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The Effect of Flirting on Attractiveness Ratings: A Comparison of Neutral, Happy, and Flirting Expressions

Physical attractiveness is an important topic in all our everyday lives. People expect a more attractive person to lead a happier life, have a more successful and prestigious occupation, be in a happier marriage than a less attractive person and they judge them as being more socially desirable (Dion et al., 1972). Indeed, previous studies revealed that being attractive leads to better evaluations in job interviews (Tsai et al., 2012), to better income prospects (Judge et al., 2009), to younger marriage (Jaeger, 2011), to increased psychological well-being and a lower risk of depression (Datta Gupta et al., 2016), and to less prosecution and less severe punishment in court (Darby & Jeffers, 1988). Moreover, attractive individuals have higher mating success (Rhodes et al., 2005). Therefore, it is not surprising that psychological research has investigated which traits or behaviours are perceived as attractive. Besides physical and specifically facial attractiveness enhancing mating success (Rhodes et al., 2005), also traits rapidly changing in time such as gaze direction (Jones et al., 2006) or emotional expression (Ueda et al., 2016) seem to influence attractiveness judgements. For instance, people with a happy facial expression were perceived as more attractive than those with neutral or angry expressions (Calvo et al., 2018). People also tend to act differently when searching for a partner in order to appear more attractive (Back et al., 2011), what we sometimes refer to as flirting. And indeed, good flirting skills seem to have an effect on mating performance (Apostolou et al., 2019) as some previous studies using self-reports reported flirting to be effective (Apostolou et al., 2019; Wade & Slemp, 2015). However, to our knowledge, no studies have yet experimentally investigated whether flirting is indeed perceived as more attractive by potential mates. Therefore, in this study we aim to investigate the effect of flirting on perceived attractiveness.

Flirting

Flirting can serve a variety of purposes. In non-mating contexts, flirting can be used for instrumental reasons, such as to get others to help or assist one with something (Henningsen, 2004; Henningsen et al., 2008) or, as flirting is highly reciprocal (Back et al., 2011), to encourage another person's flirting behaviour (Henningsen, 2004) in order to then feel flattered, thus boosting one's own self-esteem (Henningsen, 2004; Henningsen et al., 2008). This may explain why flirting is reciprocal but mate choice is not (Back et al., 2011), as mate acquisition is not the only motivation to flirt (Back et al., 2011; Henningsen, 2004; Henningsen et al., 2008). Flirting can also be used as a technique to find out if another person is willing to make contact while disguising one's own intentions or before deciding what kind

of interaction one wants for oneself (Grammer et al., 2000; Henningsen, 2004; Henningsen et al., 2008). It can also be practiced as an enjoyable and fun activity without sexual intentions (Henningsen, 2004; Henningsen et al., 2008).

Besides the reasons to flirt without sexual intention, flirting is assumed to be especially important in courtship situations. Courtship behaviour is probably one of the most important adaptations of humans to bond with possible mates and to strengthen an already existing relationship (Eibl-Eibesfeldt, 1992). Therefore, flirting is a technique in mate selection contexts to signal sexual interest in order to obtain a mating partner (Henningsen, 2004; Henningsen et al., 2008; Wade & Slemp, 2015; White et al., 2018), either for short- or long-term relationships (Wade & Slemp, 2015; White et al., 2018). Short-term relationships (STRs) are uncommitted relationships that may only last for a few dates (Wade & Slemp, 2015) and might be used for sex (Wade & Slemp, 2015; White et al., 2018), while long-term relationships (LTRs) are committed relationships that are intended to last for a longer time (Wade & Slemp, 2015; White et al., 2018) and mating partners in a LTR may share resources (White et al. 2018). Good flirting skills can positively impact one's mating performance (Apostolou et al., 2019) and intimate relationship development (Apostolou et al., 2019; Apostolou, 2021). Poor flirting skills enhance the chance of being unintentionally single rather than in an intimate relationship (Apostolou et al., 2019; Apostolou, 2021). Overall, people may flirt for a variety of reasons – some with sexual intentions, some without.

Although flirting seems to be an important courtship behaviour, it remains unclear whether or not flirting behaviour actually increases attractiveness. Cowan and Little (2013) found an interaction between flirting behaviour and perceived attractiveness. While examining the interaction between attractiveness and funniness, humour and funniness correlated strongly with perceived flirting. Subjects perceived attractive people as funnier in video recordings than in sound recordings, but they also perceived video recordings of unattractive people as less funny compared to their sound recordings. A possible explanation for this could be that laughter can be interpreted as a sign of interest in the other person (Grammer & Eibl-Eibesfeldt, 1990) and people want attention from attractive people but not from unattractive people (Rall et al., 1984). Being humorous also made men (but not women) significantly more attractive for a STR than for a LTR (Cowan & Little, 2013). As flirtatiousness correlates with funniness and as it also seems to moderate the relationship between funniness and attractiveness for a STR (Cowan & Little, 2013), flirting might have a similar modulating effect on attractiveness as funniness: It makes attractive people appear

even more attractive and unattractive people even less attractive, at least for a STR. However, to our knowledge, no study has examined this very conjecture.

Flirting Strategies

Research suggests different flirting strategies that vary in their effectiveness (Hall et al., 2010). Common flirting behaviours, such as playing with one's hair, seem to be effective, while unordinary flirting behaviours, such as offering a foot rub in class, seem to be less effective (White et al., 2018). Non-verbal behaviours, such as smiling and intense gazing, as well as gentle approaches, including being respectful, polite, and mature were found to be some of the most effective flirting strategies (Apostolou & Christoforou, 2020). Hall et al. (2010) categorized flirting behaviours into five common flirting strategies that are used to a greater or lesser extent by both men and women in mating contexts. 1) The traditional flirting style records the extent to which people act according to their assigned gender roles in mating contexts, e.g., the belief that men should make the first move. 2) People who prefer to use the physical flirting style are comfortable communicating their sexual interest or attraction to another person, also through their behaviour and body language. 3) People who score high on the sincere flirting style try to create an emotional bond with the other person by, e.g., showing genuine interest. 4) The playful flirting style captures the extent to which people feel that flirting is for fun and to feel flattered and not just to initiate a relationship. 5) When using the polite flirting style, people set value on not to get too physical and not to use inappropriate behaviours when initiating a courtship situation, while being polite, cautious and sticking to courtship rules. The sincere, the playful and the physical flirting style were correlated with greater dating success (Hall et al., 2010). Overall, there are a variety of different flirting approaches, and not all of them seem to be equally effective.

However, women and men seem to prefer different approaches when it comes to flirting strategies. Women were found to be more likely to score higher than men on all of the flirting styles Hall et al. (2010) described, with the exception of the playful flirting style, which men were more likely to ascribe to themselves than women. In addition to sex differences in the use of flirting strategies, there are also sex differences in the perception of flirting attempts. While men seem to be more likely to identify a flirting approach as sexually motivated than women (Henningsen, 2004; Henningsen et al., 2008), women seem to interpret the motivation behind flirting as wanting to have fun or starting a relationship more often than men (Henningsen, 2004). Women's flirting behaviour that demonstrated sexual accessibility was rated as most effective by men, while women evaluated men's flirting as most effective

when it indicated commitment or exclusivity (Wade & Slemp, 2015). Also, when asked what strategies might be effective in attracting a partner for a STR, women judged men's mating behaviours as most effective that indicated interest in a LTR and investment, such as spending time together or inviting them out. Women's behaviours that implied sexual accessibility, such as touching and flirting, were considered as most effective by men to get a partner for a STR. This indicates that women may use short-term mating strategies to pursue a LTR (Wade et al., 2021). Concluding, there seem to be differences between men and women when producing and perceiving flirting attempts.

There are also differences between men and women when using non-verbal flirting strategies. Generally, women seem to use more non-verbal flirting strategies than men, such as laughing and touching (Whitty, 2004). Eibl-Eibesfeldt and Hass (1967) described flirting women's typical and most likely universal non-verbal gestures in five different regions around the world. First, they start off a contact with a smile and by lifting their eyebrows, then they turn their head to the side and look downward, which may be accompanied by chuckling and hiding the face behind the hands. These steps can then be repeated. Similar non-verbal courtship signals that women use when having interest in another person were also described in a more recent study, namely a short glance that lasts no longer than three seconds, a coy smile, which is a smile that is instantly followed by the woman turning away and lowering her head, and also primping, which refers to the woman needlessly ordering her clothes (Grammer et al., 2000). Therefore, it is important to not only consider verbal but also non-verbal flirting strategies when examining flirting behaviour.

Moreover, considering male flirting strategies, dominant or explicit flirting strategies are less successful than an affiliative strategy that includes making compliments and soliciting self-disclosure of the other person (Hall et al., 2008). If the message is affiliative and also explicit, such as a compliment about the woman's eyes, it will most likely be noticed as flirting because it explicitly reveals what kind of relationship is aspired. The flirting person's attractiveness also has an influence on the outcome of the flirting attempt. Flirting was assessed more positively when used by attractive men compared to unattractive men – it was perceived as more inviting, appropriate, playful, funny and also as less annoying or embarrassing. When using a sexually aggressive strategy, attractive men were still able to achieve a successful result compared to unattractive men, although this approach strategy seems to be considered ineffective overall (Hall et al., 2008). In summary, not only the flirting

strategy but also static traits such as attractiveness seem to play an important role in the perception of flirting.

Moreover, the menstrual cycle influences how women perceive male flirtatiousness, with flirtatious faces being perceived as more attractive during the fertile phase than during the non-fertile phase (Morrison et al., 2010; Stern et al., 2020). However, not only is the perception of flirting influenced by the menstrual cycle, but also women's flirting behaviour itself, as women in their high fertility phase showed more flirting behaviour toward men that displayed certain traits that could be interpreted as markers of genetic fitness (Cantú et al., 2014). Taken together, these studies suggest an important role of the menstrual cycle regarding attractiveness, perception, and production of flirting behaviour. Since one goal of flirting seems to be to increase one's attractiveness to potential mates (Cowan & Little, 2013), the following sections describe the importance of facial attractiveness and the traits that make faces more attractive.

Facial Attractiveness

Faces play a major role in attractiveness research as they seem to be of particular importance in human mate choice (Currie & Little, 2009). This is not surprising, as faces seem to be of great social importance to humans as there even is a specific brain region, the fusiform face area, essential in processing faces (Schiltz et al., 2010). Faces also seem to be socially important as they help to convey social cues, such as age, sex, race, and emotional expression (Karnadewi & Lipp, 2011), but also attractiveness. While body attractiveness plays a role in assessing overall physical attractiveness, facial attractiveness seems to be even more important, as the face is more important in conveying social cues and may be a more honest indicator of genetic quality (Currie & Little, 2009; Peters et al., 2007). The body, however, is more sensitive to behavioural aspects, such as exercise (Peters et al., 2007). Due to the importance of faces, there is a lot of research on what is considered attractive in faces, and it has been discussed that various traits, such as averageness, symmetry, and sexual dimorphism, make faces more attractive (Rhodes, 2006).

Averageness and Distinctiveness

Among traits that make faces attractive, averageness seems to play a crucial role (Rhodes, 2006). Average faces are defined as being closer to the average of a certain population, whereby distinct faces are defined as being farer away to this average (Rhodes, 2006). In 1879, Francis Galton randomly observed that composites of faces, where he overlaid several different images of faces, looked better than the individual face images

because imperfections of individual faces disappeared through averaging. More recent studies seem to support this early finding, as they also found a significant positive effect of averageness on attractiveness using different methods (Amaya et al., 2022; Jones & Jaeger, 2019; Kočnar et al., 2019; Langlois & Roggman, 1990; Lee et al., 2016; Muñoz-Reyes et al., 2015; Pavlovič et al., 2021; Rhodes et al., 1999; Vingilis-Jaremko & Maurer, 2013). For example, when participants were asked to rate the attractiveness of unmanipulated facial images and facial images that were manipulated in their averageness, the more average-looking images were perceived as more attractive (Jones & Jaeger, 2019). The same effect was found when the attractiveness of natural faces, whose averageness was calculated, was rated (Kočnar et al., 2019). Thornhill and Gangestad (1993) argue in their review that facial averageness is attractive as it could indicate biological advantages, such as parasite resistance through heterozygosity. Indeed, facial averageness was found to signal health, which would support the hypothesis of good genes being linked to facial averageness (Rhodes et al., 2001). The effect of averageness can not only be found when face composites were created (Amaya et al., 2022; Langlois & Roggman, 1990; Rhodes et al., 1999), but also when faces with natural variation were used as stimuli (Damon et al., 2017; Jones & Jaeger, 2019; Kočnar et al., 2019; Lee et al., 2016; Muñoz-Reyes et al., 2015; Pavlovič et al., 2021; Rhodes et al., 2005). Averageness was here either measured by the distance of a face to a composite of many faces (Damon et al., 2017; Jones & Jaeger, 2019; Muñoz-Reyes et al., 2015), by asking participants how distinctive they found a face, which was defined as the opposite of averageness (Rhodes et al., 2005), or by the distance of the landmarks on each face from the calculated average of the landmarks of all the faces used (Kočnar et al., 2019; Lee et al., 2016; Pavlovič et al., 2021). Overall, averageness seems to be a stable trait to predict facial attractiveness by offering important information about a person's health and genetic fitness

However, Grammer and Thornhill (1994) argued that the effect of averageness on facial attractiveness was only moderated by an effect of symmetry. Yet, using different experimental approaches, studies could show that averageness still affects attractiveness, after controlling for symmetry, e.g., Valentine et al. (2004) used profile images of faces, where facial symmetry cannot be detected, and still found a strong preference for averageness. Rhodes et al. (1999) additionally created a fully symmetric version of facial composites and also found a significant effect of averageness when controlling for symmetry. By making individual faces more or less average looking and then making all facial images completely symmetrical, Vingilis-Jaremko and Maurer (2013) also found that average faces appear more

attractive. Thus, the positive effect of averageness on attractiveness cannot be caused by a symmetry effect alone.

Contrarily, distinctiveness also seems to play a role in the perception of attractiveness. While unattractive faces were rated as distinctive, all levels of distinctiveness were found in attractive faces when distinctiveness was defined as how unusual these faces were and how much they would stand out in a crowd (Wickham & Morris, 2003). By making two composites, one of an entire collection of 60 images of faces and one of the 15 images of this sample that were rated as the most attractive, it could be revealed that the composite of the attractive faces was rated as more attractive than the composite of the entire collection, which indicates that attractive faces differ systematically from average faces (Perrett et al., 1994). In summary, while averageness has a large effect on facial attractiveness, there are also distinctive features that seem to have a positive impact on facial attractiveness.

Symmetry

Apart from averageness and distinctiveness, symmetry has also been discussed as an important indicator of attractiveness (Rhodes, 2006). A face is symmetric if it's features on both hemispheres have the same distance to the vertical midline (Baudouin & Tiberghien, 2004). That symmetry in faces and bodies might be considered as more attractive could have a biological origin. Little and Griffey (2020) argue that symmetry may be related to aspects of mate quality, as they found adults to significantly prefer symmetrical over asymmetrical faces, whereas they found no such preference in children. Indeed, developmental instability is linked to decreased health and is also associated with being non-resistant to parasites and can be measured by fluctuating asymmetry, the discrepancy from symmetry (Thornhill & Møller, 1997). Fluctuating asymmetry can be caused by environmental stress (Edler, 2001; Livshits & Kobyliansky, 1991; Thornhill & Møller, 1997) and is also correlated with non-desirable underlying chromosomal or genetic abnormalities and with homozygosity, e.g., through in-breeding (Edler, 2001; Livshits & Kobyliansky, 1991; Thornhill & Møller, 1997). Many studies indicate a positive effect of symmetry on attractiveness when using different methods, such as rating the degree of symmetry on a scale (Germano, 2018; Rhodes et al., 1999; Rhodes et al., 2005), mathematically measuring symmetry (Grammer & Thornhill, 1994; Muñoz-Reyes et al., 2015), and also when generating symmetric faces with a computer (Little & Griffey, 2020; Rhodes et al., 1999; Valentine et al., 2004). Yet, Baudouin and Tiberghien, (2004) argue that this effect might be mainly caused by symmetric faces being closer to the average. Nevertheless, symmetric faces were still rated as more attractive when controlling

for averageness (Grammer & Thornhill, 1994; Rhodes et al., 1999). Facial averageness, symmetry and facial expression all had an independent influence on facial attractiveness (Rhodes et al., 1999). Still, not all researchers agree that symmetry is a good indicator of facial attractiveness. Some studies found contradictory results, namely that computer-generated symmetrical faces were less attractive than the original image of an attractive person (Kowner, 1996; Samuels et al., 1994; Swaddle & Cuthill, 1995). A meta-analysis of 23 studies found that this discrepancy between results was most likely caused by the different techniques used to generate symmetrical images of faces (Rhodes, 2006). Studies that used methods such as mirroring the face in the vertical centre line, which causes the face to look structurally abnormal in some way, concluded that symmetrical faces were not attractive (Kowner, 1996; Samuels et al., 1994), while studies that used other methods, such as blending the original image and the mirrored image to create symmetrical faces (Rhodes et al., 1999), or computing a symmetry value for the different faces (Baudouin & Tiberghien, 2004; Grammer & Thornhill, 1994), leaving the pictures looking more natural, found that symmetrical faces were perceived as more attractive than asymmetrical ones. An exception to this was the study of Swaddle and Cuthill (1995), in which an unmanipulated image of a face was also blended with its mirrored image, but they did not control for facial expression, which could be the reason for their different findings. Concluding, symmetry is widely assumed to influence attractiveness, which can be explained by biological advantages for the perceiver and their offspring.

Sexual Dimorphism

Besides averageness and symmetry, the role of sexual dimorphism as an indicator of attractiveness has been discussed as well (Foo et al., 2017). Secondary sexual traits develop or increase at sexual maturity because of different sexual hormones that are prominent in different ratios in men and women (see Thornhill & Møller, 1997, for a review). High levels of testosterone cause the jaw, the cheekbones, and the brow ridges to grow, while high levels of oestrogen prevent growth of these structures and favour an increase in lip size. These traits may signal immunocompetence, as sex hormones producing those features impair disease resistance and therefore can only be afforded and produced by those individuals with exceptional health (see Thornhill & Møller, 1997, for a review). Indeed, a more recent study found male immunocompetence and women's attractiveness ratings for male faces to be linked with men's testosterone levels (Rantala et al., 2012). Also, masculinity in male faces and femininity in female faces seems to indicate immune health during adolescence (Foo et al., 2020). Therefore, sexual dimorphism should be perceived as attractive because it signals

good mate qualities, and indeed, sexual dimorphism was found to influence attractiveness (Foo et al., 2017). However, studies show different results for the relationship between sexual dimorphism and attractiveness in males and females. These study results are discussed in more detail in the following paragraphs.

Sexual Dimorphism in Female Faces. A lot of research has been conducted about what is attractive in female faces (Baudouin & Tiberghien, 2004; Cunningham, 1986; Cunningham et al., 1995; Fiala et al., 2021; Kleisner et al., 2021; Koehler et al., 2004; Perrett et al., 1994; Perrett et al., 1998; Rhodes, 2006). Fiala et al. (2021) found that women whose faces were perceived as more feminine were also perceived as more attractive. Also, female faces of women with higher levels of oestrogen were rated as more feminine, but also as more attractive (Law Smith et al., 2006), and such women report more maternal tendencies, which could be considered as an indicator of mating success (Law Smith et al., 2012). In addition, feminine facial structures indicative of high oestrogen levels (Thornhill & Møller, 1997), such as higher prominent cheek bones and a thinner chin (Baudouin & Tiberghien, 2004; Cunningham, 1986; Cunningham et al., 1995; Perrett et al., 1994; Thornhill & Møller, 1997), but also facial features such as bigger eyes, (Baudouin & Tiberghien, 2004; Cunningham, 1986; Cunningham et al., 1995; Perrett et al., 1994) smaller noses (Baudouin & Tiberghien, 2004; Cunningham, 1986; Cunningham et al., 1995), and bigger lips (Baudouin & Tiberghien, 2004; Cunningham et al., 1995) were considered attractive in female faces. Also, female faces whose female traits were exaggerated were found to be more attractive than the average female face (Rhodes et al., 2000), and female faces with feminized shape were found to be more attractive than female faces with average or masculinized shape (Perrett et al., 1998). Perrett et al. (1994) found a composite of female faces with higher cheek bones, bigger eyes and a thinner jaw, which are traits that are considered as more feminine (Rhodes, 2006), to be more attractive than an average composite of female faces. To conclude, effects of sexual dimorphism seem to be relatively stable in female faces with feminine faces to be rated as more attractive (Rhodes, 2006).

Apart from faces, similar effects of sexual dimorphism have been found in voices. Voice pitch appears to be a reliable feature for discriminating men from women, with women having higher voice pitch than men (Markova et al., 2016). Indeed, higher pitch female voices were rated as younger (Collins & Missing, 2003; Feinberg et al., 2008), which indicates higher fertility (Muller et al., 2020), as more feminine (Feinberg et al., 2008), and also as more attractive (Collins & Missing, 2003; Feinberg et al., 2008). Additionally, female voices

were rated differently according to their phase of the menstrual cycle with women in their fertile phase being rated as more attractive than in their non-fertile phase (Pipitone & Gallup, 2008). Moreover, attractiveness ratings of female voices and faces were positively correlated, indicating that cues from different modalities, such as visual and auditory ones, may signal similar underlying characteristics, such as age or hormonal status (Collins & Missing, 2003).

Sexual Dimorphism in Male Faces. Contrarily, there is less agreement on what is perceived as attractive in men (Borelli & Berneburg, 2010). There are some studies that argue that women prefer male faces that were manipulated to have a feminized face shape rather than a masculinized one (Penton-Voak et al., 1999; Perrett et al., 1998; Rhodes et al., 2000). Perrett et al. (1998) found that masculinization even lowered the perceived attractiveness of male faces. They argue that this might be the case because masculinity also influences which attributes women assign men. Masculinized male faces were perceived as more dominant and also as less emotional, honest, warm, cooperative and to have lower quality as a parent (Perrett et al., 1998). Culture may also play a role in preferring masculinity, as Jamaican women preferred male faces that were masculinized whereas British women preferred feminized male faces (Penton-Voak et al., 2004). A meta-analysis (Rhodes, 2006) indicates that women's preference for either masculinized or feminized male faces may also depend on how the study was carried out, as in studies that used normal faces masculinity was found to be attractive (Cunningham et al., 1990; Koehler et al., 2004; Scheib et al., 1999). In these studies, women rated faces with features such as a larger chin and thicker eyebrows (Cunningham et al., 1990) and more prominent cheekbones as more attractive (Cunningham et al., 1990; Scheib et al., 1999). However, most studies that used manipulated faces to be feminized or masculinized could not show this preference for masculinity (Penton-Voak et al., 1999; Perrett et al., 1998; Rhodes et al., 2000). Johnston et al. (2001) argue that in these studies secondary sexual characteristics, that are hormonal markers and characterize masculinity or femininity, are not systematically changed when masculinized or feminized. Therefore, studies like these might not report optimally about the attractiveness of masculinity (Rhodes, 2006).

Additionally, women's preference for secondary sexual traits in men changes across the menstrual cycle. Women preferred less feminized faces when they were more likely to conceive (Penton-Voak et al., 1999). When asked to modify the male faces along a continuum from feminized to masculinized face shapes to choose the most attractive face for either a STR or a LTR, women preferred those face shapes that were less feminized for STRs when

they were in the high-conception-risk phase of their menstrual cycle, whereas the preferences of feminization of facial shapes for LTRs stayed constant. This effect seems to be lost when women use oral contraceptives (Penton-Voak et al., 1999). While in this study women in the low- and high-risk phases of the menstrual cycle preferred feminized male faces, in other studies women generally preferred masculine male faces (Johnston et al, 2001; Koehler et al., 2004), and those that were in the high-risk-conception phase preferred significantly more masculine male faces with longer and broader jaws and with more prominent cheekbones than those in the low-risk-conception phase (Johnston et al., 2001). These different preferences of masculinity in male faces along the menstrual cycle indicate that women might follow different mating strategies depending on their risk of conception (Penton-Voak et al., 1999). Masculinity might bring advantages, such as resistance of diseases for potential offspring, but it might also bring disadvantages, such as reduced paternal investment and negative personality traits (Penton-Voak et al., 1999; Perrett et al., 1998). Therefore, women might form LTRs with men with more feminine facial shapes, that have personality traits that are more positively evaluated and offer better parental investment, while they might form STRs with men with less feminine facial shapes in high-risk conception phases, who provide enhanced immunocompetence (Penton-Voak et al., 1999).

Like for women, voice attractiveness has also been investigated for men. Women rated deeper (Collins, 2000; Hodges-Simeon et al., 2010) and also masculinized male voices, which were artificially lowered, as more attractive (Feinberg et al., 2006), even more so in their fertile phase of their menstrual cycle (Feinberg et al., 2006; Hodges-Simeon et al., 2010). In contrast to faces, the preference for masculinity in voices is less controversial.

Emotional Expressions

Also, traits that are less static than facial averageness, symmetry or sexual dimorphic features have an effect on perceived attractiveness. Facial emotional expressions and their valence also seem to have an influence on attractiveness (Rhodes et al., 1999). In numerous studies happy faces were judged as more attractive than angry (Calvo et al., 2018; Garrido & Prada, 2017; Ho & Newell, 2020; Lindeberg et al., 2019), sad (Ueda et al., 2016) or neutral faces (Calvo et al., 2018; Garrido & Prada, 2017; Reis et al., 1990; Ueda et al., 2016). This effect was even stronger for faces that were already previously judged as more attractive (Lindeberg et al., 2019). Reis et al. (1990) found a medium effect size of smiling people being more attractive than non-smiling people ($d = 0.46$). Furthermore, faces were rated as more attractive, the more intense a happy expression appeared (Ueda et al., 2016). However, not

only emotional expressions influence attractiveness, attractiveness seems to moderate the perception of emotional expressions as well. Happy expressions were identified faster than angry expressions in attractive faces, but there was either no such time difference in expression categorization for unattractive faces (Lindeberg et al., 2019) or it was smaller than for attractive faces (Taylor & Bryant, 2016). Moreover, this effect of time differences in categorization is more pronounced in female faces and not always observed for male faces (Lindeberg et al., 2019). It was argued that a reason for this interaction between facial expression and sex could be that there might be a connection of happy expressions with feminine facial structures (Lindeberg et al., 2019), which is supported by the finding that smiling decreases the perceived masculinity of a person (Reis et al., 1990). Summarized, different facial expressions appear to affect perceived attractiveness differently, depending on their valence and intensity.

Furthermore, emotional expressions appear to have an impact not only on perceived attractiveness, but also on other perceived personality traits such as being perceived as more sincere, competent, and sociable when smiling (Reis et al., 1990) or being perceived as more familiar and generally more positive with a happy facial expression compared to a neutral or angry facial expression (Garrido & Prada, 2017). Happy faces were also rated as more trustworthy than were surprised, neutral, or angry faces (Calvo et al., 2018). Calvo et al. (2018) suggest that attractiveness might prime how trustworthy a face is perceived, as the neural assessment of attractiveness occurs earlier in the brain than the assessment of trustworthiness. Furthermore, because neural processing of facial expressions precedes the processing of attractiveness, they suggest that facial expressions might bias attractiveness judgements. Reis et al. (1990), however, suggested that the attribution of positive traits to smiling people is not mediated by their attractiveness. Overall, showing a happy facial expression seems to have certain advantages, namely that the person displaying it is perceived as more attractive and, in addition, positive traits are assigned to him or her. Since different emotional expressions seem to influence perceived attractiveness and personality traits, it is of great interest to see to what extent more complex behaviours that try to achieve this perception, such as flirting, have the intended effects and function in a similar or even more efficient way than happiness.

The Influence of Personality Traits on Mating Behaviour

Not only physical attractiveness and flirting, but also personality is part of human mating behaviour. Different aspects of personality can influence how people flirt (Back et al.,

2011; Hall et al., 2010), how choosy they are, and how popular they are to potential mates (Asendorpf et al., 2011; Back et al., 2011). Being more popular for potential mates is related with being choosier, indicating that individuals who would be interesting to many others as mates seem to be interested in less people as potential mates (Asendorpf et al., 2011; Back et al., 2011). Moreover, personality traits seem to have an influence on the characteristics that people prefer or find more attractive in a partner, e.g., the higher the degree of men's sociosexuality, the more they seem to prefer women with higher physical attractiveness (Vogt, 2016). Therefore, four personality traits seem to be important in mating and flirting contexts and might alter mating behaviour, namely extraversion, self-confidence, self-perceived mate value, and sociosexuality. These are described in the following.

Extraversion

Extraversion seems to have an influence on human mating behaviour (Back et al., 2011; Nettle, 2005; Whyte et al., 2019). Extraversion is one of five personality traits measured by the Big Five Inventory 2 (BFI-2) and it measures how sociable, assertive, and active a person is (Danner et al., 2019). More extraverted individuals have been found to flirt more (Back et al., 2011), have more weekly sex (Whyte et al., 2019), and have more sexual partners across the lifespan than less extraverted individuals (Nettle, 2005). In addition, more extraverted individuals, particularly men, appear to be less faithful to their partner (Nettle, 2005). In a speed-dating setting, it has been found that women with higher scores of extraversion show more interest in men and that men prefer women with higher scores of extraversion (Luo & Zhang, 2009). Moreover, higher levels of extraversion also seem to rise the chance of being more interested in short-term mating and of engaging in short-term mating with another person's romantic partner (Schmitt & Shackelford, 2008). While the effect of extraversion on mating behaviour seems to be uncontroversial, the effect of extraversion on men's popularity is not, as Back et al. (2011) found that more extraverted men were more popular amongst women, while Asendorpf et al. (2011) did not find this positive relationship. However, extraversion seems to have an important influence on various mating behaviours, e.g., flirtatiousness (Back et al., 2011) and interest in different mating strategies (Schmitt & Shackelford, 2008).

Men's different levels of extraversion can be considered as part of different male reproductive strategies regulated by testosterone levels (Alvergne et al., 2010). Testosterone was found to correlate with men's extraversion, with testosterone levels appearing to be higher in more extraverted men (Alvergne et al., 2010). Aside from extraversion, no other

personality traits correlated with testosterone levels in this study, and extraversion was the only personality trait that successfully predicted mating success, supporting the idea that different levels of extraversion are due to variations in reproductive strategies in men (Alvergne et al., 2010). Since dominant behaviours are correlated with higher testosterone levels (Mazur & Booth, 1998) and extraversion partially displays a disposition toward dominant behaviours, higher testosterone levels in more extraverted men could also result from their higher level of dominance (Alvergne et al., 2010). Researchers indicate a reciprocal relationship between testosterone and behaviour in which they influence each other (Apicella et al., 2014; Mazur & Booth, 1998), implying that not only could a person's level of extraversion be influenced by their testosterone levels, but their testosterone level could also be influenced by their levels of extraversion. Yet, this implication remains to be investigated. However, the relationship between extraversion and testosterone suggests that extraversion plays an important role in men's reproductive strategies (Alvergne et al., 2010).

Self-Perceived Mate Value

Besides extraversion, self-perceived mate value (SPMV) has also been discussed as important for mate choice (Arnocky, 2018; Back et al., 2011; Goetz, 2013; Landolt et al., 1995). SPMV describes a person's assessment of his or her own value to potential mates (Back et al, 2011) and seems to be related to physical attractiveness, supporting the idea that self-perceived physical attractiveness may alter a person's SPMV (Back et al., 2011). However, other studies could not find a correlation between attractiveness and SPMV in either men (Arnocky, 2018) or women (Goetz, 2013). Moreover, men (Arnocky, 2018) and women (Goetz, 2013) with higher SPMV ratings evaluated physical attractiveness of potential mates as more important than those with lower SPMV ratings. Apart from physical attractiveness, SPMV also seems to correlate with people's popularity and choosiness, according to Back et al. (2011), who found in their real-life speed-dating study that participants with higher SPMV ratings were more popular as they got chosen more often than those with lower ratings, but they were also choosier, as they chose others as potential mates less often. Since popularity depends on the opinions and choices of others, the correlation between SPMV ratings and popularity seems to be due to the popular person engaging in a certain behaviour. This behaviour might possibly be flirting, as it was correlated with SPMV (Back et al., 2011). SPMV also seems to influence mating tactics, as men with higher SPMV ratings were found to have a greater preference for short-term mating as opposed to long-term mating than men with lower SPMV ratings (Landolt et al., 1995). However, no such differences were found in women (Goetz, 2013; Landolt et al., 1995). Overall, SPMV seems

to play an important role in mating contexts, influencing choosing others and being chosen by others as potential mates (Back et al., 2011).

Self-Confidence

Among personality traits that seem to influence human mating behaviour, self-confidence also seems to play a role. It has been found to correlate with SPMV (Goodwin et al., 2012; Kavanagh et al., 2010) and to influence the selection of potential mating partners (Kavanagh et al., 2010). In the experiment of Kavanagh et al. (2010), participants were unknowingly assigned to a group in which they were accepted or rejected as potential mates by members of the opposite sex. Acceptance and rejection by others altered participants' mating aspirations, mediated by self-confidence, as participants who experienced rejection had lower self-confidence after the rejection trial and therefore felt more compatible with the less attractive targets than those who were accepted, whereas participants who experienced acceptance had increased self-confidence after the acceptance trial and therefore felt more compatible with the more attractive targets than those who were rejected. This indicates that self-confidence seems to alter mating behaviour when selecting potential mating partners, so that one does not aim too high or low (Kavanagh et al., 2010).

Besides mating aspirations, self-confidence also appears to influence how attractive a person is perceived by others, as higher self-confidence has been found to be attractive in men (Roberts et al., 2009) and women (Luo & Zhang, 2009). Since attractiveness and self-confidence have been found to be related (Kavanagh et al., 2010; Roberts et al., 2009), it may be possible that more attractive people gain more self-confidence from their appearance. However, Roberts et al. (2009) found that men whose self-confidence was artificially enhanced by the use of a specific deodorant appeared more attractive to women in video recordings than men in the control group, even though photographs of participants in both groups did not differ in attractiveness and also facial attractiveness was controlled for. This suggests that self-confidence increases attractiveness. Moreover, self-confidence can also be predicted by self-perceived attractiveness (Bale & Archer, 2013). This could be the case for several reasons. First, it indicates that self-confidence is dependent on one's appearance, as boosting participants' self-perceived attractiveness by complimenting them on their appearance increases their self-confidence (Jiang et al., 2021). However, it is also possible that self-confidence alters perceptions of one's appearance, as self-confidence has been found to alter perceptions of one's traits (Brown et al., 2001). Overall, self-confidence seems to play

an important role in mating behaviour, influencing not only mating aspirations (Kavanagh et al., 2010) but also perceived attractiveness (Luo & Zhang, 2009; Roberts et al., 2009).

Sociosexuality

Sociosexuality also seems to influence human mating behaviour, as it describes a person's tendency to engage in uncommitted sex and also correlates with a person's interest in short-term mating (Schmitt & Shackelford, 2008). Sex differences in sociosexuality have also been found, with men being sociosexually less restricted than women (Back et al., 2011; Penke & Asendorpf, 2008; Schmitt & Shackelford, 2008), particularly in terms of their desire and attitude, but not their behaviour (Penke & Asendorpf, 2008). Men and women have also been found to differ in their selectivity in short-term and long-term mating contexts, with men appearing to be less selective than women in short-term mating contexts (Kenrick et al., 1993). However, this difference in selectivity was less noticeable in long-term mating contexts, where men's investment in potential offspring is similar to that of women (Kenrick et al., 1993). Moreover, sociosexuality also seems to influence flirtatiousness (Back et al., 2011). In the former mentioned speed-dating study, sociosexually less restricted men were found to be more flirtatious towards women and were also flirted with more by women. It was also found that sociosexually less restricted women were flirted with more by men but were not more flirtatious themselves (Back et al., 2011). However, in another study, sociosexually less restricted women were found to be more flirtatious than sociosexually more restricted women (Penke & Asendorpf, 2008). Not only flirtatiousness appears to be influenced by sociosexuality, but also popularity and choosiness of men and women in mating contexts (Asendorpf et al., 2011; Back et al., 2011). Although women reported high interest in LTRs (Asendorpf et al., 2011), sociosexually less restricted men were found to be more popular among women, even though they were not choosier (Asendorpf et al., 2011; Back et al., 2011). However, sociosexuality was not found to be related with choosiness or popularity in women (Asendorpf et al., 2011; Back et al., 2011). Even though sociosexuality can have a positive influence on popularity, being sociosexually less restricted or being in a relationship with a sociosexually less restricted partner may reduce marital satisfaction over time, and being in a relationship with a sociosexually less restricted partner has therefore been associated with dissolution of marriage (French et al., 2019). Besides the influence of sociosexuality on human mating behaviour, it also seems to correlate with other personality traits, e.g., being sociosexually unrestricted correlates with higher extraversion (Schmitt & Shackelford, 2008; Whyte et al., 2019) and higher self-perceived mate value (Penke & Asendorpf, 2008). One reason for the positive correlation between sociosexuality and self-

perceived mate value could be that individuals with higher scores on the behavioural aspect of sociosexuality may have had success with their mating strategy in the past and, in consequence, may have developed a higher self-perceived mate value (Penke & Asendorpf, 2008). Thus, consideration of sociosexuality in discussions of human mating behaviour seems to be of tremendous importance.

Despite all this, fundamental questions about flirting remain unanswered, namely whether flirting per se is a special way of presenting oneself in a particularly positive way in front of others, or whether it is different from a pure positive emotion. Therefore, it is important to not only study flirting, but also to compare it with positive emotions.

The Current Study

There are some studies that have examined flirting and which strategies are the most effective, but most of them did not use experimental designs with potential mates as raters. Instead, most of them were based on self-report data (Apostolou, 2021; Apostolou et al., 2019; Apostolou & Christoforou, 2020; Wade & Slemp, 2015; Wade et al., 2021; White et al., 2018). Whether and how flirting affects a person’s attractiveness has not been well studied. Therefore, we wanted to fill this gap in the literature and investigate the attractiveness of flirting.

Previous studies (Calvo et al, 2018; Garrido & Prada, 2017; Rhodes et al., 1999; Ueda et al., 2016) suggested that facial expressions have an effect on attractiveness ratings of faces, e.g., happy faces were rated as more attractive than neutral ones (Calvo et al., 2018; Garrido & Prada, 2017; Ueda et al., 2016) and angry faces were rated as less attractive than neutral ones (Calvo et al., 2018). In our study, we wanted to find out whether flirting differs from mere positive emotions and, therefore, we examined a person's attractiveness in multimodal synchronized videos of faces and voices under three different conditions: neutral, happy, and flirting. We expect to replicate the results of previous studies on facial attractiveness in person's evaluations as well. Therefore, if emotional expression has an effect on person's attractiveness ratings for STRs and LTRs, people in the happy expression condition will be rated as more attractive for STRs and LTRs than in the neutral expression. For the difference between the flirting and neutral condition, we expect a similar effect for people with a higher average attractiveness score, but not for people with a lower average attractiveness score. Here, flirting is expected to have more of a moderating effect, enhancing or impairing attractiveness judgments in the direction of the average attractiveness score. Average attractiveness rating scores were retrieved from the subjective validation study of the Vienna Talking Faces database (ViTaFa; Krumpholz et al., unpublished). Here, participants rated

videos and images with neutral emotional expression on attractiveness. Ratings were given on a 7-point Likert scale ranging from “not attractive at all” to “extremely attractive”. Reported values are mean values across all participants. Ueda et al. (2016) found an effect of expression intensity on attractiveness evaluations. Therefore, for both conditions, happy expression and flirting expression, we expect a reinforcing effect of emotional expression intensity on attractiveness ratings, i.e., the more intense the expression, the closer are the values to the scale ends.

Since some personality traits have an influence on different aspects of mating, we assessed the four previously described traits in our experiment. However, based on statistical analysis choices, we only included sociosexuality in our final data analysis, since we expect sociosexuality to have the greatest impact on attractiveness ratings, as previous studies indicate an effect of sociosexuality on attractiveness (Asendorpf et al., 2011; Penke & Asendorpf, 2008). Therefore, we expect a positive relationship between ratings for STR attractiveness and sociosexuality score in all three conditions, with a higher sociosexuality score representing a sociosexually less restricted personality. Additionally, if sociosexually less restricted participants are more open to flirting in general, we expect them to give higher ratings for STR attractiveness in the flirting condition than in the neutral or happy condition.

Previous studies (Back et al., 2011; Penke & Asendorpf, 2008; Schmitt & Shackelford, 2008) found that men generally have higher sociosexuality scores than women. Therefore, we expect a similar image here. When men and women have identical sociosexuality scores, we expect men to give higher ratings for STR attractiveness. This could be explained by them being less selective than women in short-term mating contexts (Kenrick et al., 1993). Therefore, we expect men to give higher ratings for STR attractiveness than women in all three conditions. However, this gender effect seems to be less relevant for LTR attractiveness, where investment is more evenly distributed across both partners (Kenrick et al., 1993). Hence, we expect any sociosexuality effects to be less important for LTR attractiveness.

Although we assessed the menstrual cycle in this experiment, we did not include it in our analysis as the sample size in this experiment is too small to evaluate possible effects of the menstrual cycle on attractiveness ratings or on how flirting is perceived statistically.

Method and Materials

Experimental Design

The experiment included three blocks, a demographic questionnaire, a personality questionnaire, and a video-rating block. The personality questionnaire assessed participants' level of sociosexuality, self-perceived mate value, self-confidence, and extraversion on various Likert scales. In the video-rating block, we used 117 videos of 39 actors (20 women), who ranged in age from 18 to 45 years, from the ViTaFa (Krumpholz et al., unpublished). We collected attractiveness ratings for these actors using the phrase *Wie geht's dir?* (How are you?) in three different ways (happy, neutral, flirtatious). The experiment was designed as a within-subject design, in which participants rated attractiveness for STRs and LTRs of actors of the sex of interest in all three conditions in randomized order and also indicated how intense they found the expression in the videos.

Participants

With the formerly mentioned effect size (*d*) of 0.46 for smiling people being more attractive than non-smiling people (Reis et al., 1990), a sample size of 52 participants were required for this study. A total of $N = 55$ participants were recruited to participate in the current study. Psychology students ($N = 45$) were invited via an invitation link and received course credits. The remaining participants ($N = 10$) were recruited directly through the researcher's circle of acquaintances and received small goodies (e.g., sweets) as an incentive. The only requirement for participation in this study was self-reported sexuality, whereby participants had to be either hetero- or homosexual. Two female participants were excluded due to reported bisexuality, the other 53 participants reported being heterosexual. Of the remaining participants ($N = 53$; 34 women, 19 men), aged 19 to 39 years ($M = 23.89$ years, $SD = 3.78$ years), 52 currently lived in Austria and one in Germany. 21 participants indicated to be single, 31 to be in a relationship and one participant to be in an open relationship. Women rated themselves as being more extraverted and to have more self-perceived mate value than men, while men rated themselves as having more self-confidence as well as being sociosexually less restricted than women. Participants' ratings on the personality questionnaire are displayed in Table 1. Instructions were given to all participants prior to the experiment and participants gave informed consent, which they could withdraw at any time without any negative consequences for themselves.

Table 1

Means and Standard Deviations for Extraversion, Self-Confidence, Self-Perceived Mate Value (SPMV), and Sociosexuality as a Function of Gender

Gender	Extraversion		Self-Condfidence		SPMV		Sociosexuality	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
female	3.52	0.64	3.06	0.46	5.17	0.78	4.13	1.22
male	3.08	0.45	3.21	0.46	4.46	0.84	4.40	1.15

Note. Ratings for extraversion were given on a 5-point scale, ratings for self-confidence were given on a 4-point scale, ratings for self-perceived mate value were given on a 7-point scale and ratings for sociosexuality were given on a 9-point scale.

Measures

Demographic Questionnaire

In the demographic questionnaire, participants' age, German language skills, country they currently live in, gender, sexual orientation, and relationship status were assessed. Moreover, women had to indicate the first day of their last period to assess the approximate phase of their menstrual cycle.

Personality Questionnaire

The experiment includes different questionnaires to assess self-perceived personality traits that we assumed to have an influence on perceiving attractiveness of others. It consisted of items measuring extraversion, self-perceived mate value, sociosexuality and self-confidence. To measure extraversion, we used the twelve *Extraversion*-items (e.g., *I am talkative*) of the *Big Five Inventory 2* (BFI-2), which measure extraversion on a Likert scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*; Danner et al., 2019). Reliability of the items appears good, as the internal consistency of the items ($\alpha = .85$) and the test-retest reliability are good ($r_{tt} = .90$). Construct validity appears good as well, as comparison of the items with items from different personality questionnaires produces a high correlation (between $r = .71$ and $r = .86$; Danner et al., 2019). To measure SPMV, we included the eight items (e.g., *I can have as many sexual partners as I choose)* from the *Self-Perceived Mating Success Scale*, which uses a Likert scale ranging from 1 (*disagree*) to 7 (*agree*; Landolt et al., 1995). The scale has a good internal consistency ($\alpha = .83$) and scores on the scale correlate significantly with an approximated number of sexual invitations received either in the past year ($r = .49$) or in the past three years ($r = .48$; Landolt et al., 1995). As a German version of the *Self-*

Perceived Mating Success Scale was not available, we translated it ourselves and had a native English speaker translate it back into English to obtain a translation that was as close as possible to the original. Moreover, the experiment includes the *revised Sociosexual Orientation Inventory* (SOI-R), which uses a Likert scale from 1 (*0*, *Strongly disagree*, *never*) to 9 (*20 or more*, *Strongly agree*, *at least once a day*) to measure sociosexuality with nine items (e.g., *Sex without love is OK*; Penke & Asendorpf, 2008). The internal consistency shows a Cronbach's Alpha of .83 for men and a Cronbach's Alpha between .83 and .84 for women, the test-retest reliability is .83 for men and .78 for women. Among other things, the inventory correlates most with short-term mating interest (r = .70 for men, r = .68 for women), with the number of former sexual partners (r = .59 for men, r = .56 for women), with the sensation seeking scale (r = .53 for men, r = 46 for women), and, for people in a relationship, with being able to imagine being unfaithful (r = .54 for men, r = .45 for women; Penke & Asendorpf, 2008). Apart from scales measuring extraversion, sociosexuality, and self-perceived mate value, we included the *revised Rosenberg Self-Esteem Scale* (RSES) to measure self-esteem, which consists of ten items (e.g., *I feel that I have a number of good qualities*) rated on a Likert scale from 1 (*Strongly agree*) to 4 (*Strongly disagree*; Von Collani & Herzberg, 2003). The internal consistency of the scale is good (α = .84; Von Collani & Herzberg, 2003).

Video-Rating Block

Participants rated the actors on three separate Likert scales after each video. First, they rated how intense they perceived the emotion or expression in each video on a Likert scale from 1 (*not at all intense*) to 7 (*very intense*). Second, they indicated how attractive they found the person in that video for a STR from 1 (*not at all attractive*) to 7 (*very attractive*) and third, for a LTR. Here, STR was defined as either a one-time relationship or a relationship lasting only for a few days or a few weeks. LTR was defined as a relationship lasting at least over a few weeks.

Apparatus

The experiment was coded using Labvanced (Finger et al., 2017) and executed on a desktop computer running Windows 10 Enterprise. Videos were displayed on a grey background on a 24'' LCD-screen (LG 24MB65PM; native resolution 1920 x 1200 pixels) at a frame rate of 60 Hz. Audio was played through headphones (Sony MDR 7506 or Sennheiser HD 380 Pro), with volume levels identical for all participants. Seats were positioned in front

of the monitors, with about 45cm distance to the screen. There was no chin rest. Participants provided ratings by mouse click, and their responses were not timed.

Procedure

Up to four participants were tested simultaneously in the laboratory of the Faculty of Psychology of the University of Vienna. Prior to the experiment, participants were instructed verbally about the procedure and the duration of the experiment. They were informed about the experiment's personality questionnaire, in which they would be asked very intimate questions at the beginning of the experiment, and they were assured that their answers cannot be traced back to them and would be handled completely confidential. They were also told that they had to rate the attractiveness of various people in videos. After that, they were asked about their consent on the computer screen right before the experiment started and were given the information that they could terminate the experiment whenever they wanted without any negative consequences for them.

After the informed consent, a headphone test was conducted to ensure that the headphones worked and were loud enough for the participants. Afterwards, they were presented with the demographic questionnaire and the personality questionnaire. Depending on their sexual orientation they indicated in the demographic questionnaire, they were presented with either the videos with male or female actors in the video-rating block. Before the actual video-rating block, a practice trial was conducted to familiarize the participants with the task. Each trial began with a black fixation cross presented in front of a white background for 5000ms. The fixation cross was then replaced with a video, lasting between 1.47 and 2.93 seconds in the neutral condition, between 2.07 and 3.17 seconds in the happy condition, and between 2.45 and 3.15 seconds in the flirting condition. After each video, participants were asked on a 7-point Likert scale how attractive they found the person in the video for a STR, a LTR, and how intense they perceived the expression / emotion in the video.

The experiment ended with some final questions asking about possible disturbances during the experiment, whether participants were familiar with the people depicted in the videos, or whether they had any remarks regarding the experiment. Participants were then informed on the computer screen that the experiment ended and were given a verbal or written debriefing after the experiment. However, as we could not rule out the possibility that some participants were in contact with each other through university seminars, we wanted to avoid an exchange of information between participants before the experiment was completely

closed. Therefore, some participants were only roughly debriefed in verbal form about the aims of the current study.

Statistical Analyses

RStudio (version 4.2.0; R Core Team, 2022) was used to conduct all statistical analyses. We performed Linear Mixed Models (LMMs) to analyse the relationship between attractiveness and neutral, happy, and flirtatious expressions / emotions (condition) and to analyse the relationship between intensity and condition. We used LMMs to account for individual differences and for differences between stimuli. We used the lme4 package (Bates et al., 2015) to carry out five linear effects analyses of the relationship between attractiveness (dependent variable; STR and LTR attractiveness) and condition (independent variable; neutral, happy, flirtatious expression / emotion). As fixed effects, we stepwise included gender and condition in the model without interaction terms, as well as average attractiveness score, intensity and sociosexuality with interaction terms. As random effects, we included intercepts for subjects and video stimuli and by-subject and by-video stimulus random slopes for the effect of condition. However, as the model with both random slopes showed a boundary fit due to overfitting, we needed to simplify the model. First, we removed the random slope of the video stimulus as we expected that the influence of the condition on the subjects would be greater than the influence on the video stimuli. As the model still had a boundary fit after this adaptation, we instead removed the random slope for the subjects, which solved the issue. The final null model for the analyses of STR attractiveness as a dependent variable was constructed as the following:

ST_Relationship ~ Gender + (1 |subject_code) + (1+condition|video_number)

After creating the null model, we stepwise added fixed effects to the model to find out if the newly created models with the effects in question would differ significantly from the preceding model. Wherever overfitting or convergence occurred, we altered the models accordingly, by either excluding random slopes or by deleting interaction terms. The final models are summarised in Supplementary Table 1.

Afterwards, we constructed the null model for the analyses of LTR attractiveness as the dependent variable. Since the null model with both random slopes showed a boundary fit as well, we simplified the model in the same way we did for the model with STR attractiveness as the dependent variable, which left us with the same random slopes. The following model describes the final null model for LTR attractiveness:

Table 2

Model Comparisons of the LMMs, with one Effect Added at a Time

Model Comparison	Ratings	X^2	*p*
Null model (with Gender only) and 1-effect model (condition and Gender)	STR	41.091	**<.001*** **
	LTR	35.712	**<.001*** **
1-effect model and 2-effect model (condition, average attractiveness score and Gender)	STR	0.871	.833
	LTR	0.057	.996
1-effect model and 2-effect model (condition, Intensity and Gender)	STR	61.547	**<.001*** **
	LTR	89.647	**<.001*** **
2-effect model and 3-effect model (condition, Intensity, Sociosexuality and Gender)	STR	3.833	.147
	LTR	6.105	**.047***

Note. Separate comparison of the LMMs for STR and LTR attractiveness.
*p < .05, ** p < .01, *** p < .001

LT_Relationship ~ Gender + (1 |subject_code) + (1+condition|video_number)

As we did before, we stepwise added fixed effects to the model. Again, wherever convergence or overfitting occurred, we modified the model accordingly by either changing or removing random slopes or interaction terms. When a model with interaction term showed

no boundary fit, we checked the Akaike information criterion (*AIC)* and compared it to the *AIC* of the same model without an interaction term. We then chose the model with the lower *AIC*, as this indicated better model fit. The final models for LTR attractiveness can also be found in Supplementary Table 1.

We performed likelihood ratio tests where we compared the model with the effect in question to the preceding model without the effect in question to assess the validity of the mixed effect analyses. When we had to modify models with the effect in question because of overfitting or convergence, we modified the preceding model in the same way so that the random effect structure of both models would be the same within a given model comparison. If the model with the effect in question did not differ significantly from the preceding model without the effect in question, we rejected the results. An overview of the model comparisons is displayed in Table 2.

However, the assumption of homoscedasticity was violated, and a visual inspection of residual plots against fitted values revealed that there was no normal distribution of residuals. While normal distribution of residuals seems to be less important in LMMs, as these models seem to be quite robust to violations of this model assumption, given that outliers are dealt with, dealing with the violation of homoscedasticity is of greater importance (Knief & Forstmeier, 2021). In the current study, various things were implemented to try to deal with existing heteroscedasticity. First, we tried to transform the response variable using log, square root, and cube root transformations, which did not solve the issue of heteroscedasticity. Then we tried repeating the calculations after excluding the subjects with the lowest response variance, which did not make any difference either. Since we did not find a way to implement weighted least square regressions for our lme4 models, we implemented bootstrapping methods and used a robust standard error (HC3). Coefficients are reported in the supplementary material (Supplementary Table 2-7).

Results

Descriptive statistics

In Table 3, means and standard deviations for intensity and attractiveness ratings for STRs and LTRs for men and women in all three conditions are presented. The happy condition was rated as the most intense, the neutral condition as the least intense. While actors displaying a happy expression were rated as the most attractive for a LTR, actors displaying a flirting expression were rated as the most attractive for a STR and those displaying a neutral expression were rated as the least attractive for both STR and LTR. Men gave higher ratings

than women in every condition for both STRs (d = 0.52) and LTRs (d = 0.44), as well as for intensity (d = 0.21). Moreover, men gave higher ratings for sociosexuality than women (d = 0.22, see Table 1).

Many participants had low response variance, with a *SD* of less than 1 for LTR in 22 participants and for STR attractiveness in 16 participants. However, as participants' answer behaviour regarding intensity did not show any abnormalities, we assume that this unexpected response pattern rather reflects that participants found most stimuli not attractive for a potential relationship. For this reason, we decided to include participants in further analyses.

Video-rating Block

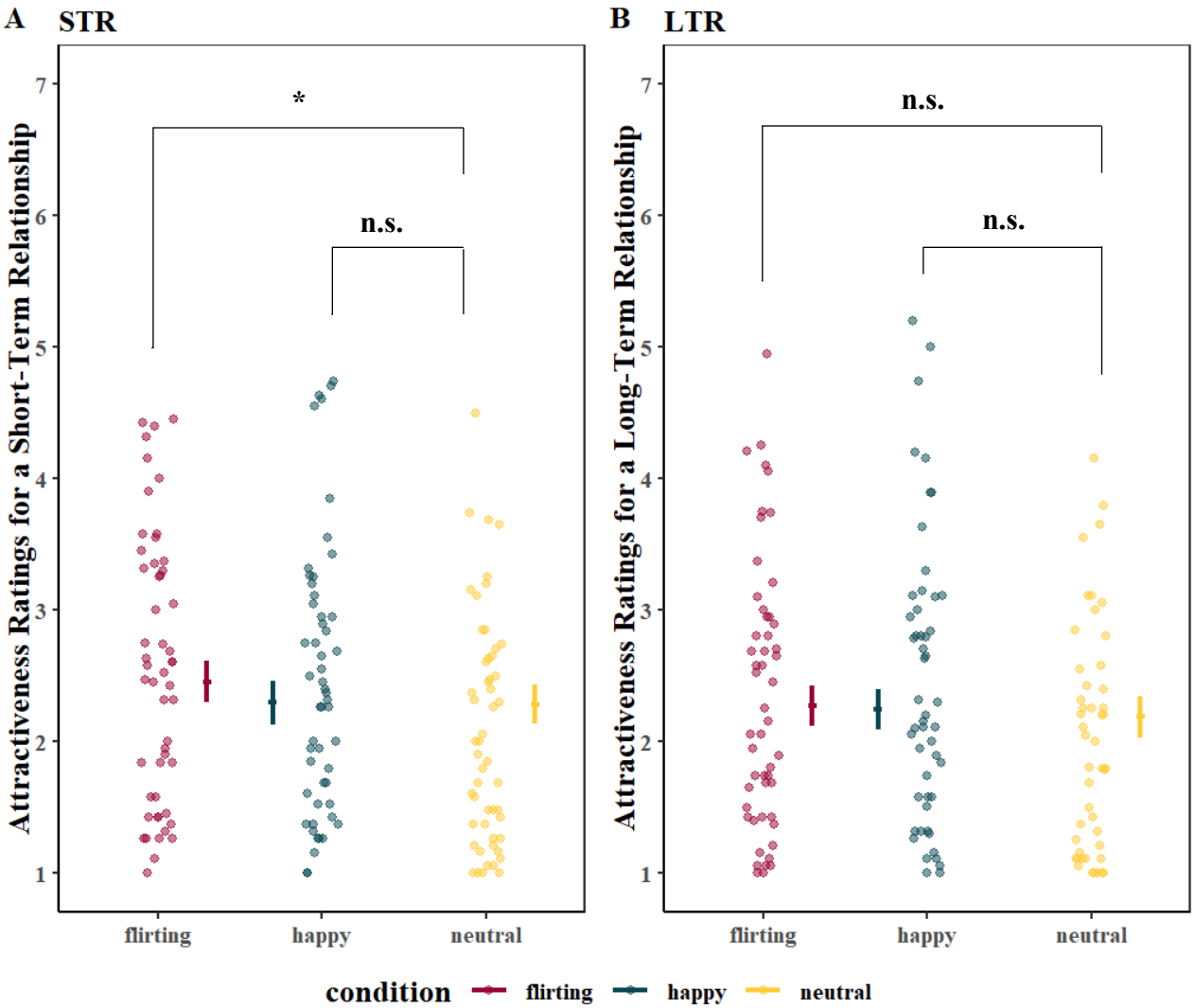
Visualisation of the results from the video-rating block can be found in Figure 1.

STR Attractiveness

LMM analysis (Table 4) revealed a significant effect of both the happy condition (β = 0.41, t = 6.79, p < .001) and the flirting condition (β = 0.49, t = 7.78, p < .001) on attractiveness ratings for a STR, with higher ratings for STR attractiveness in both conditions compared to the neutral condition. Moreover, there was a significant effect of gender (β = 0.84, t = 2.74, p < .001), with men giving significantly higher ratings for STR attractiveness than women. When including intensity as a fixed effect, LMM analysis (Table 5) revealed a significant effect of intensity on STR attractiveness (β = 0.15, t = 8.02, p < .001), with expressions / emotions rated as more intense being also rated as more attractive for a STR. However, after including intensity into the model, the effect of the happy condition on STR attractiveness became non-significant (β = 0.01, t = 0.18, p =.856), while the effect of the flirting condition also decreased but remained significant (β = 0.17, t = 2.47, p = .013). The effect of gender, with men giving higher ratings, remained significant after including intensity (β = 0.83, t = 2.81, p = .005). The random effect of subject explained 27% of the variance (*ICC* = .27), while the random effect of item / video explained only 13% of the variance (*ICC* = .13). Adding sociosexuality to the LMM did not have a significant influence on STR attractiveness ($X^2(2) = 3.83$, p = .147, see Table 2). Neither a significant effect of sociosexuality (β = -0.00, t = -0.04, p =.966) nor a significant effect of the interaction of sociosexuality and gender (β = -0.31, t = -1.61, p =.109) on STR attractiveness ratings was found when added to the LMM (Table 6).

Figure 1

Model Results for STR and LTR Attractiveness



Note. Results of LMM analyses for attractiveness ratings. Plots show the effects of condition (flirting, happy, and neutral) on (A) STR attractiveness and on (B) LTR attractiveness. Condition is specified on the x-axis and color-coded, neutral condition in gold, happy condition in dark cyan, and flirting condition in dark pink. The mean values of each subject are illustrated by data points (circles) that are jittered vertically for illustration. Horizontal lines indicate model estimate for each condition, error bars illustrate the 95% confidence intervals of the model fit. Significance of effects is indicated above data points.

Table 3

Means and Standard Deviations for STR and LTR Attractiveness and Intensity as a Function of Gender and Condition

Gender	Condition	STR		LTR		Intensity	
		M	*SD*	*M*	*SD*	*M*	*SD*
Female	neutral	1.76	1.27	1.64	1.17	2.03	1.22
	happy	2.21	1.59	2.20	1.58	4.57	1.42
	flirting	2.19	1.57	2.04	1.46	4.05	1.44
Male	neutral	2.56	1.53	2.35	1.46	2.27	1.25
	happy	2.91	1.65	2.71	1.70	4.98	1.25
	flirting	3.13	1.67	2.84	1.69	4.49	1.29

Note. Ratings for intensity and STR and LTR attractiveness were given on a 7-point scale.

Table 4

LMMs with Gender and Condition (Neutral vs. Happy vs. Flirting) as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted Variable	Predictors	Estimates	*SE*	Test *(df)*	*p*
STR	(Intercept)	1.74	0.20	8.78 (3066.00)	**<.001*** **
	condition [happy]	0.41	0.06	6.79 (3066.00)	**<.001*** **
	condition [flirting]	0.49	0.06	7.78 (3066.00)	**<.001*** **
	Gender [male]	0.84	0.31	2.74 (3066.00)	**0.006** **
LTR	(Intercept)	1.63	0.19	8.56 (3066.00)	**<.001*** **

condition [happy]	0.47	0.07	7.09 (3066.00)	**<.001*** **
condition [flirting]	0.43	0.07	6.39 (3066.00)	**<.001*** **
Gender [male]	0.72	0.30	2.37 (3066.00)	**.018***

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Table 5

LMMs with Gender, Condition (Neutral vs. Happy vs. Flirting), and Intensity as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted variable	Predictors	Estimates	*SE*	Test *(df)*	*p*
STR	(Intercept)	1.42	0.19	7.37 (3065.00)	**<.001*** **
	condition [happy]	0.01	0.08	0.18 (3065.00)	.856
	condition [flirting]	0.17	0.07	2.47 (3065.00)	**.013***
	Intensity	0.15	0.02	8.02 (3065.00)	**<.001*** **
	Gender [male]	0.83	0.29	2.81 (3065.00)	**.005****

LTR	(Intercept)	1.33	0.21	6.46 (3070.00)	**<.001*** **
	condition [happy]	0.05	0.07	0.82 (3070.00)	.411
	condition [flirting]	0.08	0.06	1.38 (3070.00)	.167
	Intensity	0.17	0.02	9.55 (3070.00)	**<.001*** **
	Gender [male]	0.61	0.31	1.96 (3070.00)	.050

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Table 6

LMMs with Gender, Condition (Neutral vs. Happy vs. Flirting), Intensity, and Sociosexuality as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted variable	Predictors	Estimates	*SE*	Test *(df)*	*p*
STR	(Intercept)	1.44	0.49	2.94 (3063.00)	**.003****
	condition [happy]	0.01	0.08	0.19 (3063.00)	.848
	condition [flirting]	0.17	0.07	2.48 (3063.00)	**.013***

	Intensity	0.15	0.02	8.00 (3063.00)	**<.001*** **
	Sociosexuality	-0.00	0.11	-0.04 (3063.00)	.966
	Gender [male]	2.17	0.87	2.50 (3063.00)	**.013***
	Sociosexuality * Gender [male]	-0.31	0.19	-1.61 (3063.00)	.109
LTR	(Intercept)	1.55	0.51	3.02 (3068.00)	**.003****
	condition [happy]	0.05	0.07	0.83 (3068.00)	.404
	condition [flirting]	0.08	0.06	1.39 (3068.00)	.164
	Intensity	0.17	0.02	9.53 (3068.00)	**<.001*** **
	Sociosexuality	-0.06	0.11	-0.48 (3068.00)	.632
	Gender [male]	2.17	0.91	2.39 (3068.00)	**.017***

Sociosexuality * Gender [male]	-0.35	0.20	-1.77 (3068.00)	.077

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

LTR Attractiveness

LMM analyses (Table 4) showed a significant effect of the happy condition (β = 0.47, *t* = 7.09, *p* < .001) and also the flirting condition (β = 0.43, *t* = 6.39, *p* < .001) on attractiveness ratings for a LTR. In both conditions, perceived LTR attractiveness was higher than in the neutral condition. The effect of gender on LTR attractiveness was significant (β = 0.72, *t* = 2.37, *p* < .001), with men giving higher ratings than women. When intensity was included in the model as fixed effect, LMM analysis (Table 5) showed a significant effect of intensity on LTR attractiveness (β = 0.17, *t* = 9.55, *p* < .001). However, when including intensity, the effects of the happy condition (β = 0.05, *t* = 0.82, *p* = .411) and the flirting condition (β = 0.08, *t* = 1.38, *p* = .167) on perceived LTR attractiveness were non-significant. Moreover, the effect of gender was non-significant when intensity was included in the model (β = 0.61, *t* = 1.96, *p* = .050).

Comparing the LMM without sociosexuality to the LMM with sociosexuality included as fixed effect, a significant difference was found ($X^2(2) = 6.105$, *df* = 2, *p* = .047, see Table 2). However, although the two models differ significantly, the effect of sociosexuality (β = -0.06, *t* = -0.48, *p* = .632) and the interaction effect of sociosexuality and gender (β = -0.35, *t* = -1.77, *p* = .077) are non-significant (Table 6). While the effect of gender was non-significant in the model without sociosexuality, the effect was significant in the model with sociosexuality included (β = 2.17, *t* = 2.39, *p* = .017), with men rating LTR attractiveness higher than women (Table 6). Moreover, the random effect of subject explained 30% of the variance (*ICC* = .30), while the random effect of item / video explained only 16% of the variance (*ICC* = .16).

Discussion

Disclaimer: As we were not able to control for heteroscedasticity in our data, the following interpretation must be considered cautiously, as heteroscedasticity might distort confidence intervals, *t*- and *F*- values (Williams et al., 2013) and, in consequence, it might lead to a higher chance of type I errors (Knief & Forstmeier, 2021). Other statistical models might have been able to deal with the heteroscedasticity better, but we decided to still employ

LMMs due to their advantages, such as being able to include various fixed and random effects as well as random slopes, which seemed to be specifically relevant for our research question and study design, therefore, we decided to implement LMMs in the present study nevertheless.

In previous studies, people with happy facial expressions were rated as more attractive (Calvo et al., 2018; Garrido & Prada, 2017; Ho & Newell, 2020; Lindeberg et al., 2019; Reis et al., 1990; Ueda et al., 2016) and they reported higher mating success when flirting (Apostolou et al., 2019). Nevertheless, no study has experimentally investigated whether flirting has a similar effect as happiness on perceived attractiveness. Therefore, in the present study we compared dynamic audio-visual videos with either a happy expression or a flirtatious expression to a neutral expression regarding perceived attractiveness for STRs and LTRs. We employed LMMs to incorporate individual differences between participants, but also differences between stimuli and we included other covariates such as intensity, gender, and sociosexuality. We found a stable positive effect of flirtatiousness on perceived attractiveness for STRs across different models including these various covariates. Happiness, however, was significant only for some models and the effect seemed to be moderated by intensity. For LTR attractiveness, less complex models showed a significant positive effect of happiness and flirtatiousness as well. However, when including more covariates, we found a similar pattern as for happiness and STR: the effect of happiness was moderated by intensity and was non-significant, when this covariate was included in the model, while the effect of flirtatiousness was moderated by intensity and sociosexuality and was non-significant, when only intensity was included as a covariate, but significant when intensity and sociosexuality were included in the model. Across all models for STRs and almost all models for LTRs (except for the one model in which only intensity was included as a covariate in the model), there was a significant effect of gender, with men constantly giving higher ratings than women. Moreover, men described themselves as less sociosexually restricted than women, which is in line with previous studies (Back et al., 2011; Penke & Asendorpf, 2008; Schmitt & Shackelford, 2008).

Attractiveness for a STR

Flirting was perceived as the most attractive expression for a STR, followed by happy and neutral expressions. Even when controlling for intensity, flirting led to significantly increased attractiveness ratings, whereas happy expressions did not. Flirting might be particularly important for STR attractiveness because raters could interpret it as sexually motivated (Henningsen, 2004; Henningsen et al., 2008), which would be an important

motivation for forming a STR. Moreover, because men seem to prefer women's flirting methods that suggest sexual accessibility (Wade & Slemp, 2015), and because they also seem to interpret flirting as more sexually motivated than women (Henningsen, 2004; Henningsen et al., 2008), flirting might be particularly important for STRs, especially for male raters, as it may convey sexual interest. Indeed, in line with our hypothesis, men rated STR attractiveness significantly higher than women in every condition examined (see Table 3). Men face lower risk and potential investment than women when considering STRs, therefore men might be less selective and give higher ratings (Kenrick et al., 1993). Women have also been found to flirt more with certain men during their high fertility phases (Cantú et al., 2014), so flirting may have been perceived as more attractive by men because they subconsciously perceived women as more fertile. Contrary to our hypothesis, sociosexuality did not contribute significantly to the model, although the effect of gender increased from $\beta = 0.83$ to $\beta = 2.17$ when sociosexuality was taken into account (see Table 5 and 6), with men giving higher ratings than women. This further confirms that men are less selective than women in STR contexts.

Attractiveness for a LTR

Both flirtatious and happy expressions were perceived as more attractive than neutral expressions for a LTR. Moreover, men rated attractiveness for LTRs significantly higher than women. However, when intensity was included in the model, the condition effects of happy and flirtatious expression as well as the effect of gender ($p = .05$) were nonsignificant, leaving only intensity as a significant effect. Thus, the more intense a happy or flirtatious expression is perceived, the more attractive a person is perceived for a LTR. Flirtatious expressions may not be perceived as more attractive for a LTR than displaying neutral expressions, apart from their higher intensity, as flirting could indicate a person's higher sociosexuality and consequently the flirting person could make less effort for a LTR (Penke & Asendorpf, 2008), which could be less desirable when aiming for a long-term partner. Therefore, flirting may not be more effective than displaying a happy expression or other positive expression when trying to increase one's attractiveness for a LTR. Moreover, condition showed no effect when controlling for sociosexuality. Although both the effect of sociosexuality and its' interaction effect with gender were nonsignificant, the effect of gender increased from $\beta = 0.61$ to $\beta = 2.17$ (see Table 5 and 6) when controlling for sociosexuality, indicating that the effect of gender was confounded by the effect of sociosexuality. Thus, even if there were no differences between genders in terms of their sociosexuality, men still seem to rate the attractiveness of potential mates higher than women regarding LTRs, despite previous

research suggesting that men are more selective than women regarding attractiveness for marriage (Kenrick et al., 1993) and that men having not more interest in LTRs than women (Asendorpf et al., 2011). This could be because we also accounted for expression intensity as a covariate in the current study, and men also perceived each condition as more intense than women (d = 0.21). Thus, men might rate LTR attractiveness higher than women because they also perceive expressions as more intense, which we found to have a large influence on perceived attractiveness.

General Discussion

In line with our hypothesis, we found that happy faces are perceived as more attractive. This could be due to the fact that people attribute a variety of positive traits to a smiling person (Reis et al., 1990). Moreover, intensity seems to have a greater influence on happy expressions than on flirtatious expressions. The reason that the effect of the happy condition on attractiveness was not significant when intensity was included as a covariate in the model, while the effect of the flirting condition sometimes remained significant, may be that flirting is not just an emotion or an expression that can be more or less intense, but rather a whole repertoire of different behaviours, such as seeking for eye contact, smiling, looking down, giggling, lifting eyebrows (Eibl-Eibesfeldt & Hass, 1967), primping, or glancing shortly at a potential mating partner (Grammer et al., 2000). Therefore, flirting could be viewed as an adaptive behaviour that can be used and adapted to specific needs in order to appear more attractive to potential mating partners, rather than just an emotion. However, happiness seems to be perceived as more attractive than a neutral expression mainly because of its perceived intensity, as the significant effect of the happy condition completely disappeared when intensity was taken into account. We did not include negative emotions in our study design, which is why we cannot conclude whether happiness is perceived as more attractive only because of its increased perceived intensity compared to the neutral expression. Following this train of thought, negative emotions such as anger or sadness should also be perceived as more attractive, which would be contradictory to previous study results (Calvo et al., 2018; Garrido & Prada, 2017; Ho & Newell, 2020; Lindeberg et al., 2019; Ueda et al., 2016). Maybe more in line with these previous results, there could be an interaction between intensity and attractiveness ratings, whereby intensity does not increase attractiveness per se, but rather follows the perceived valence of the emotion. More intense positive emotions are also ascribed more positive looks, hence higher attractiveness ratings, and more intense negative emotions are ascribed more negative looks, hence lower attractiveness ratings.

Therefore, including negative emotions for comparison could facilitate the interpretation of the influence of happiness on attractiveness.

Although we found heteroscedasticity in our data, it seems reasonable to still implement LMMs, as we were able to implement random effects and random slopes, as there seem to be large individual differences. The difference between individual subjects explained more variance (27% for STR attractiveness and 30% for LTR, respectively) than the difference between individual items for both STR and LTR attractiveness ratings (13% for STR attractiveness and 16% for LTR), suggesting that personal taste plays an important role in attractiveness ratings, confirming Hönekopp's (2006) argument that shared and personal tastes are almost equally important for variation in attractiveness ratings. Some participants in our study may have had more interest than others in a relationship in general and thus generally gave higher attractiveness ratings than others, while others may have had no interest in a relationship at all. Moreover, other factors may have had an impact on attractiveness ratings that we did not include in our experiment or analyses. Extraversion (Back et al., 2011; Nettle, 2005; Whyte et al., 2019), self-perceived mate value (Arnocky, 2018; Back et al., 2011; Goetz, 2013; Landolt et al., 1995), and self-confidence (Kavanagh et al., 2010), which we assessed but did not include in our statistical analyses, were all found to influence mating behaviour and thus may be at least partially responsible for the large variance between subjects. Status of the menstrual cycle may also have had an effect on the variance between subjects, as previous studies have found that flirtatious faces are more attractive to women in their fertile phase than in their non-fertile phase (Morrison et al., 2010; Stern et al., 2020), and the women in our study were likely not all in the same phase of their cycle. Therefore, repeating the study with a larger sample size – which would be necessary to include that many covariates – might provide more certainty about the cause of the large variance. However, other factors could be responsible for the variance between subjects, such as interest in STRs or LTRs, as interest in different types of relationships has been found to influence mating outcomes (Asendorpf et al., 2011).

The effect of men rating attractiveness higher than women was even stronger for STRs (d = 0.52) than for LTRs (d = 0.44), supporting that men are less selective than women in short-term mating contexts. It also supports that men are less selective in short-term mating contexts than they are in long-term mating contexts, which is in line with Kenrick et al. (1993), who found that the effect of gender was less pronounced regarding LTR attractiveness, suggesting that men are more selective regarding a LTR than regarding a STR

because their potential investment is higher when committing to a LTR compared to a STR. However, both men and women gave higher overall attractiveness ratings for STRs than LTRs, and thus women also seem to be less selective when choosing a short-term mate compared to a long-term mate. However, it is possible that subjects rated STRs over LTRs because they could not obtain enough information about the person from the short videos that would be more important to form a LTR, such as the person being loving or loyal (Goetz, 2013) or their sociosexuality, as a sociosexually less restricted partner may lead to lower marital satisfaction (French et al., 2019). This could also be a reason for the participants' low response variance, as they needed more information to know whether they wanted to form a relationship with the stimuli and therefore preferred to rate the stimuli as unattractive for a relationship.

Contrary to our hypothesis that subjects' sociosexuality is more important for STR attractiveness than LTR attractiveness, sociosexuality contributed significantly to our model for LTR attractiveness but not for STR attractiveness. It seems that the effect of gender was masked by sociosexuality. In the LMM for LTRs, the effect of sociosexuality as well as its interaction effect with gender were not significant themselves, but the effect of gender was revealed after their inclusion in the model. In the model for STR attractiveness, although the effect of gender was consistently significant, including sociosexuality in the model also increased the effect of gender for STR. Thus, subjects' sociosexuality may not have a direct significant effect on either model, but only an indirect effect, as variance in subjects' sociosexuality ratings masked gender effects, although this was significant only for LTR. Therefore, a person's sociosexuality does not seem to influence their attractiveness perceptions; rather, the significant contribution of sociosexuality to our model seems to be due to men and women having different levels of sociosexuality as well as rating the attractiveness for LTR and STR differently.

Attractiveness ratings for STRs and LTRs were higher than the included average attractiveness score from the ViTaFa validation study (Krumpholz et al., unpublished). It is possible that responses in the present study differed from those in the validation study due to the nature of the question. Participants in the validation study were asked to rate attractiveness (without further specification of interest in relationships), whereas we asked about attractiveness for specific types of relationships. People may find a person generally attractive but still might not want to be in a relationship with that person for a variety of reasons, such as not finding the person sexually attractive or simply not looking for any kind of relationship,

as people with low motivation to find a relationship would be expected to give lower ratings and vice versa (Hönekopp, 2006). This might be the reason why we did not find the expected interaction between the average attractiveness score and the effects of the different conditions on the attractiveness ratings for STRs and LTRs. Hence, it seems to be particularly important to select attractiveness terms carefully because, depending on the research question, asking only about attractiveness could change individuals' response behaviour. In the present study, we were interested in mate choice, participants' interest in a possible partner and not attractiveness per se. Results suggest that this should be considered in future studies as well by proposing different evaluations of attractiveness and attractiveness for relationships (and different evaluations for different types of relationships).

Limitations and Future Studies

Future studies should employ a larger sample size in order to be able to incorporate several covariates in the analyses that seem to have an influence on perceived attractiveness but avoid heteroscedasticity or boundary fits of the LMMs.

In addition, future studies should include participants of different age groups, as Asendorpf et al. (2011) found that age has something to do with being choosy, namely that older men were choosier, while older women were less choosy. While in this study by Asendorpf et al. (2011) the participants were between 18 to 54 years old and therefore some of the women could already be in their post-reproductive phase, we would potentially find different effects on attractiveness ratings if we also included older participants, as mating strategies might be different for different mating risks. Since we only assessed responses from subjects aged 19 to 39 years, most of which are likely to be at a fertile age, the difference between women and men in attractiveness ratings for STRs and LTRs may equalise with increasing age. Therefore, women's attractiveness ratings for a relationship might increase with age because women seem to be less choosy with higher age, probably because their risk of pregnancy decreases. Similarly, men's attractiveness ratings for a relationship might decrease with age because the likelihood of impregnating a mating partner decreases, as studies show that men's preferred age for a mating partner is only about three years younger than their own age and that, e.g., American men marry women who are only between three and eight years younger when they first marry than when they marry for the third time (see Conroy-Beam & Buss, 2019, for a review). Hence, to expand the interpretation of men's higher attractiveness ratings, future studies should include different age groups.

In addition, our results may only apply to heterosexuals, as we did not test individuals with other sexualities in the current study. Future studies may consider including participants with other sexualities to make broader assumptions about flirting, as there are studies suggesting differences between heterosexuals and homosexuals in mating behaviour to retain an already existing relationship (Vanderlaan & Vasey, 2008).

Finally, future studies may investigate how flirting and happy expressions differ from each other, as they appear to be quite similar. Flirting can be conducted using different strategies (Hall et al., 2010), whereas happiness cannot. Thus, future studies could use qualitative approaches to examine the flirting strategies that the stimuli exhibited and determine whether they are similar to each other or whether they differ strongly from each other. Flirting has some things in common with happy expressions, that are indicative of a positive emotion, such as smiling and laughing (Eibl-Eibesfeldt & Hass, 1967; Grammer et al., 2000). However, our study demonstrated that flirting is something beyond a mere positive emotion, as intensity affects happy and flirting expressions differently. Therefore, an examination and comparison of similarities and, more importantly, differences between happiness and flirting may shed more light on what flirting really is.

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Supplementary Tables

Supplementary Table 1

Overview of the Applied Models for each Included Effect for STR and LTR. Included Models are Shown in Bold.

a) STR

Effect Included	Model Term	Final Null Model	Exclusion Criterium
None	lmer(ST_Relationship ~ Gender + (1+condition|video_number) + (1+condition|subject_code))	**lmer(ST_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))**	Failed to converge (with 1 negative eigenvalue) and boundary fit (overfitting)
Condition	**lmer(ST_Relationship ~ condition + Gender + (1+condition|video_number) + (1|subject_code))**	lmer(ST_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))	included
Average attractiveness score	**lmer(ST_Relationship ~ condition * mean_attractiveness + Gender + (1+condition|video_number))**	lmer(ST_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))	included
Intensity	lmer(ST_Relationship ~ condition *		Failed to converge (with 1 negative

	Intensity + Gender + (1+condition|video_number) + (1|subject_code))		eigenvalue) and boundary fit (overfitting;)
	lmer(ST_Relationship ~ condition + Intensity + Gender + (1+condition|video_number) + (1|subject_code))	lmer(ST_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))	included
Sociosexuality	**lmer(ST_Relationship ~ condition + Intensity + Sociosexuality * Gender + (1+condition|video_number) + (1|subject_code))**	lmer(ST_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))	included

b) LTR

Effect Included	Model Term	Final Null Model	Exclusion Criterium
None	lmer(LT_Relationship ~ Gender + (1+condition|video_number) +	**lmer(LT_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))**	Boundary fit (overfitting)

	(1+condition|subject _code))		
Condition	**lmer(LT_Relationship ~ condition + Gender + (1+condition|video_number) + (1|subject_code))**	lmer(LT_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))	included
Average attractiveness score	**lmer(LT_Relationship ~ condition * mean_attractiveness + Gender + (1+condition|video_number))**	lmer(LT_Relationship ~ Gender + (1+condition|video_number) + (1|subject_code))	included
Intensity	lmer(LT_Relationship ~ condition * Intensity + Gender + (1+condition|video_number) + (1|subject_code))		Boundary fit (overfitting)
	lmer(LT_Relationship ~ condition + Intensity + Gender + (1+condition|video_number) + (1|subject_code))		Boundary fit (overfitting)

	lmer(LT_Relation ship ~ condition * Intensity + Gender + (1|video_number) + (1|subject_code))		*AIC* = 9431.0
	lmer(LT_Relatio nship ~ condition + Intensity + Gender + (1|video_number) + (1|subject_code))	lmer(LT_Relationship ~ Gender + (1 |video_number) + (1|subject_code))	included (*AIC* = 9428.8)
Sociosex uality	**lmer(LT_Relatio nship ~ condition + Intensity + Sociosexuality * Gender + (1|video_number) + (1|subject_code))**	lmer(LT_Relationship ~ Gender + (1|video_number) + (1|subject_code))	included

Coefficients of Models Calculated with a Robust Standard Error (HC3)

Supplementary Table 2

LMMs Calculated With Robust Standard Error (HC3) with Gender and Condition (Neutral vs. Happy vs. Flirting) as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted Variable	Predictors	Estimates	*SE*	Test *(df)*	*p*
STR	(Intercept)	-0.39	0.12	-3.11 (3066.00)	**.002****
	condition [happy]	0.26	0.04	6.79 (3066.00)	**<.001*****
	condition [flirting]	0.30	0.04	7.78 (3066.00)	**<.001*****
	Gender [male]	0.53	0.19	2.74 (3066.00)	**0.006****
LTR	(Intercept)	-0.36	0.13	-2.67 (3071.00)	**.008****
	condition [happy]	0.31	0.03	10.21 (3071.00)	**<.001*****
	condition [flirting]	0.28	0.03	9.04 (3071.00)	**<.001*****
	Gender [male]	0.43	0.21	2.09 (3071.00)	**.037***

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Supplementary Table 3

LMMs Calculated with Robust Standard Error (HC3) with Gender, Condition (Neutral vs. Happy vs. Flirting) and Intensity as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted Variable	Predictors	Estimates	*SE*	Test *(df)*	*p*
STR	(Intercept)	-0.24	0.12	-1.97 (3065.00)	**.049***
	condition [happy]	0.01	0.05	0.18 (3065.00)	.856
	condition [flirting]	0.11	0.04	2.47 (3065.00)	**.013***
	Intensity	0.16	0.02	8.02 (3065.00)	**<.001****
	Gender [male]	0.52	0.18	2.81 (3065.00)	**.005****
LTR	(Intercept)	-0.18	0.13	-1.32 (3070.00)	.185
	condition [happy]	0.03	0.04	0.82 (3070.00)	.411
	condition [flirting]	0.05	0.04	1.38 (3070.00)	.167
	Intensity	0.19	0.02	9.55 (3070.00)	**<.001****

Gender [male]	0.	0.20	1.96 (3070.00)	.050

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Supplementary Table 4

LMMs Calculated with Robust Standard Error (HC3) with Gender, Condition (Neutral vs. Happy vs. Flirting), Intensity and Sociosexuality as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted Variable	Predictors	Estimates	*SE*	Test *(df)*	*p*
STR	(Intercept)	-0.24	0.12	-2.01 (3063.00)	**.044***
	condition [happy]	0.01	0.05	0.19 (3063.00)	.848
	condition [flirting]	0.11	0.04	2.48 (3063.00)	**.013***
	Intensity	0.16	0.02	8.00 (3063.00)	**<.001*****
	Sociosexuality	-0.00	0.08	-0.04 (3063.00)	.966
	Gender [male]	0.55	0.18	3.05 (3063.00)	**.002****
	Sociosexuality * Gender [male]	-0.23	0.14	-1.61 (3063.00)	.109

LTR	(Intercept)	-0.18	0.13	-1.39 (3068.00)	.164
	condition [happy]	0.04	0.04	0.83 (3068.00)	.404
	condition [flirting]	0.05	0.04	1.39 (3068.00)	.164
	Intensity	0.19	0.02	9.53 (3068.00)	**<.001*** **
	Sociosexuality	-0.04	0.09	-0.48 (3068.00)	.632
	Gender [male]	0.44	0.20	2.27 (3068.00)	**.024***
	Sociosexuality * Gender [male]	-0.27	0.15	-1.77 (3068.00)	.077

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Coefficients of Models with a Bootstrapping Method Applied

Supplementary Table 5

LMMs with Applied Bootstrapping Method with 1000 Iterations with Gender and Condition (Neutral vs. Happy vs. Flirting) as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted Variable	Predictors	Estimates	95% *CI*	*p*
STR	(Intercept)	1.74	[1.38, 2.12]	**<.001*** **
	condition [happy]	0.41	[0.29, 0.53]	**<.001*** **
	condition [flirting]	0.49	[0.36, 0.61]	**<.001*** **
	Gender [male]	0.83	[0.24, 1.47]	**0.004** **
LTR	(Intercept)	1.67	[1.26, 2.08]	**<.001*** **
	condition [happy]	0.49	[0.39, 0.58]	**<.001*** **
	condition [flirting]	0.43	[0.34, 0.52]	**<.001*** **
	Gender [male]	0.67	[0.06, 1.26]	**.024***

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Supplementary Table 6

LMMs with Applied Bootstrapping Method with 1000 Iterations with Gender, Condition (Neutral vs. Happy vs. Flirting) and Intensity as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted Variable	Predictors	Estimates	95% *CI*	*p*
STR	(Intercept)	1.42	[1.01, 1.80]	**<.001*** **
	condition [happy]	0.01	[-0.15, 0.17]	.898
	condition [flirting]	0.17	[0.03, 0.30]	**.022***
	Intensity	0.15	[0.11, 0.19]	**<.001*** **
	Gender [male]	0.85	[0.29, 1.44]	**.004****
LTR	(Intercept)	1.34	[0.93, 1.73]	**<.001*** **
	condition [happy]	0.05	[-0.07, 0.18]	.478
	condition [flirting]	0.08	[-0.03, 0.20]	.198
	Intensity	0.17	[0.13, 0.20]	**<.001*** **
	Gender [male]	0.61	[0.01, 1.28]	.048

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Supplementary Table 7

LMMs with Applied Bootstrapping Method with 1000 Iterations Calculated with Robust Standard Error (HC3) with Gender, Condition (Neutral vs. Happy vs. Flirting), Intensity and Sociosexuality as the Fixed Effects and Ratings for STR and LTR Attractiveness as Dependent Variables

Predicted Variable	Predictors	Estimates	95% *CI*	*p*
STR	(Intercept)	1.44	[0.47, 2.40]	**.004****
	condition [happy]	0.01	[-0.14, 0.17]	.878
	condition [flirting]	0.17	[0.04, 0.30]	**.010***
	Intensity	0.15	[0.11, 0.19]	**<.001*****
	Sociosexuality	-0.01	[-0.22, 0.21]	.902
	Gender [male]	2.20	[0.56, 3.92]	**.008****
	Sociosexuality * Gender [male]	-0.31	[-0.70, 0.04]	.092
LTR	(Intercept)	1.57	[0.59, 2.55]	.002
	condition [happy]	0.06	[-0.08, 0.18]	.402
	condition [flirting]	0.09	[0.03, 0.21]	.160
	Intensity	0.17	[0.13, 0.20]	**<.001*****
	Sociosexuality	-0.06	[-0.28, 0.16]	.618
	Gender [male]	2.13	[0.42, 3.90]	**.012***

Sociosexuality * Gender [male]	-0.34	[-0.76, 0.05]	.084

Note. SE = standard error, *df* = degrees of freedom, *p < .05, ** p < .01, *** p < .001

Appendix

Abstract

Attractiveness plays a major role in various aspects of daily life and is influenced by various things, such as facial expressions. Although flirting is often used to find a partner and attractiveness has a great influence on dating, it is still largely unclear how it influences attractiveness. Therefore, the aim of this study was to find out what influence flirting has on attractiveness ratings. In addition, we also investigated a possible influence of sociosexuality on attractiveness ratings. To do this, we asked 53 subjects about their sociosexuality and showed them short videos of people talking in three different conditions, namely while displaying neutral, happy, and flirting facial expressions. Subjects were then asked to rate their attractiveness for a short- and long-term relationship and the intensity of the facial expression. Happy and flirting expressions were consistently rated as more attractive than neutral ones. However, when expression intensity was controlled for, only expression intensity showed a positive effect on attractiveness ratings for a long-term relationship, however, happy or flirtatious facial expressions did not. For a short-term relationship, both expression intensity and flirting showed a positive effect on attractiveness ratings, while happy expressions did not. Contrary to our expectations, when sociosexuality was controlled for, it had a significant effect on attractiveness ratings only for a long-term relationship and reinforced the effect that men gave higher attractiveness ratings than women. This could mean that flirting plays a greater role in finding a short-term relationship than in finding a long-term relationship.

Keywords: flirting, emotions, expressions, facial attractiveness, Sociosexuality

Zusammenfassung

Attraktivität spielt in verschiedensten Bereichen des Alltags eine große Rolle und wird durch verschiedenes beeinflusst, wie beispielsweise Gesichtsausdrücke. Obwohl flirten oft dazu angewendet wird, um potenzielle Partner zu finden, und Attraktivität einen großen Einfluss auf die Partnersuche hat, ist noch weitestgehend unklar, wie es sich auf die Attraktivität auswirkt. Ziel dieser Studie war es daher, herauszufinden, welchen Einfluss flirten auf Attraktivitätsbewertungen hat. Außerdem untersuchten wir auch einen möglichen Einfluss von Soziosexualität auf Attraktivitätsbewertungen. Dafür befragten wir 53 Testpersonen hinsichtlich ihrer Soziosexualität und spielten ihnen Kurzvideos von sprechenden Personen in drei verschiedenen Bedingungenvor, nämlich mit einem neutralen, fröhlichen und flirtenden Gesichtsausdruck. Die Testpersonen sollten daraufhin die Attraktivität für eine Kurzzeit- und Langzeitbeziehung sowie die Intensität der Videos beurteilen. Fröhliche und flirtende Personen wurden durchwegs als attraktiver als neutrale Personen beurteilt. Wurde jedoch auf die Intensität des Ausdrucks kontrolliert, zeigte bei den Attraktivitätsbewertungen für eine Langzeitbeziehung nur noch die Intensität des Ausdrucks eine intensitätssteigernde Wirkung, nicht jedoch der fröhliche oder flirtende Ausdruck. Für eine Kurzzeitbeziehung zeigten dann die Intensität des Ausdrucks sowie das Flirten eine attraktivitätssteigernde Wirkung, nicht jedoch der fröhliche Ausdruck. Wurde auf Soziosexualität kontrolliert, hatte dies wider Erwarten nur einen signifikanten Einfluss auf die Attraktivitätsbewertungen für eine Langzeitbeziehung, indem es den Effekt, dass Männer höhere Attraktivitätsbewertungen als Frauen gaben, noch verstärkte. Dies könnte bedeuten, dass Flirten beim Suchen einer Kurzzeitbeziehung eine größere Rolle spielt als beim Suchen einer Langzeitbeziehung.

Schlagwörter: Flirten, Emotionen, Ausdrücke, Gesichtsattraktivität, Soziosexualität