the ground by the drunk (*willing but fails*, *willing but fails + harm (hit)*, and *push control + harm (hit)*) and four conditions where you are harmed during the assault (in two you accidentally fall and in two you are hit by the drunk: *willing and succeeds + harm (fall)*, *willing but fails + harm (hit)*, *control and falls*, and *push control + harm (hit)*). (A) Women rating a male date. (B) Men rating a female date. Whiskers are standard errors.

Willingness and unwillingness were not mirror images of one another. Discovering that a man is unwilling to physically protect you (compared to having no information about his willingness to do so) had large and unequivocal effects for women rating dates: The attractiveness of male dates plummeted if they were unwilling to protect a woman from the attacker (Prediction 2); this is consistent with the bodyguard hypothesis of female mate choice which holds that protection from physical aggression is a survival-critical resource in a potential romantic partner (Mesnick, 1997; Wilson & Mesnick, 1997). Beyond this, however, the extent to which unwillingness decreased attractiveness was nuanced—it depended on the sex of raters and targets, and whether the target was a date or a friend.

First, supporting Prediction 3 with dates, the effect of unwillingness depended on the sex of raters. We combined ratings of opposite-sex dates (Exp. 1A) and same-sex dates (Exp. 1B) to hold sex of targets constant. Doing this showed that women judged dates who were unwilling to protect them more than twice as harshly as men did, regardless of the sex of those dates.

Second, supporting Prediction 4 with dates, the effect of unwillingness depended on the sex of targets. When they were unwilling to protect, male dates were judged more harshly than female dates, by raters of either sex (holding sex of raters constant by combining Exp. 1A and Exp.

1B).

With friends, however, interpreting the effects of the sex of raters (Prediction 3) or targets (Prediction 4) was made difficult by the surprisingly low ratings of men as compared to women in the friend control conditions (no willingness information) of Experiment 1C.¹⁰

We note that when men rated a woman, she was always judged relatively desirable as a friend, even when she was unwilling to protect (Exp. 1C, 1C-R, and 2B): The attractiveness of women who proved unwilling to protect a man was at or above the midpoint of the scale across all five studies with this condition. This is consistent with theories of male mating psychology according to which men value proximity to female friends because it could translate into opportunities for sex (e.g.,

¹⁰ With no information about willingness, ratings of female friends were always above the midpoint of the scale (Exp. 1C, 1C-R, and 2B), and consistently higher than ratings of male friends, which were mostly near or below the midpoint of the scale (e.g., see blue lines with triangles in Fig. 4). Discovering that a male friend was unwilling to protect did not decrease his desirability as a friend in Exp. 1C and 1C-R (although it did in 2B) relative to baseline, which was already relatively low, whereas discovering that a female friend was unwilling to protect did decrease her desirability as a friend in Exp. 1C and 2B (although not in 1C-R) relative to baseline.

Symons, 1979). By contrast, when either sex evaluated an unwilling man, he was always rated below the midpoint of the scale on his desirability as a friend—compatible with the idea that male friends who are unwilling to protect are seen as bad allies by everyone.

Finally, supporting Prediction 5, the detrimental effect of unwillingness depended on relationship type—date versus friend. The cleanest test of this prediction compared ratings of same- and opposite-sex dates (Exp. 1A and 1B) to ratings of same- and opposite-sex friends (Exp. 1C). Doing this showed that when the partner was unwilling to protect, the fall in attractiveness was nearly three times more precipitous for dates than for friends.

We note that comparing the effects of willingness or unwillingness to protect to the no-information control conditions is telling, but so are absolute ratings. Across all studies, partners who were willing to protect were very attractive. Willing dates and friends of both sexes were generally rated near the ceiling of the rating scale, by both women and men. Conversely, unwillingness to protect was unattractive, especially to women raters, and it was a deal-breaker for women rating male dates—male dates who stepped away when a woman was being attacked were rated near the floor of the scale (Exp. 1A and 2A).

As a secondary aim, we tested whether the ability to protect against aggression is attractive in partners once we control for the partner's willingness to protect. When looking at mate choice, we found only weak support for this. In our initial experiments we operationalized ability to protect by varying the physical strength of a partner across conditions. We confirmed that participants used strength to estimate a partner's ability to protect them from aggression—and also to estimate the partner's willingness to protect them. Women did show a weak preference for strength in male dates, however, most of this was mediated by inferred *willingness* to protect. Men did not show a preference for strength in female dates (Exp. 1A).

In our later experiments we operationalized ability to protect from aggression by varying whether a partner who tried to protect either succeeded or was overpowered by the assailant. Compared to their respective baseline no-information conditions, we did not find strong evidence that dates who tried to protect and failed were less attractive than dates who tried to protect and succeeded (Exp. 2A and 3). We did find evidence, albeit mixed (Exp. 3, but not Exp. 2A), that when dates were overpowered by the drunk, women judged them as less attractive than when they were not; this could arguably be a response to lesser ability, as it was independent of willingness to protect.

Finally, when women were harmed during the altercation, they found their date less attractive. But this effect was independent of ability to protect—women found the male date less attractive even when the date successfully overpowered the assailant (indicating high ability) but she accidentally fell and hit her head.

When looking at friend choice, a partner's strength did not influence how attractive he or she was as a friend, for both men and women raters and for same- and opposite-sex friends, whether strength was stated straightforwardly (Exp. 1C) or inferred from whether the partner pushed the assailant to the ground or was overpowered by him (Exp. 2B).

In sum, the experiments reported here supported all five primary predictions about the importance for mate and friend choice of a partner's willingness and unwillingness to protect you from aggression. Unlike the strong and consistent effects of willingness, our secondary prediction that differences in ability to protect would influence attractiveness had only limited support.

8. Future directions

8.1. Trying but failing (once) implies ability to protect

Whether you protect someone is a function of both your willingness and ability to do so. Although a mate or a friend is not expected to successfully protect you against all attackers, a partner who is willing to protect you *and* much stronger than average is more likely to protect you successfully in a range of physically dangerous situations, and would likely incur lower costs while doing so. As such, we were surprised that physical strength was not a stronger predictor of partner attractiveness, especially for women judges. Indeed, even among male dates and friends who were willing to protect them, we did not find strong evidence that failure to effectively protect was less attractive to women than success (Exp. 2A and 2B). Why might that be?

First, people strongly infer a partner's ability to protect from their willingness to do so, even when their strength is described as “average” (Exp. 1A). Compared to having no evidence about willingness, discovering the date was willing to protect you increased estimates of his or her ability to protect by ~3 scale points; discovering he or she was unwilling decreased estimates of the date's ability by ~1.5 scale points. Indeed, men who were described as “weaker than average” were not seen as feeble *if they stepped up to protect their dates*. When rating their date's ability to protect them, women's estimates were similar for weaker willing men and stronger unwilling ones (7.05 vs. 6.39), and both were above the midpoint of the scale. A close inspection of Fig. 1 shows that women found the weaker willing man massively more attractive than the stronger unwilling one, despite similar estimates of their ability. This is consistent with our mediation analyses which showed that estimated ability to protect is not irrelevant to attractiveness, but it exerts its effects indirectly, by influencing estimates of willingness.

Second, whatever led to your failure today (e.g., the assailant might have been stronger, or caught you by surprise, or you were inebriated walking out of a bar), might not lead to your failure tomorrow. Although a single observation of failure to protect should decrease your estimate of success in the future, it is not clear that this decrease should be very large. Our estimated ability findings for Experiment 2A speak to this (opposite-sex mate choice, all targets described as average strength). Regardless of whether their date succeeded or failed, participants inferred that partners who were willing to protect them were more able to do so, compared to when no willingness information was given (baseline condition). When dates were willing to protect and succeeded, their estimated ability increased relative to estimates in the baseline condition (women rating male dates: 8.73 vs. 5.68; men rating female dates: 8.08 vs. 5.58). When they were willing to protect and failed, their estimated ability again increased—and nearly as much as when they succeeded (women rating male dates: 7.63 vs. 5.29; men rating female dates: 7.12 vs. 5.66).

A more informative test of the importance (or lack thereof) of ability to protect might be to repeatedly try to protect but fail, with different assailants and in different situations. A partner such as this might indeed be substantially less attractive as a mate and maybe also as a friend.

Third, a partner's willingness to defend you is a cue that should down-regulate an aggressor's motivation to fight. According to the asymmetric war of attrition (AWA), willingness to fight will be regulated not just by relative formidability, but also by how much each rival values the contested resource—which could be a mate (Smith & Parker, 1976). When the rival values the resource more, even more formidable challengers may retreat (e.g., crickets: Hofmann & Schildberger, 2001; wasps: Tibbetts, 2008; bluethroats: Lindström et al., 1990). In the

current protection scenarios, AWA implies that your date's willingness to protect a potential mate—you—can function as a value signal to the attacker. Because fighting always carries a risk of injury, adaptations regulating the attacker's decision to de-escalate the conflict should weigh estimates of how fiercely your date will fight against assessments of their relative formidability. Retreat will sometimes be the better option, even when the protector is not as strong as the attacker.

8.2. Are partner preferences for the ability to protect facultatively calibrated?

Although physically strong individuals, especially men, would be better able to protect themselves and others from violence, such men might also be more violent toward their mates and friends (e.g., Sell et al., 2009)—physical strength can be an asset or a liability (Mesnick, 1997).

A plausible design feature of evolved preferences—including content-specific ones—is the capacity to be up- or down-regulated by the social and physical environment in which people live and their vulnerabilities. Thus, another possible explanation for the relative unimportance of physical strength for partner attractiveness is that preferences for physical strength in mates and friends are facultatively calibrated. Indeed, it is possible that the high variance in rates of violence across ancestral human societies would have favored the evolution of such flexible preferences for physical strength. In the U.S. today—the ontogenetic environment of the participants in this study—levels of violence are orders of magnitude lower than they were in ancestral environments (even when we consider the most dangerous neighborhoods in the U.S.); in such an environment, partner preferences for physical strength per se may be downregulated (see e.g., Snyder et al., 2011).

Willingness to physically protect may not be a double-edged resource like strength is, but it is possible that preferences for willingness are facultatively calibrated as well. In safer environments, willingness to physically protect might be given less weight relative to other goods a partner can provide. Our results do not speak to this possibility, and finding out will require more than comparing preferences in dangerous versus safe environments—it would require a design that looks at tradeoffs, where people choose between partners who vary on many different traits (see, e.g., Conroy-Beam & Buss, 2016).

8.3. Is willingness to protect you from violence attractive in and of itself, or because it signals that the partner values your welfare in general?

We commonly make decisions about how much of our own welfare to trade-off for the welfare of a social partner (as when sacrificing time or money to benefit a friend; Delton et al., 2023; Delton & Robertson, 2016; Howard et al., 2018; Tooby et al., 2008). Thus, the question for partner choice is not just the delivery of benefits, but how much the other person is willing to sacrifice to provide those benefits. All else equal, we should prefer social partners who value us—ones who are willing to make sacrifices to benefit our welfare. When choosing between partners who sacrificed a lot versus a little to benefit them, people preferred cooperative partners who sacrificed more, even when the benefits they delivered were much lower (Lim, 2012; Sznycer et al., 2019). Moreover, people accurately estimate—based on sparse information—the degree to which another person is willing to sacrifice to provide them with benefits (Quillien et al., 2023).

How is this general valuation estimated, and what do alternative accounts imply about why willingness to protect you from violence is attractive?

A fully domain-general account would say that the mind has no cognitive adaptations for estimating willingness to protect per se. Instead, the mind considers the cost of various actions and uses them to compute a person's willingness to sacrifice their own welfare for yours. In this view, interceding to protect you from an attack is just one of many

costly behaviors done on your behalf—no different from standing in a line all night in freezing weather to get you concert tickets, picking you up from the airport in rush hour traffic, or standing on a creaky ladder to clean leaves from your gutter. That is, under this account, willingness to protect you from aggression was valued even in the relatively safe social ecologies of our participants because it is a costly demonstration of domain-general valuation.

A close examination of our findings makes us doubt this last possibility. First, for willing partners, attractiveness did not closely track the costs they incurred. If partner preferences solely track domain-general welfare valuation, then, all else equal, the more costs a partner incurs to benefit us, the more attractive he or she should be. The costs of protecting against male aggression are larger for women than for men, yet women who were willing to protect were not more attractive than men who were willing to do so, as mates or friends. Similarly, a date who was willing to protect and was harmed—pushed to the ground—has incurred higher costs than one who was unharmed. But a willing date who was pushed to the ground was not *more* attractive than a willing date who was not harmed: This date was similarly attractive (Exp. 2A, Exp. 3 men rating women) or might have even been *less* attractive (Exp. 3, women rating men).

Second, if attractiveness was fully a function of domain-general welfare tradeoff calculations, then willingness and unwillingness should have had similar but opposite effects. Instead, willingness to protect increased attractiveness for dates and friends across the board, regardless of the sex of raters or partners, but unwillingness to protect did not decrease attractiveness in the same symmetrical manner. Unwillingness had little effect on how men evaluated women as dates or friends, and its effects on how men evaluated male friends were inconsistent; but when it came to how women evaluated men, the attractiveness of unwilling men was near the bottom of the scale, especially when they were evaluated as romantic partners.

Although we consider the fully domain-general account unlikely, it is certainly possible that social decision-making is regulated by a hybrid psychological architecture, using both content-specific preferences for willingness to protect and inferences about the extent to which partners value your welfare in general.

What might such a hybrid psychological architecture look like? A domain-general valuation could be calculated by tracking costs incurred to deliver benefits to me, and this could operate alongside domain-specific systems to influence the attractiveness of partners. Alternatively, general valuation could be computed from domain-specific indices, such as willingness to protect you from violence, willingness to provide you with food, and willingness to nurse you to health. Under this latter view, there is a cognitive adaptation specialized for attending to a person's willingness to protect you from violence, but its output does not function as an independent partner choice preference; rather, it influences the attractiveness of partners—mates and friends alike—indirectly, by increasing estimates of how much that person values you. Teasing apart such possibilities requires future research.

8.4. Just how domain-specialized are preferences for willingness to protect?

The attractiveness of romantic partners and friends was strongly regulated by behavioral evidence of their willingness to protect you from violence. But what are the input conditions that activate this preference? How domain-specialized are they? The answers to these questions bear on why, exactly, this preference was a target of selection.

We investigated willingness and ability to protect because managing interpersonal aggression was an important adaptive problem ancestrally, and this might have selected for functionally-distinct and content-specific preferences. Ellis (1998), investigating the delivery of partner-specific investments by actual couples, found that protection was independent of factors such as monetarily investing, being socially attentive, or giving time to your partner—this is compatible with preferences for

protection being content-specific.

But just how content-specific are these preferences? The same qualities that make a person willing and able to protect you from violence could make them willing and able to protect you from many ancestral dangers, such as predator attacks, stampeding herds, and venomous snakes. Our studies were not designed to distinguish between willingness to protect you from violence from conspecifics versus protection from other sources of physical harm. Thus, determining just how content-specific this preference is requires further research.¹¹

9. Conclusions

Although it has long been theorized that willingness to protect you from aggression is an important dimension of partner choice, this study is the first to systematically disentangle willingness to physically protect from the ability to do so. Across seven experiments, we explored how preferences for willingness and ability vary across relationship types (romantic partner, friend) and the sexes of social perceivers and targets. We did this while controlling for several possible alternative interpretations.

We found overwhelming support for the prediction that behavioral evidence of willingness to protect you from aggression matters for both women and men in choosing romantic partners and friends. This held even when controlling for differences in strength and other indices of the partner's ability to protect you.

We showed that physical strength is used to infer willingness to protect, and willingness is used to infer the partner's ability to protect you. However, inferences about willingness were the primary driver of how attractive a person was as a mate or friend. We also showed that this effect largely holds even if the person who tries to protect you fails to do so, and even if you are harmed because of this failure.

The partner preferences documented here are compatible with the view that they were crafted, at least in part, by ancestral risks. But they are surprising on the view that general learning systems sample the modern environment for risks, use this information to infer needs, and then construct partner preferences that can fulfill these needs (e.g., Eagly & Wood, 1999). A straightforward prediction from this latter view is that willingness to protect you from violence should have little or no effect on how attractive you find a partner, because the lower the risk of violence, the less need there is to choose a partner based on this criterion.

Our American participants live in a society where protection from violence is considered the responsibility of police and courts rather than of romantic partners, family, friends, and coalitional allies. Indeed, although the risk of violence varies substantially across communities in the U.S., that risk is much lower in the present than it was in our ancestral past, where rates of death due to interpersonal violence averaged 15 %. Nowadays, the yearly homicide rate in the U.S. is less than 1 in 10,000 and each year fewer than 2 in 100 Americans are victims of a crime in which violence is used (Morgan & Thompson, 2021). Yet, discovering that a person is willing to protect you from violence made them highly attractive as a romantic partner and as a friend, whereas discovering that a person is unwilling to protect you decreased their attractiveness, and was even a dealbreaker for women evaluating men as mates.

As such, the findings reported here not only shed light on an

important feature of our partner choice psychology, but they also illustrate how considering adaptive challenges in the environments in which our species evolved and the systems that would solve these challenges can guide psychological research. The extent to which the preferences we have documented here reflect special design for protection from human violence is a fruitful direction for future research.

CRedit authorship contribution statement

Michael Barlev: Writing – review & editing, Writing – original draft, Visualization, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Sakura Arai:** Visualization, Writing – review & editing, Methodology, Investigation, Data curation, Conceptualization. **John Tooby:** Funding acquisition, Conceptualization. **Leda Cosmides:** Writing – review & editing, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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¹¹ A related direction worth considering in future comes from Eisenbruch and Krasnow (2019). They have suggested that willingness (which they refer to as “warmth” or “valuation”) generalizes across domains—you might infer that a social partner who is willing to physically protect you may also be willing to invest in your welfare in other domains, such as sharing material resources with you (they have also suggested that willingness generalizes better than ability or “competence”). The extent to which such inferences explain the preferences for willingness to protect shown in our experiments is an open question.

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