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Attractive Opportunities: How Business Angels Are Biased by Beauty

Student	Supervisor	Co-reader
J. (Jesse) de Vries	T.H. (Timo) van Balen	M.T. (Mirella) Schrijvers
j.devries18@students.uu.nl	t.h.vanbalen@uu.nl	m.t.schrijvers@uu.nl
9186123		

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Abstract

Like any decision-making process, business angels are susceptible to biases in early-stage investment decisions. This research investigates the role of the beauty premium biasing this decision by introducing mediation effects of attractiveness through criteria typically assessed by business angels. Prior research shows deviance from expected results based on key work on beauty premiums and physical attractiveness. By exposing the underlying mechanisms through which attractiveness influences the process of acquiring funding for entrepreneurial ventures, this research aims to explain this dissonance. Using data acquired from an online experiment on investors, we analyze investor behavior using main effects models, multiple regression and causal mediation analysis. This research finds that the beauty premium only exists for female entrepreneurs, that this female beauty premium only influences the initial decision to invest or not and can help in closing observed gender gaps in entrepreneurship. No evidence can be identified for biasing of the amount invested or the existence of a male beauty premium, inconsistent with the results of previous research. These findings can be explained by characteristics of investor 'gut feel' and the context specifity of the beauty premium, as well as dual processing theories.

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Introduction

Public interest in pitches of entrepreneurial ventures has been growing due to the increasing popularity of TV shows such as Shark Tank or shows similar in nature. Similarly, academic interest in how early-stage investment decision-making processes of business angels work has taken on (Florin et al., 2013). As for the academic field of sociological and behavioral research, a vast number of articles have been written on pitching and presentation skills; the influence of nonverbal cues and even physical attributes of the individual on perceived quality of the pitch or presentation. Relevant factors include the influence of the tone of voice (Parhankangas & Ehrlich, 2014), structure, images, and colors (Chan & Park, 2015), use of figurative language or gestures (Clarke et al., 2019), and introduction of narratives or adoption of storytelling (van Werven et al., 2019). This proves that pitch content is just as important as who is presenting or how it is presented.

However, in the context of funding entrepreneurial ventures by business angels, prior research mainly focuses on objective criteria of ventures and their products offered as predictors of decision-making outcomes (Clarke et al., 2019; Parhankangas & Ehrlich, 2014), as opposed to the influence of entrepreneur-related heuristics. This is interesting, as research has shown that business angels apply such heuristics in their decision-making processes (Harrison et al., 2015; Maxwell et al., 2011). One of the most well-known biases related to attributing positive qualities to an individual is the attractiveness bias, in popular culture also known to as the 'beauty premium'. As shown in literature, attractiveness highly influences career and organizational success (Hosoda et al., 2003), and moderately influences other positive qualities (Eagly et al., 1991; van Leeuwen & Macrae, 2004). Although facial attractiveness is used as a heuristic in general decision-making processes (Schmidt et al., 2012; van 't Wout & Sanfey, 2008) and is suspected to influence early-stage investment decisions as well (Smith & Viceisza, 2018), we do not know why investors are susceptible to facial attractiveness bias and under which conditions this effect exists. More

specifically, we don't know as of yet how this bias influences or relates to other factors in the decision-making process.

Due to the multidisciplinary nature of this phenomenon, literature on biasing, heuristics and early-stage investment decision-making is distributed among several academic fields. The effect of attractiveness is often researched from a social or psychological perspective (e.g. Agthe et al., 2011; Berscheid & Walster, 1974) whereas investment decision-making is generally researched from either a behavioral economics or entrepreneurial financing perspective (e.g. Dellavigna, 2009; Thaler, 2005). As a result, we must aggregate and transfer assumptions between these domains, which in the context of attractiveness should be approached with caution. A meta-analysis by Eagly et al. (1991) demonstrates this by finding that the effect of attractiveness is highly variable and that there is no homogenous effect size to be identified, problematizing interpretation of effects.

This variable effect of attractiveness emerges given the results of Brooks et al. (2014) and Smith & Viceisza (2018). Smith & Viceisza (2018) found evidence for attractiveness influencing investment decisions. Brooks et al. (2014) also identified this bias; however, they only did so for male entrepreneurs. However, conceptually, the beauty premium should appear to be stronger for females (Eagly et al., 1991), suspected to be due to more associations of females with beauty in media (Downs & Harrison, 1985) and an unbalanced effect of male response on female attractiveness (Feingold, 1992). The results of the meta-analysis by Eagly et al. (1991) show that if any difference can be identified, higher effect sizes are more likely for females than for males. Feingold (1992) indeed found that this effect of attractiveness is indeed larger for female targets.

This then raises the question – why is this different for investment decisions? A possible explanation for this inconsistency could be the context specificity of beauty premiums, as put forward by Eagly et al. (1991). However, which contextual elements define whether this effect only shows for male entrepreneurs then remains unknown. Given that trustworthiness is a key element in early-stage investment decisions (Maxwell & Lévesque, 2014), one could argue that this effect is

a mediator of male entrepreneurs' attractiveness (van Leeuwen & Macrae, 2004). The issue with this is that prior behavioral research shows that attractiveness leads to trustworthy perceptions of females as well, and quite strong (Schmidt et al., 2012). As Brooks et al. (2014) did not include trustworthiness as a mediator, we fail to find evidence explaining differences by gender-specific mediation through trustworthiness.

We could find an alternative explanation in the effect of 'gut feel' for investors, and how it differs from the irrationality observed in the gut feel of noninvestors. Yet, we can't support this as an explanation for the observed inconsistency, as the sample of Brooks et al. (2014) was not limited to investors. Smith & Viceisza (2018) did not analyze interactions of attractiveness with target gender, failing to support this alternative explanation as well. Adding to that, the explanation of the different use of 'gut feel' by investors fails to explain why it prevails specifically for men only, lacking in exposing underlying mechanisms. Domain expertise, an often referred to construct explaining differences in biases in specific contexts (Dane et al., 2012), fails to explain the reversed male/female effect as well on the basis of this same argumentation.

Ultimately, we fail to have reached academic consensus explaining the observation of this male-only beauty premium. It contrasts with existing research on attractiveness biasing, and prior research fails to shed light on why it differs from what we would expect. To the best of our knowledge, no article has researched the effect of attractiveness on specific criteria weighed by business angels in their investment decisions, aiming to explain the very nature and underlying mechanisms of attractiveness bias in early-stage investment decisions.

This is concerning, as knowing whether and how facial attractiveness affects early-stage investment decisions and to what extent allows us to better understand why some entrepreneurs are better at raising funding than others. It also allows us to gain better insight in the balance between verbal and non-verbal interpretation and its consequence on pitch success. Adding to this, from a societal perspective, it helps us understand under what conditions business angels do not

objectively assess entrepreneurs and their ventures, leading to an inequality in entrepreneurial chances. This research aims to address this issue by answering the question:

'Through which mechanisms are business angels biased by the effect of facial attractiveness in early-stage investment decision-making processes?'

We argue that an attractive entrepreneur seeking funding has higher chances of acquiring any funding, as well as receiving an increased investment amount compared to average entrepreneurs. We believe that this attractiveness bias works so by investors trusting attractive entrepreneurs more and evaluating the viability of the business pitched to be higher, depending on the sex of the entrepreneur. Thus, we hypothesize that facial attractiveness increases both the chances of acquiring funding as well as acquiring more funding through gender-specific mediated evaluations of trustworthiness and business viability. These hypotheses were tested using a randomized online experiment in which participants screened on having investment experience were presented with an investment opportunity. We then analyzed this data set using various regression approaches and causal mediation analysis and found that this beauty premium only exists for female entrepreneurs and only influences the intention to fund, through attractiveness leading to a higher perception of business viability. No beauty premium for male entrepreneurs could be identified, as well as no biasing of the amount investors offer the entrepreneur. Also, we did not find enough evidence to support the existence of a general attractiveness bias in investment decisions.

This research contributes to the domain of entrepreneurial and behavioral financing in several ways. First, we find results inconsistent with those of previous research on attractiveness in investment decisions. Brooks et. al (2014) identified an attractiveness bias in early-stage investment decisions, but only for male entrepreneurs. Smith & Viceisza (2018) did not identify a gender-specific effect of attractiveness biasing. We challenge existing literature by posing that not only

there is a gender-specific effect for attractiveness and its biasing of investment decisions, but that this gender-specific effect is only present for female entrepreneurs. Second, we show that investors behave differently with regards to biases and heuristics. Our results show no sign of attractiveness affecting perceptions of trustworthiness, an effect observed in prior research in other domains (Schmidt et al., 2012; van Leeuwen & Macrae, 2004; van 't Wout & Sanfey, 2008). Additionally, we argue that the described inconsistency in results is related to either externally sourced attractiveness ratings or samples not limited to investors. We show that research on investment decisions should carefully design research to ensure external validity. Third, we find that although the beauty premium plays a role in investment decisions, it's context-specifity does as well, confirming variable effects (Eagly et al., 1991). We provide evidence of attractiveness biasing the likelihood of acquiring funding, but not for the investment amount. We thus argue that the existence of this bias is only present in the initial decision-making stage and not in the subsequent stage of business valuation, which requires more deliberate efforts and is more rational, integrating our findings with dual system/processing theories (Kahneman, 2003). Our study is the first to utilize primary data of investors in the context of attractiveness and investment decisions, showing that investors behave differently and that this gender-specific effect of attractiveness bias contrasts with that of non-investors. Next to this, we discuss how female entrepreneurs are affected by gender bias and how the identified beauty premium for female entrepreneurs relates to this gender bias in investment decisions.

Theoretical Framework

Business angels and early-stage investment decision-making

To grow or start a business, entrepreneurs require funding. If seeking to raise capital of investors, they need to convince investors that their opportunity is worth investing in. However, investors are not that easy to convince: investment decisions are made under great uncertainty and risk (Maxwell et al., 2011), given the considerable asymmetry in information and often the lack of credibility in information in early-stages (Han et al., 2020). This uncertainty and risk have more impact on 'business angels', defined as informal investors that are private individuals who provide risk capital to new or growing businesses, with no family connection to the business (Mason & Harrison, 1995). They are characterized by making investment in early-stages with high pace, often based on an initial entrepreneurial pitch (Maxwell et al., 2011).

Business angels differ from venture capitalists in their investment decision-making process. As business angels tend to invest in these early-stages of venturing, their risk is higher, leading them to rely on 'gut-feel' or perceptive cues in their decision-making as risk reduction strategies (Huang, 2018). For example, subjective or perceptive criteria related to the entrepreneur, such as trustworthiness or enthusiasm (Harrison, 1997; Huang & Pearce, 2015; Maxwell et al., 2011; Sudek, 2006). Venture capitalists tend to focus more on objective characteristics, relying on due diligence and extensive ex ante research (Granz et al., 2020; Mason & Stark, 2004; van Osnabrugge, 2010). Moreover, business angels tend to reduce risks in different stages compared to venture capitalists (van Osnabrugge, 2010), while these typical stages may differ as well (Maxwell et al., 2011; Paul et al., 2007; White & Dumay, 2020). They reject opportunities in these stages using elimination-by-aspects, as to reduce alternatives in their decision set (Maxwell et al., 2011). Moreover, business angel decision-making is non-compensatory in nature, which effectively means that business angels

do not allow other characteristics of an opportunity to 'compensate' for deficiencies or risks (Jeffrey et al., 2016).

The role of subjective and perceptive criteria

The difference of particular interest between business angel decision-making and venture capitalist decision-making is the emphasis on subjective and perceptive criteria as opposed to objective characteristics. Huang (2018) argues that this use of 'gut feeling' by business angels allows them to manage their risks in decisions under uncertainty. This appears to be an effective strategy (Huang & Pearce, 2015); however, interestingly, this emotion-cognitions approach is contrasting with dual system theories of Kahneman (2003) & Simon (1990), which argue that emotion-based decisions display less rationality and thus are prone to biasing and heuristics.

We do observe irrationality in investment decisions, in which subjective or perceptive characteristics are unknowingly incorporated in decision-making. For example, images and color (Chan & Park, 2015), presentation skills (Clark, 2008), rhetoric (van Werven et al., 2019), positive language, and opinion conformity (Parhankangas & Ehrlich, 2014). Furthermore, the presence of biases and heuristics identified in social-psychological fields has also been confirmed among investment decisions (Abdin et al., 2017; Kumar & Goyal, 2016; Yalcin et al., 2016; Zahera & Bansal, 2018). Even in investment decision-making processes that appear to be rational, the presence of heuristics and biases in smaller phases of these large processes is seen (Kumar & Goyal, 2016). Subjective and perceptive criteria play a role in investment decisions and more importantly in business angel decision-making.

Attractiveness and its relation to decision-making

From a social-psychological perspective, a vast amount of research has been dedicated to attractiveness, popularized as 'the beauty premium'. We observe several streams in the literature related to attractiveness. First, we see research focused on ex post analysis of attractiveness effects, which has led to identification of attractive people having better careers (Hosoda et al., 2003), receiving higher compensations (Li et al., 2021), being perceived as more trustworthy (Schmidt et al., 2012) and being attributed or affiliated with more positive qualities in general (Dion et al., 1972; Eagly et al., 1991; Feingold, 1992; Mello & Garcia-Marques, 2018). Second, we observe a literature stream dedicated to analyzing the ex ante effect of attractiveness in decision-making processes. Several papers have found evidence for the existence of attractiveness used as a heuristic or biasing decisions (Schmidt et al., 2012; van 't Wout & Sanfey, 2008), even in decision-making processes not related to attractiveness-related outcomes at all (Praxmarer, 2015; van Leeuwen & Macrae, 2004). Schmidt et al. (2012) and Van 't Wout & Sanfey (2008) both argue that the influence of facial attractiveness mostly applies to an intermediary valuation of individuals in the decision-making process in terms of trustworthiness. The integration of these two major literature streams shows us that beauty matters in our lives, both in ex ante decision-making as well as ex post evaluations.

This attractiveness bias is of importance in understanding early-stage business angel investment decisions. As investor 'gut feel' is an emotions-cognitive approach to decision-making, it is particularly prone to stereotyping or affective heuristics (Bodenhausen, 1993). Early-stage investment decisions are characterized by an entrepreneur pitching an investment opportunity to an investor in an informal setting, in which the social element in decision-making is attenuated even more so. Prior research has shown that attractiveness effects tend to lead to stronger affective responses in social situations (Carducci & Ogan, 1983), stressing the importance of researching biases resulting from this 'first impression'. Literature further reflects the importance of social interactions in investment decision-making by researching concepts such as impression

management or investors emphasizing on traits of entrepreneurs as criteria (e.g. Harrison, 1997; Maxwell et al., 2011; Maxwell & Lévesque, 2014; Parhankangas & Ehrlich, 2014).

The consolidation of these findings suggests that business angels could be particularly prone to attractiveness biasing investment decision-making after being pitched by an entrepreneur. Prior research on attractiveness in investment-decision-making shares the conceptual importance of attractiveness in such decisions (e.g. Baron et al., 2006; Brooks et al., 2014; Smith & Viceisza, 2018).

Conceptual issues and observed gaps

A conceptual issue of prior work on attractiveness biasing investment decisions (e.g. Brooks et al., 2014; Smith & Viceisza, 2018) is the inconsistency with expected effects on the beauty premium. Brooks et. al (2014) find that attractiveness biasing only exists for male entrepreneurs, however, literature suggests that beauty premiums have larger effects for female targets perceived as attractive as opposed to male targets (Eagly et al., 1991). This may well be due to media portraying attractiveness and success more for woman (Downs & Harrison, 1985) and the strength by which males assess female positive qualities based on appearance (Feingold, 1990, 1992), which does not balance out. Given this, finding a beauty premium stronger for males than for females deviates from what we would expect.

The prior works of Brooks et. al (2014) and Smith & Viceisza (2018) fail to explain why their results deviate from expectations on beauty premiums. Conceptually, several possible explanations could be given to explain that a difference exists, however, why this difference exists in the particular setting of investment decisions is not identified. For example, Eagly et al. (1991) claim that beauty premiums are highly variable and context-specific, but this does not explain through which mechanisms they can do so. From other domains, we have observed that a beauty premium can be dependent on sex (Ewens & Townsend, 2020; Schmidt et al., 2012), interaction

between sexes (Johnson et al., 2010), job type (Heilman & Stopeck, 1985), can lead to attribution of socially undesirable traits (Dermer & Thiel, 1975), can be perceived as a social threat (Agthe et al., 2010) or can be reversed under specific informational processing contexts (Kranz et al., 2019). However, support for one of these possible discrepancies in context is not identified by prior research in light of investment decisions. Trying to identify a possible pathway for the attractiveness effect, one could claim that trustworthiness, a key ingredient for business angels in their decision-making (Maxwell & Lévesque, 2014), could explain this by gender-specific mediation. However, attractiveness strongly signals trustworthiness in women as well (Schmidt et al., 2012).

We find another possible explanation for this difference in the use of 'gut feel' by investors (Huang, 2018), which proves to be effective in managing risks (Huang & Pearce, 2015). Common use of 'gut feel' or implicit reasoning leads to greater susceptibility to biases or heuristics (Kahneman, 2003), and this could suggest that this investor's 'gut feel' explains the difference in bias for male entrepreneurs compared to female entrepreneurs. These findings could be related to gaining domain expertise, proving to reduce the susceptibility to biases (Dane et al., 2012). We note that List (2003) for example finds that the endowment effect diminishes as investment experience increases. Additionally, Feng & Seasholes (2005) found that investors attenuate the influence of several other behavioral biases as well by gaining experience. However, prior research on attractiveness in investment decisions did not limit their sample to investors, failing to explain the deviation from expected results.

Adding to the list of conceptual explanations, we note that attractiveness can influence unrelated assessments as well (Eagly et al., 1991; Praxmarer, 2015) and that a direct social effect in interpersonal relations has been observed as well (Agthe et al., 2011; Berscheid & Walster, 1974; Thornhill & Gangestad, 1999; van Leeuwen & Macrae, 2004). The variety in possible explanations for this phenomenon shows that there are many conceptual reasons that could explain that it is reasonable a difference exists, however, literature shows no clear reason, support, or preference

for one of these explanations in the light of investment decision-making. The works of Brooks et al. (2014) and Smith & Viceisza (2018) are focused on whether attractiveness influences investment decisions, but not how this bias affects elements typically considered by business angels in early-stage investment decisions. Introducing additional mediating concepts business angels consider in investment decisions in research could untangle the inconsistent results of beauty premium-related research.

In conclusion from our review of relevant literature, we find that there is a critical gap in the literature on the influence of attractiveness on early-stage investment decisions. Prior literature has shown that attractiveness bias is of importance in early-stage investment decisions, even more so among business angels. However, when taking into account the inconsistency in expectations versus findings, the variety of possible explanations for this phenomenon, existing research or their methodologies are not sufficient to allow adopting proposed explanations. We observe a critical gap in existing research in uncovering the underlying mechanisms of this bias, failing to explain how this bias works and how it relates to investment criteria business angels typically consider in their decision-making.

Hypothesis Development

Aiming to uncover the mechanisms through which attractiveness influences investment decisions, we designed the research to include two hypothesized mediated effects as visualized in Figure 1. We include the sex of the entrepreneur moderating these mediated effects. In this chapter, we provide an extensive development of these hypotheses. Based on Huang & Pearce (2015), we include trustworthiness as a perceptive, entrepreneur-related criterion and business viability as an objective criterion, two elements considered by business angels in their decision-making.

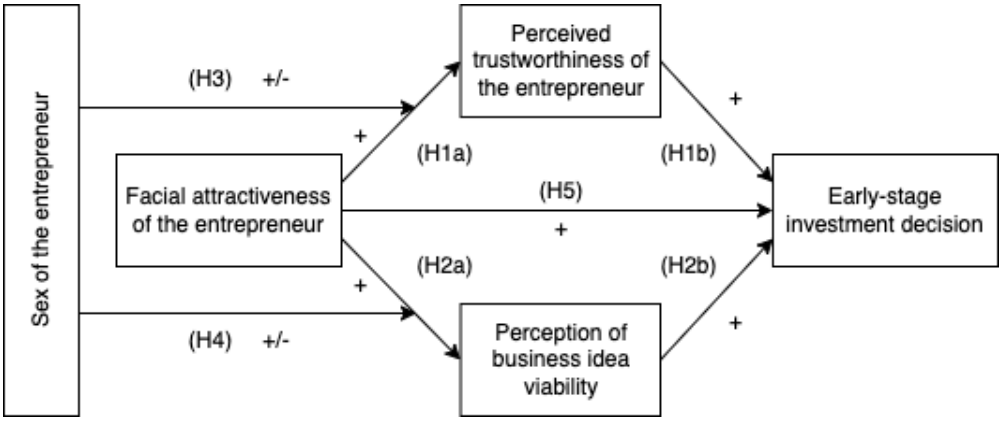

Figure 1 Conceptual model

<u>Trustworthiness in investment decisions</u>

While business angels are typically more involved with their investment than venture capitalists, they still face agency issues (van Osnabrugge, 2010). Given the fact that business angels often have an investment portfolio of several ventures, they are imposed by time constraints and rely on existing entrepreneurial and managerial structures. Economists refer to this behavior as principal-agent theory. The entrepreneur acts as an agent on behalf of the investor, the principal, in ensuring that the investment becomes effective, which poses a risk to business angels due to an *agency problem*. That is, conflicting interests of principals and agents. Agency problems are common in

organizations, as managers and stockholders often have conflicting goals (Eisenhardt, 1989). While typically entrepreneurs and business angels both hold equity, conflicting interests still prevail, e.g., exit orientation, employer responsibility, future business developments, and other impactful strategic decisions (van Osnabrugge, 2010).

What's more, is that business angels tend to have a less diverse and smaller portfolio compared to those of venture capitalists, which leads to risks (such as agency problems) having bigger impact on an individual investor (Mason & Stark, 2004). Business angels are aware of these increased risks and employ risk-reducing strategies to reduce exposure to and impact of risks (Paul et al., 2007). In the scope of this research, we conceptualize trustworthiness with that of interpersonal trust, that is, one's beliefs about reliability, emotional trust, and honesty of an individual (Rotenberg, 2010). Because trust is an essential ingredient in both reducing agency problems as well as the belief that an agency problem can occur, we believe that business angels tend to rely on their sense of an individual's trust to reduce this risk. By verifying interpersonal trust, they conform to stewardship theory as opposed to agency (Davis et al., 2018). It simply allows them to sleep at night, since their investment is in good hands. Therefore, we introduce hypothesis H1b:

H1b: An increase in perceived trustworthiness of the entrepreneur is positively related to the probability of acquiring funding, as well as the amount invested.

Attractiveness creating trustworthiness

Sociologists have identified that attractiveness is associated with positive traits through stereotyping (Berscheid & Walster, 1974; Dion et al., 1972; Eagly et al., 1991; Gillen, 2016). We integrate this stereotyping using social identity theory. We argue that people tend to categorize these attractive individuals into a group associated with this stereotype of 'success' (Eagly et al., 1991). Individuals

who perceive themselves as attractive may show in-group conformity, in which in-group members secure group membership by social interactions and relationships (Ellemers et al., 2003). On the other hand, individuals that aspire in-group membership, or identify themselves with this in-group but lack recognition, try to build relationships with in-group members to become member of this in-group (Turner, 1975).

The common element of both in-group ("attractive / success") and out-group ("average / less success") members is that they both desire recognition and a connection with in-group members. Sociologists identify trust as one of the most important elements in these interpersonal relationships - our social connections depend on the existence of trust, and building trust depends on developing a connection (Ferrin et al., 2003). Therefore, we hypothesize that exhibiting attractiveness attracts others' desire to become recognized by this individual in the in-group, which requires us to develop a social connection with this individual. To allow this social connection to be more easily made, we unknowingly bias our perception of trust, overruling any rational assessment of whether we can judge an individual to be trustworthy. Thus, this brings us to our first hypothesis, H1a:

H1a: Facial attractiveness of the entrepreneur is positively related to the perceived trustworthiness of the entrepreneur.

Business viability in investment decisions

Prior literature has confirmed that the business itself or how the business is modeled to create value for investors is of importance in investment decisions. For example, Sudek (2006) showed that expectations on business model-related characteristics such as profit margins or market competition highly influence investment decisions. We also see the perception of other business and product-related characteristics reflected in investment criteria (Bachher & Guild, 1996; Mason & Stark, 2004). Investors do so because they want to make a return on their investment, for

example through dividends, but mostly through a planned exit (Botelho et al., 2021). To make a return on their investment, the venture they invest in must therefore increase in value to allow a successful 'exit' or provide substantial profits over time.

This return leads investors to require a certain belief that the business can thrive in future market conditions. This 'thriving' is mainly dependent on the competitive advantage of the business: whether the business offers a unique, promising product, or the business delivers an existing product in a more efficient way, this advantage over alternative products or businesses is essential (Lee & Hsieh, 2010). In their decision-making process, business angels assess this competitive advantage by evaluating product and market characteristics, the future value of it ("sustained competitive advantage") and weigh opportunities with both internal and external risks (Mason & Stark, 2004; Paul et al., 2007; White & Dumay, 2020). If they believe that these characteristics related to the product or business outweigh possible future risks, future returns are more likely. We group cognitional thoughts and hard data leading to future predictions of investment success under 'business viability' – that is, the belief that a business will thrive in the future based on the current idea and model, in line with Huang & Pearce (2015). We then hypothesize:

H2b: An increase in perceived viability of the business is positively related to the probability of acquiring funding as well as the amount invested.

Attractiveness increasing business viability

The vast amount of ex post research on attractiveness, specifically the identified correlations between attractiveness and perceptions of positive qualities, suggests that we seem to believe that this attribution of positive qualities has existed in the past for this individual (Eagly et al., 1991). We humans tend to believe that attractive people are in possession of these positive qualities and

this increase in ability, that this assessment is not just a snapshot and that they characterize this individual – we thus truly believe an attractive person is successful (Berscheid & Walster, 1974; Carducci & Ogan, 1983).

When integrating this with the representativeness heuristic of the *hot hand effect* identified in behavioral research, investors falsely project this perception of success, positive qualities, and heightened ability on future decisions (Ayton & Fischer, 2004). Thus, future success is more likely because of this past success. The signaling of prior success, combined with this hot hand effect, may lead investors to believe that this past success increases the ability of the entrepreneur to sustain or increase future competitive advantage of the business. If the venture encounters future difficulties, an increase in ability could allow the entrepreneur to make the right decisions based on this increase in entrepreneurial competence (Erikson, 2002). Any future risks identified by the investor in his assessment of the investment opportunity could be perceived as having less impact due to this increased ability, believing that the increase in entrepreneurial skills compensates for risks threatening business viability. Thus, we hypothesize the following:

H2a: Facial attractiveness of the entrepreneur is positively related to the perceived viability of the business.

Gender-specific effects on trustworthiness and business viability

Sociological research has hinted at gender-specific effect sizes for attractiveness bias, for example when affirming relations (Murphy et al., 2014). Prior research has shown that the effect of facial attractiveness on investment decisions is gender-specific considering the entrepreneur (Brooks et al., 2014). We extend these findings conceptually for both trustworthiness and business viability, explaining how we suspect different mechanisms at play for female and male entrepreneurs.

For trustworthiness, we take on an evolutionary perspective of attractiveness. A large body of research has shown that attractiveness signals good genes (Barber, 1995; Gangestad, 1993). In

prior times, these good genes signaled strength, which was a crucial element to ensure survival (Hönekopp et al., 2007). Humans tended to group around these males exhibiting good genes and thus strength (Boehm, 2000; Savin-Williams, 1977). The ability of strength and the possession of good genes thus results in credibility in leadership through this dominance. We find it natural that these "alpha" males were leaders, trusting that we survive under their leadership (van Vugt & von Rueden, 2020).

We argue that this remnant of our animalistic origin and primitive times as a species has resulted in association of attractiveness with this credibility, and that this credibility has evolved into an association with trust because of the similarities between these constructs, explaining results of Van 't Wout & Sanfey (2008). Because other biases and effects result from evolutionary origins (Kenrick et al., 2015), we expect that the effect of attractiveness on judgments of trust is thus stronger for males than for females, as primitive humans tended to have male leaders. We hypothesize:

H3: The relationship between facial attractiveness and investors' perception of the trustworthiness of the entrepreneur differs for male entrepreneurs pitching compared to female entrepreneurs.

We take a different line of reasoning for the perception of business viability, covering the four possible combinations. Attractive females signal good genes to male investors, which can lead these males to become blind sighted because of evolutionary mating preferences (Barber, 1995; Gangestad, 1993). They unconsciously start desiring favorable, social responses, ensuring that they do not exert negativity on the female to increase their chances (Bhogal et al., 2016). We believe this leads to more complimenting behavior and praise, as opposed to critical judgements, in line with (Bar-Tal & Saxe, 1976). Through the underestimation of associated risks, male investors overestimate the viability of the business for female entrepreneurs.

If we compare this to attractive males pitching to female investors, we must conclude that this does not hold in reverse. Males tend to overestimate interest of females (Abbey, 1982), which shows that this effect may well be stronger for attractive female entrepreneurs pitching to male entrepreneurs.

When considering attractive female entrepreneurs interacting with female investors, attractiveness signals success and a desirable in-group, as mentioned in Hypothesis H1a. We expand upon this reasoning for Hypothesis H4. Investors either want to join this in-group that signals success, desiring group membership, or exhibit in-group conformity, maintaining group membership. The desire to join an in-group leads to an increase in complimenting behavior and praise, which we connect to a more positive evaluation of the business's viability due to underestimation of risks. If the investor identifies with the in-group of the attractive person, this in-group conformity leads to mirroring behavior of the entrepreneur's opinions and behavior. This mirroring behavior is stronger when the investor considers herself to be less attractive and feels threatened by this competition. Because entrepreneurs often take on a more positive outlook, this mirroring can result in underestimation of risks as well.

We believe that this latter effect is weaker for attractive males pitching to male investors, because females tend to be more sensitive to social exclusion (Benenson et al., 2011, 2013), leading males to exhibit less in-group conformity compared to females. Thus, we expect the effect of attractiveness on business viability being stronger for female entrepreneurs pitching to both male investors and female investors, which leads us to hypothesis H4:

H4: The relationship between facial attractiveness and investors' perception of the viability of the business differs for male entrepreneurs who pitch compared to that of female entrepreneurs.

Direct effect of attractiveness

We know that the beauty premium is highly context-specific and that sometimes its presence or the lack thereof is unexpected (Eagly et al., 1991). Because investment opportunities often are accompanied with a lot of complex information, early-stage investment decisions are inherently complex (Maxwell et al., 2011). Business angels rely on their assessment of specific elements, distilling criteria they require to offer an investment. When specifically focusing on a single element considered in the decision-making process, we believe that elements act as if they each reside in their own context. The vast number of criteria and the variability in personal preference regarding these criteria simply do not allow researching the specific effect of attractiveness on all criteria weighed.

However, we do believe that other elements in the decision-making process are influenced by attractiveness as well. The association of positive traits with attractiveness for entrepreneurs could spill-over to other concepts through either associative beliefs or psychological states through the attractiveness-positivity link (Mello & Garcia-Marques, 2018). For example, spill-over to other personal traits next to trustworthiness, to psychological constructs (e.g. mood, feelings and emotions of the investor), to behavioral constructs (e.g. attitude, intention) or other subconscious evaluations not explicitly expressed by investors. We call this spill-over of the attractiveness-positivity link "rose-glass attractiveness", referring to the metaphor of taking on an overly optimistic view.

We hypothesize that there are other mechanisms through which attractiveness also affects investment decisions because of this "rose-glass attractiveness", not captured by the entrepreneur's trustworthiness or its business viability. Thus, this leads us to hypothesis H5:

H5: Facial attractiveness of the entrepreneur is positively related to the probability of acquiring funding as well as the amount invested.

Methodology

To establish meaningful answers to the formulated research question, a quantitative approach is adopted. We are particularly interested in the intention to fund, the extent to which a funding request is met by a business angel and how facial attractiveness influences this decision-making process. Adopting a quantitative research methodology allows us to gain insights into both effect size and effect power. The research is designed as an online experiment in which respondents take part in a simulated investment pitch. We design the experiment as such to contain four manipulated conditions. In these manipulated conditions, both the biological sex and the facial attractiveness of the presenter are manipulated. This section covers our experimental design and outlines our approach by discussing our sampling strategy, the experimental tasks, procedures, conditions and measures/variables used to ensure both validity and reliability.

Experimental design

Participants take part in an online survey, allowing to source respondents from the participant platform Prolific. This survey, included in Appendix A, takes 6 minutes to answer on average. In this section, we elaborate on the design of this experiment.

Power analysis

To support the choice for a specific sample size, a power analysis for the main analysis method, multiple regression, was conducted.

As for the regression models, a total maximum number of 8 predicting variables have been defined. Two variables represent the experimental condition, one variable represents the interaction effect, and five other variables allow controlling for other demographics and individual characteristics. Assuming a medium effect size of $f^2 = 0.15$ ($\alpha = 0.05$, power = 0.8, predictors = 8),

we need a minimum of 108 respondents to establish meaningful claims about the effect of facial attractiveness in early-stage business angel investment decisions (Cohen, 2013; Soper, 2022). If f^2 increases to $f^2 = 0.02$, considered by Cohen (2013) as a small effect, a minimum of 759 respondents would be needed.

In the context of this research and prior literature as outlined in the literature review, we assume the presence of a medium effect size, resulting in a minimum needed number of 108 respondents. To further strengthen the reliability and validity of the research and to account for a smaller effect size, we introduce an additional number of respondents as a safety measure, resulting in a target sample size of n = 200.

Screening requisites

To ensure generalization and representation of the research's object of study, the participant platform used was configured to require participants having prior experience in the field of investing. In addition to this, we screened participants on having an immaculate reputation on Prolific by requiring participants to have a 100% approval rate on earlier studies in which they participated. We also included several attention checks that participants had to answer correctly for both receiving their pay-out and inclusion in the results we use in our analyses. These attention checks are observable in the survey outline attached as Appendix A.

Experimental task and manipulations

Participants are guided through an online survey which is in fact a between-subjects experiment. A between-subjects design is adopted, as it ensures no experience or practice is gained during the experiments, improving independency of observations (Charness et al., 2012). The experiment is designed to include four manipulated conditions, being a male presenter not exhibiting facial

attractiveness, a male presenter exhibiting facial attractiveness, a female presenter not exhibiting facial attractiveness, and a female presenter exhibiting facial attractiveness.

Each condition is visualized by a still image of a male or female presenter and a short video in which the opportunity is pitched using slides and the corresponding narration. Both the narration of the presentation and the slides contain the same content, which is based off a realistic business opportunity sourced from TechLeap, a Dutch platform focused around empowering both start-ups and scale-ups. The slide deck of this pitch is included in Appendix B. The pitch has been designed such that it takes short of 3 minutes to watch fully to ensure participants maintain their attention span. We hired both male and female native British-English speakers with neutral accents, controlling for difference in accents/pronunciation or possible grammatical errors. The script of the narration can be found in Appendix C.

We used the MEBeauty dataset of Lebedeva et al. (2021), containing facial images and pre-tested attractiveness scores from a non-overlapping sample. Following Langlois et al. (2016)'s research om averageness versus attractiveness, we choose cut-offs for the attractive conditions ranging from 8+ onward and for the average conditions ranging from 5-6. We then selected three images per treatment based on the requirements of having the subject look at the camera, the image's color not to have been edited excessively and having the subject's face fully in frame. The selected images are included in Appendix D. To ensure the still images of both the male and female presenter are actually perceived as attractive or average, subjects of the experiment are asked to assess the attractiveness of the presenter in their assigned condition as well to allow manipulation checking for supporting the necessary assumptions allowing us to inferring claims concerning hypotheses H1 to H5.

Procedure

Having started the survey, participants are informed on the level of anonymity, the masked general purpose of the survey and which general parts the survey contains.

After being introduced to the survey, participants are assigned to one of the four groups corresponding to the manipulated conditions. Participants are instructed to watch the presentation and are obliged to watch the pitch fully before continuing to the next section is possible. Next to the video containing the slide deck, participants are randomly assigned to one of the three images selected per condition. Following the pitch, participants are first instructed using investment instructions provided by Van Balen et al. (2019) and subsequently guided into the actual questionnaire, in which they cannot go back to previously submitted sections. Participants are asked to answer whether they want to invest and to what extent they want to meet the funding request of the presenter. In the next section, participants are asked to assess the trustworthiness of the entrepreneur. Following, participants are asked to assess the attractiveness of the entrepreneur. The initial picture that accompanies the video is also shown in the section containing the investment decision, the section containing business viability perception, the section containing trustworthiness perception, and the section containing manipulation checks to maximize treatment exposure.

The last section of the survey is divided into a part in which participants fulfill informational needs regarding the variables controlled and a part in which the demographics of the participants are collected. Finally, participants are thanked and redirected back to the Prolific website.

Conditions

Participants are randomly assigned to one of the following four conditions.

Condition 1

In this condition, participants watch the pitch, narrated by a male voice. A still picture randomly drawn of the average male presenter pool is shown next to the pitch.

Condition 2

In this condition, participants watch the pitch, narrated by a male voice. A still picture randomly drawn of the attractive male presenter pool is shown next to the pitch.

Condition 3

In this condition, participants watch the pitch, narrated by a female voice. A still picture randomly drawn of the average female presenter pool is shown next to the pitch.

Condition 4

In this condition, participants watch the pitch, narrated by a female voice. A still picture randomly drawn of the attractive female presenter pool is shown next to the pitch.

Variables and measures

Independent

The use of two binary independent variables, being *Biological sex of the presenter (0 = male, 1 = female)* and *Facial attractiveness (0 = not exhibiting, 1 = exhibiting)* naturally results in the four manipulated conditions as mentioned before.

	Male	Female
Not exhibiting facial attractiveness, facial averageness	**Condition 1**	**Condition 3**
Exhibiting facial attractiveness	**Condition 2**	**Condition 4**

Additionally, we include the interaction effect of the average/attractive and male/female treatments as an independent variable.

Dependent

We operationalize the early-stage investment decision of a business angel using whether they are willing to invest in the opportunity (*Willing to invest (0 = no, 1 = yes)*) and to what extent (*Investment amount (0 – 2,000,000)*. The use of two dependent variables, one binary and one ratio, allows us to both perform analyses on an increase or decrease in probability of getting early-stage investment by a business angel and to analyze whether the amount of funding differs between the manipulated conditions.

Additionally, we operationalize the trustworthiness of the entrepreneur using a 5-point Likert scale (*Trustworthiness (0 = not to be trusted, 4 = highly trusted)*) measured using a multi-item measure including elements of Ohanian (1990)'s scales related to trustworthiness with additional synonyms relevant in entrepreneurial relations.

Finally, we operationalize the viability of the business by asking participants on a 5-point Likert scale (*Business viability (0 = not viable, 4 = highly viable)*) whether they agree with statements on

the business model itself, whether the business could become successful and if they consider the business idea an attractive investment opportunity.

Manipulation checks

To verify the assumptions made about facially attractive or unattractive entrepreneurs, the attractiveness as perceived by the subject is operationalized as well using a 5-point Likert scale. (*Attractiveness entrepreneur (0 = not at all, 4 = very attractive)*). We measure this variable using a multi-item measure incorporating elements and synonyms of previously developed and confirmed attractiveness scales (Li et al., 2021; Ohanian, 1990).

Control

To control for other factors possibly influencing the investment decision, we add several demographics and other variables such as age (*Age (ratio variable, free input)*), investing experience (*Investing experience (ratio variable, free input))*, biological sex (*Biological sex of participant (0 = male, 1 = female)*). Additionally, we introduce the variables whether participants demonstrate risk-taking or risk-averse behavior by asking them their preference for either winning $ 1,000 dollar for sure or having a 50% chance of receiving $ 2,000 using a 10-point sliding scale (*Risk preference (0 – 10).*

Analysis

Survey data is transformed to allow statistical analysis in both STATA and R. Having excluded participants failing to meet attention checks, we conduct both an Exploratory Factor Analysis and a Confirmatory Factor Analysis to ensure the reliability and validity of scales implemented in the survey design. Next to this, we verify our manipulations using two-way ANOVA and post-hoc contrast analysis. We present both pairwise Pearson correlations and descriptive statistics, as well as an overview of our dependent variables per experimental condition.

The use of two dependent variables allows us to run two general analyses per mediating variable, allowing us to answer the research question accordingly. The binary dependent variable whether a venture is funded is analyzed using logistic regression, allowing us to identify both effect size and significance of our variables in predicting the likelihood of a business receiving funding. We analyze the amount of funding investors would offer for a 20% stake in equity using a log-linear regression.

Reporting of regressions is done using nested regression tables partially generated by the 'asdoc' package for STATA (Shah, 2021), allowing us to observe the consequences of introducing additional variables in our models. To support the results of the regression models and to infer causality, we conduct an additional causal mediation analysis using the 'mediation' package for R (Tingley et al., 2014) allowing us to further inspect the balances between direct and mediated effects.

Results

This section will cover the analysis of our collected data and primarily focuses on identifying statistical evidence for the hypotheses proposed in the chapter

Hypothesis Development. We first start with both an Exploratory Factor Analysis and subsequently a Confirmatory Factor Analysis to verify both the overall reliability and validity of the scales used as well as the reliability and validity in this particular research setting. Then, confirmed factor structures are averaged to create scales, which are used in our manipulation checks to verify the assumptions on our experimental conditions using two-way ANOVA and post-hoc contrast analysis. Following our manipulation checks, we present general descriptive statistics, an overview of our dependent variables per treatment, and pairwise Pearson's correlations. Next, we test our hypotheses using both Ordinary Least Squares and Logistic regression analysis using a main effects model and multiple regression models for both mediators. This is then supported by a Causal Mediation Analysis and subsequently a robustness analysis.

Exploratory Factor Analysis

To explore the factorial structure of the multi-item measures assessing the presented business viability as well as the trustworthiness of the entrepreneur presenting the business we conducted an Exploratory Factor Analysis with oblique promax rotations, assuming interfactor correlation. Bartlett's test of sphericity χ^2 (df = 28) = 1492.822 ($p < 0.001$), confirming oblique rotations are adequate. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.900, supporting that the data is suited for factor analysis. Factors are extracted using Principal Axis Factoring due to non-normal distributions of items. We explored additional factor structures by researching the expected factor structure of two factors as well as a one factor and three factor solution.

The one-factor solution as displayed in Table 1 loaded items on a factor with an eigenvalue of 4.81765, accounting for 92,68% of variance. The unrotated eigenvalues of a second and a third factor are 0.71074 and 0.06899 respectively. Oblique promax rotation resulted in eigenvalues of 4.18502 and 4.00412 in the two-factor solution, accounting for 80,51% and 77,03% of variance, respectively. The rotated three-factor solution showed eigenvalues of 4.12632, 4.00858 and

0.15307, accounting for 79.38%, 77.11% and 2,94% in variance, respectively. Based on Kaiser's criterion for retaining factors with eigenvalues greater than 1, we find that our expected two-factor solution yields the best fit.

Table 1 EFA - Rotated one-factor model solution

Items	Factors	Dimension
	1	
Solid and promising business model	**0.795**	**Attitude**
Attractive opportunity	**0.818**	
Will become successful business	**0.838**	
Credible entrepreneurial reputation	**0.706**	
Entrepreneur is trustworthy	**0.705**	
Would trust him/her with funds	**0.830**	
Would handle funds responsibly	**0.771**	
Entrepreneur is an honest person	**0.732**	

Notes: Extraction method: principal axis factoring; Rotation method: oblique promax without Kaiser normalization. Loadings larger than .40 are bold.

Table 2 EFA - Rotated two-factor model solution

Items	Factors		Dimension
	1	2	
Solid and promising business model	0.064	**0.822**	**Business viability**
Attractive opportunity	0.029	**0.884**	
Will become successful business	0.061	**0.873**	
Credible entrepreneurial reputation	**0.638**	0.133	**Trustworthy**
Entrepreneur is trustworthy	**0.798**	-0.032	
Would trust him/her with funds	**0.658**	0.251	
Would handle funds responsibly	**0.701**	0.141	
Entrepreneur is an honest person	**0.810**	-0.015	

Notes: Extraction method: principal axis factoring; Rotation method: oblique promax without Kaiser normalization. Loadings larger than .40 are bold.

Table 3 EFA - Rotated three-factor model solution

Items	Factors	Dimension

	1	2	3	
Solid and promising business model	0.057	**0.835**	-0.037	
Attractive opportunity	0.036	**0.866**	0.078	**Business viability**
Will become successful business	0.056	**0.880**	-0.018	
Credible entrepreneurial reputation	**0.625**	0.158	-0.053	
Entrepreneur is trustworthy	**0.785**	-0.006	-0.046	
Would trust him/her with funds	**0.678**	0.209	0.205	**Trustworthy**
Would handle funds responsibly	**0.717**	0.105	0.183	
Entrepreneur is an honest person	**0.804**	-0.002	0.006	

Notes: Extraction method: principal axis factoring; Rotation method: oblique promax without Kaiser normalization. Loadings larger than .40 are bold.

Confirmatory Factor Analysis

To verify the reliability and validity of the scales in this particular research setting, an additional Confirmatory Factor Analysis was conducted. We both modeled the factor analysis using a one-factor approach and a two-factor approach, the latter allowing covariance between the latent variables, visualized in Figure 2 and Figure 3. The latent variables were restricted to have a mean of 0 and a standard deviation/variance of 1. These models were then estimated using the maximum-likelihood method.

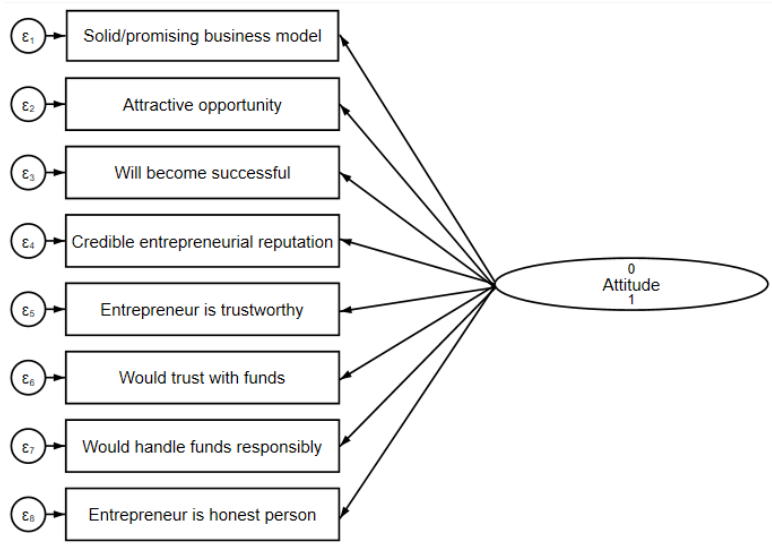

Figure 2 CFA - One-factor structure with maximum likelihood estimation

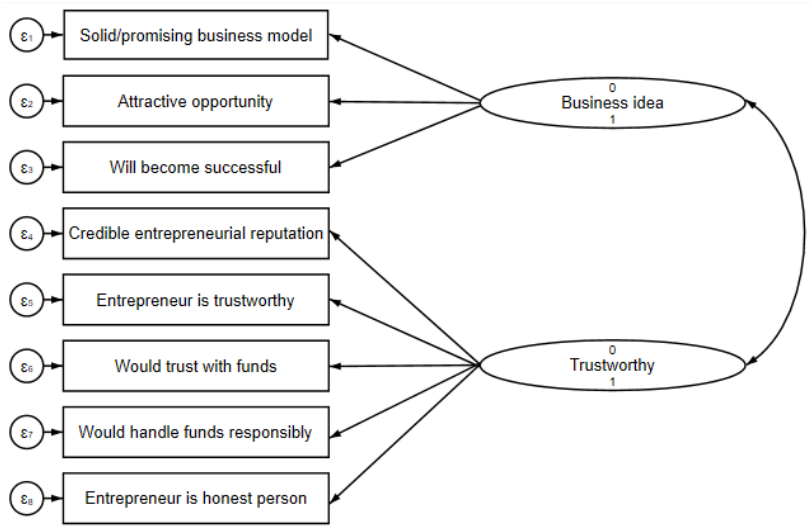

Figure 3 CFA - Two-factor structure with maximum likelihood estimation

Table 4 reports the coefficients, z-values, standard errors, 95% confidence intervals and p-values for all hypothesized relationships in all models.

Table 4 CFA - Results

Item	Coefficient	z-value	Standard error	p-value	95% CI
One-factor model					
Solid and promising business model	0.8415798	35.95	0.0234093	< 0.001	0.7956983 – 0.8874612
Attractive opportunity	0.8654616	39.42	0.0219525	< 0.001	0.8224355 – 0.9084877
Will become successful business	0.8802258	41.97	0.0209716	< 0.001	0.8391222 – 0.9213294
Credible entrepreneurial reputation	0.6655673	16.97	0.0392224	< 0.001	0.5886929 – 0.7424418
Entrepreneur is trustworthy	0.637365	14.58	0.0429104	< 0.001	0.5532622 – 0.7214677
Would trust him/her with funds	0.7930887	27.39	0.0289558	< 0.001	0.7363362 – 0.8498411
Would handle funds responsibly	0.7233545	20.29	0.0356499	< 0.001	0.6534821 – 0.793227
Entrepreneur is an honest person	0.6652169	16.32	0.0407622	< 0.001	0.5853244 – 0.7451094
Two-factor model					
Solid and promising business model	0.872568	48.78	0.0178865	< 0.001	0.837511 – 0.907625
Attractive opportunity	0.9102106	62.94	0.0144625	< 0.001	0.8818646 – 0.9385565
Will become successful business	0.9345228	74.32	0.0125736	< 0.001	0.909879 – 0.9591666
Credible entrepreneurial reputation	0.7258211	21.52	0.0337337	< 0.001	0.6597043 – 0.7919379
Entrepreneur is trustworthy	0.7552258	24.19	0.0312172	< 0.001	0.6940413 – 0.8164104
Would trust him/her with funds	0.8609016	40.14	0.0214485	< 0.001	0.8188634 – 0.9029398
Would handle funds responsibly	0.819375	32.84	0.0249512	< 0.001	0.7704715 – 0.8682785
Entrepreneur is an honest person	0.7858865	27.73	0.0283393	< 0.001	0.7303424 – 0.8414306

Notes: In the one-factor model, all items were loaded on one factor. In the two-factor model, items (1), (2), and (3) were loaded onto one factor, while items (4) to (8) were loaded onto a separate factor.

After model estimation, we obtained goodness-of-fit statistics visualized in Table 5. The two-factor model clearly outperforms the one-factor model comparing CFI and TLI. In the one-factor model, they are below the 0.95 cut-offs proposed by Hooper et al. (2007), whereas the two-factor model exceeds these cut-offs. Moreover, RMSEA, a common measure for assessing informative fit indices, shows a value of 0.080 for the two-factor model, which is considered to be of good fit. RMSEA values above 0.10 are considered to be of poor fit, which would apply to the one-factor model (Hooper et al., 2007).

Table 5 CFA - Goodness-of-fit statistics

Fit statistic	One-factor model	Two-factor model
Chi2 (df)	303.955	49.51
	(20)	(19)
RMSEA (90% CI)	0.238	0.080
	(0.215 – 0.262)	(0.053 – 0.108)
AIC	4061.926	3809.479
BIC	4146.632	3897.715
CFI	0.810	0.980
TLI	0.734	0.970
SRMR	0.097	0.034
CD	0.933	0.988

Notes: df = Degrees of freedom; RMSEA = Root Mean Squared Error of Approximation, CI = Confidence interval; AIC = Akaike's Information Criterion; BIC = Bayesian Information Criterion; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardized Root Mean squared Residual; CD = Coefficient of Determination

Next to this, we calculated the heterotrait-monotrait ratio of correlations (HTMT) using the pairwise correlations of measure items. Our model shows discriminant validity with HTMT = 0.732, well below the most conservative HTMT cut-off of 0.85 proposed by Henseler et al. (2015). Following our Confirmatory Factor Analysis, we averaged the items corresponding to the factor loadings from the two-factor model with equal weights into two scales (*Business viability*, *Trustworthiness*). These scales are subsequently used in further analyses and statistics in this section.

Manipulation checks

To verify whether our manipulations in the experimental conditions were effective, several manipulation checks have been conducted. Pearson's correlation between the independent dummy variable of the attractive condition and the variable that measures perceived attractiveness shows that both are not independent ($r = 0.3400$, $p < 0.001$). Additionally, two-way ANOVA of our attractiveness measure versus our two independent variables indicating average or attractive condition and male or female entrepreneur showed that both independent variables affect the latent variable attractiveness ($F(1, 251) = 36.13$, $p < 0.0001$; $F(1, 251) = 24.81$, $p < 0.0001$; respectively), but no interaction effect is present ($F(1, 251) = 0.66$, $p = 0.4186$). On average, female entrepreneurs

scored higher on the latent variable of attractiveness compared to male entrepreneurs, as visualized in the graph shown in Figure 4. As can be observed in this figure, the slopes are similar, visualizing the absence of an interaction effect.

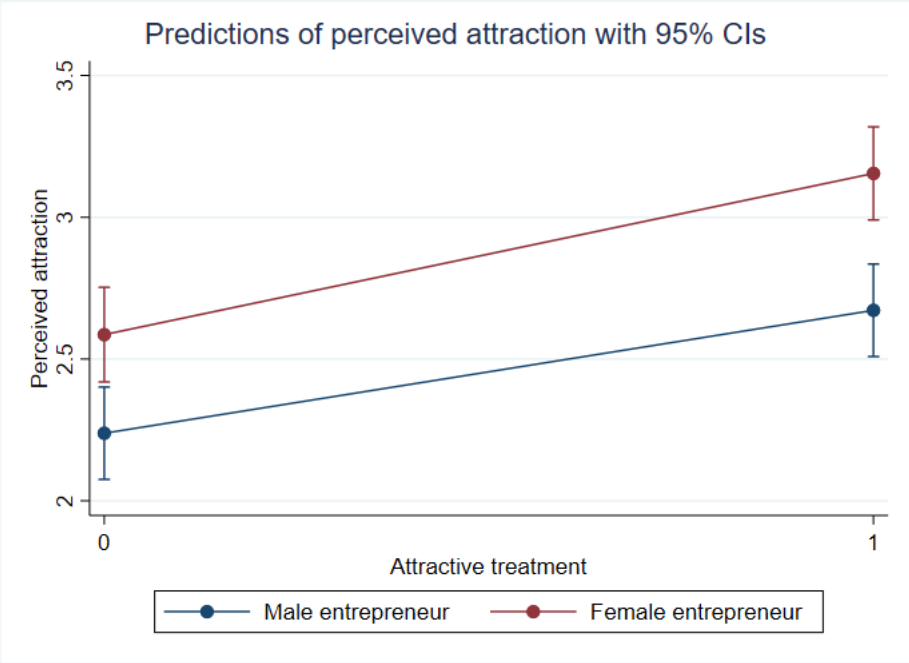

Figure 4 Predictions of latent attraction per manipulation

Post-hoc contrast analysis shows that for the variable of perceived attractiveness, significant mean differences exist between all experimental conditions except the contrast between an attractive male entrepreneur versus an average female entrepreneur (mean diff. = 0.085, S.E. = 0.118, t = 0.72, p = 1.000; Bonferroni-adjusted). This was expected due to the overall perceived higher attractiveness of female entrepreneurs compared to male entrepreneurs. Four comparisons of interest, being attractive female entrepreneurs to average female entrepreneurs (mean diff. = 0.569, S.E. = 0.119, t = 4.78, p < 0.001; Bonferroni-adjusted), attractive male entrepreneurs to average male entrepreneurs (mean diff. = 0.434, S.E. = 0.117, t = 3.71, p = 0.002; Bonferroni-adjusted), average male entrepreneurs to average female entrepreneurs (mean diff. = 0.348, S.E. = 0.119, t = 2.94, p = 0.022; Bonferroni-adjusted) and attractive male entrepreneurs to attractive female

entrepreneurs (mean diff. = 0.483, S.E. = 0.117, t = 4.11, p = 0.000; Bonferroni-adjusted) are all significant and thus we can establish the success of our experimental manipulations.

Descriptive statistics

Having confirmed our factor structure, reducing multi-item measures to scales and establishing the effectiveness of our manipulations, we present descriptive statistics of the sample (N = 252) in Table 6 and Table 7.

First, we observe that our sample tends to be risk-averse (mean = 2.02, S.D. = 2.193). Additionally, we find that our sample has on average short of 11 years of experience in investing of any sort (mean = 10.81, S.D. = 10.882). As *Business viability, Trustworthiness* and *Perceived attraction* all are measured on 5-point Likert scales, we observe that our sample believes the business is viable (mean = 2.69, S.D. = 0.977), the trustworthiness of the fictious entrepreneurs (mean = 2.783, S.D. = 0.676) and the average perceived attractiveness of the fictious entrepreneurs (man = 2.662, S.D. = 0.735) are all slightly more than the average.

This slightly positive assessment of the viability of the business is reflected in the dependent variable that indicates whether respondents would invest in the business (mean = 0.772, S.D. = 0.449), since 72.2% of the respondents shows intention to fund. Furthermore, we see that respondents generally do think that the business is valued too high, as the average investment in return for 20% equity is $ 717,749.58 compared to the asked $ 2,000,000 (mean = 717749.58, S.D. = 540293.186).

As for demographics, we note that the average age of respondents is 44 years, while the sample comprises of 127 male respondents and 125 female respondents.

Table 6 Descriptive statistics

Variable	N	Mean	Median	Std. Dev.	Min	Max
Would invest (0 =No, 1 = Yes)	252	.722	1	0.449	0	1
Investment in return for 20% equity	252	717749.58	800000	540293.186	0	2000000
Risk preference (0 = Risk-averse, 10 = Risk-seeking)	252	2.02	1	2.193	0	10
Years of investing experience	252	10.81	5	10.882	0	40
Age	251	43.972	43	14.338	18	75
Sex (0 = Male, 1 = Female)	252	.496	0	0.501	0	1
Business viability	252	2.69	3	0.977	0	4
Trustworthiness	252	2.783	2.8	0.676	.6	4
Perceived attractiveness	252	2.662	2.75	0.735	.5	4

Table 7 Frequencies and percentages of dummy variables

Variable	0 (% of Total)	1 (% of Total)
Would invest (0 =No, 1 = Yes	70 (27.78%)	182 (72.22%)
Sex (0 = Male, 1 = Female)	127 (50.40%)	125 (49.60%)

Additionally, we present an overview of our two dependent variables per treatment in Table 8. Comparing the treatment groups of average male entrepreneurs with attractive male entrepreneurs, we see that respondents assigned to the attractive male treatment want to invest more (mean diff. = 0.063) and a higher amount (mean diff. = 14526.39) compared to respondents assigned to the average male treatment. The same holds for our female entrepreneur treatments (mean diff. = 0.14; mean diff. = 130073.44; respectively). It should be noted that the differences in the female treatment groups are greater than in the male treatment groups. Finally, we observe that our sample is more likely to invest in male entrepreneurs, regardless of attractive treatments; however, we do not observe this in business valuations.

Table 8 Descriptive statistics of dependent variables per treatment

Treatment	Would invest		Investment amount	
	Mean	Std. Dev.	Mean	Std. Dev.
Average male entrepreneur	0.75	0.436	725631.3	569249.3
Attractive male entrepreneur	0.813	0.393	740157.69	557509.01
Average female entrepreneur	0.59	0.496	636030.43	511281.42
Attractive female entrepreneur	0.73	0.447	766103.87	523628.1

To establish some sense of the relationships between variables in our data, we include a pairwise Pearson's correlation matrix in Table 9. We observe that risk-seeking respondents are associated with a higher evaluation of business viability (r = 0.181, p < 0.01), a higher perception of trustworthiness (r = 0.172, p < 0.01) and are more likely to invest, while also wanting to invest more (r = 0.139, p = 0.03; r = 0.157, p = 0.01; respectively). In addition to this, we observe that the older one gets, one becomes less likely to invest and wants to invest less (r = -0.146, p = 0.02; r = -0.254, p < 0.01; respectively), which could be related due to the moderately significant negative correlation with perceived viability of the business (r = -0.115, p = 0.07). Furthermore, we see that being exposed to the female entrepreneur treatment is negatively related to wanting to invest, in line with the results in Table 8 (r = -0.134, p = 0.03).

Regarding the attractive treatment, we see a moderate significant correlation with wanting to invest in the business (r = 0.111, p = 0.08), but no significant correlations with assessments of the business viability or the trustworthiness of the entrepreneur. When considering perceived attraction, one observes that there are significant correlations with these two concepts, however, these should be interpreted with caution due to common method bias.

Table 9 Pairwise Pearson correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Would invest	1.000										
(2) Investment amount	0.527***	1.000									
(3) Attractiveness (0 = Average, 1 = Attractive)	0.111*	0.066	1.000								
(4) Entrepreneur (0 = Male, 1 = Female)	-0.134**	-0.029	0.008	1.000							
(5) Risk preference (0 – 10)	0.139**	0.157**	-0.074	-0.063	1.000						
(6) Years of investing experience	-0.019	-0.114*	-0.117*	-0.049	-0.076	1.000					
(7) Age	-0.146**	-0.254***	-0.120*	-0.034	-0.015	0.617***	1.000				
(8) Sex (0 = Male, 1 = Female)	0.137**	-0.009	0.079	0.008	-0.002	-0.023	-0.004	1.000			
(9) Business viability	0.782***	0.556***	0.068	-0.114*	0.181***	-0.037	-0.115*	0.128**	1.000		
(10) Trustworthiness	0.549***	0.424***	0.084	-0.053	0.172***	0.018	-0.053	-0.001	0.672***	1.000	
(11) Perceived attraction	0.109*	0.170***	0.343***	0.286***	0.089	-0.107*	-0.113*	-0.027	0.168***	0.262***	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Regression analysis

In our regression analysis, we first provide the results of a main effects model using regression analysis. Then, we report extended multiple regression models for both suspected mediating variables separately, aiming to present statistical consequences that occur upon introducing additional variables in the models.

Main effects model regression analysis

In Table 10, the results of the main effect regression models are presented. We note that the interaction effect of our treatments shows moderate significance in model (2) (S.E. = 0.245; p = 0.095). Additionally, we observe that for the probability of acquiring funding, model (5) shows a moderate significant effect for our attractiveness treatment, not controlling for the interaction effect (S.E = 0.287; p = 0.073). Finally, we note that the introduction of the interaction in effect in model (2) shows a moderate significant Wald's F-test against model (1).

Table 10 Simple regression analysis

	Business viability (Ordinary Least Squares)		Trustworthiness (Ordinary Least Squares)		Would invest (Logistic Regression)		Investment amount (Log-linear Regression)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	2.733***	2.833***	2.762***	2.791***	1.034***	1.099***	697206.81***	725631.3***
	(.101)	(.114)	(.073)	(.084)	(.248)	(.289)	(60750.944)	(71165.128)
Attractiveness	.134	-.068	.114	.056	.515*	.368	71375.365	14526.391
	(.123)	(.166)	(.085)	(.116)	(.287)	(.431)	(68158.554)	(99610.261)
Entrepreneur	-.223*	-.429**	-.073	-.132	-.616**	-.734*	-31353.971	-89600.871
(0=M, 1=F)	(.123)	(.177)	(.085)	(.124)	(.288)	(.389)	(68072.83)	(96682.975)
Interaction		.409*		.116		.263		115547.06
effect		(.245)		(.171)		(.578)		(136225.88)
R-squared	.018	.029	.01	.012			.005	.008
F-statistic (df1/df2) / LL (df)	2.047 (2/249)	2.176* (3/248)	1.229 (2/249)	.923 (3/248)	7.79 (2)	8.00 (3)	.661 (2/249)	.736 (3/248)
Test against competing models[b] (df)		2.80* (1/248)		0.47 (1/248)		0.21 (1)		0.72 (1/248)
AIC					295.996	297.789		

Notes: Standard errors are in parentheses. OLS and Log-linear standard errors are corrected for robustness.
aLikelihood ratio test of model fit against the null model. bFor the OLS and Log-linear regression Wald's test (F-test) was used, the logistic regressions used a likelihood ratio test ($\chi 2$ statistic)

*** p<.01, ** p<.05, * p<.1

Trustworthiness

Model (1) in Table 11 shows that the only significant predictor for trustworthiness is one's risk preference ($\beta = 0.055$, S.E. = 0.019, $p < 0.01$). After controlling for our treatment variables, we observed no significant relationships with the treatments or its interaction in the regression model (2), which leads us to reject Hypotheses H1a and H3.

Regarding the main analysis of predicting the likelihood of wanting to invest in the business, we find that female respondents are more likely to fund the venture, being a significant predictor in models (3) to (5). We observe no direct significant relationships between opting to fund the venture and the attractive condition or the interaction between treatments, whereas we do observe

a significant negative coefficient for the female entrepreneur treatments in model (4) and (5) ($\beta_{model\ 4}$ = -.792, S.E. = 0.409, p = 0.053; $\beta_{model\ 5}$ = -1.019, S.E. = 0.515, p = 0.048). Finally, we note that in model (5) trustworthiness has a highly significant effect on opting to fund the venture or not (β = 2.635, S.E. = 0.375, p < 0.01), supporting Hypothesis H1b.

When inspecting the results of the log-linear regressions on the amount of money respondents would invest for a 20% stake in equity, we see a similar significant effect for trustworthiness (β = 0.302, S.E. = 0.114, p < 0.01), further supporting Hypothesis H1b.

Inspecting all models (1) – (8) shows us that neither being exposed to the attractive treatment nor being exposed to both the female entrepreneur and the attractive treatment has a significant direct effect on the investment decision. We further analyze possible mediation of the attractive treatment through trustworthiness in our Causal Mediation Analysis.

Business viability

Table 12 reports the regression analyses executed concerning the variable *Business viability*. In model (2), we observe insignificance in our attractive treatment as a predictor, while we do see our female entrepreneur treatment having a significant effect (β = -0.413, S.E. = 0.172, p = 0.02). Special attention should be given to the interaction effect, which while it does show moderate significance (β = 0.413, S.E. = 0.241, p = 0.09), mirrors the female entrepreneur treatment effect. This could be interpreted as attractive female entrepreneurs facing less gender bias in evaluations of their business compared to average-looking female entrepreneurs, controlling for all other factors. We therefore find moderate significant support for Hypothesis H4 and partial support for Hypothesis H2a, as Hypothesis H4 is the moderation of Hypothesis H2a. The interaction effect is shown in Figure 5.

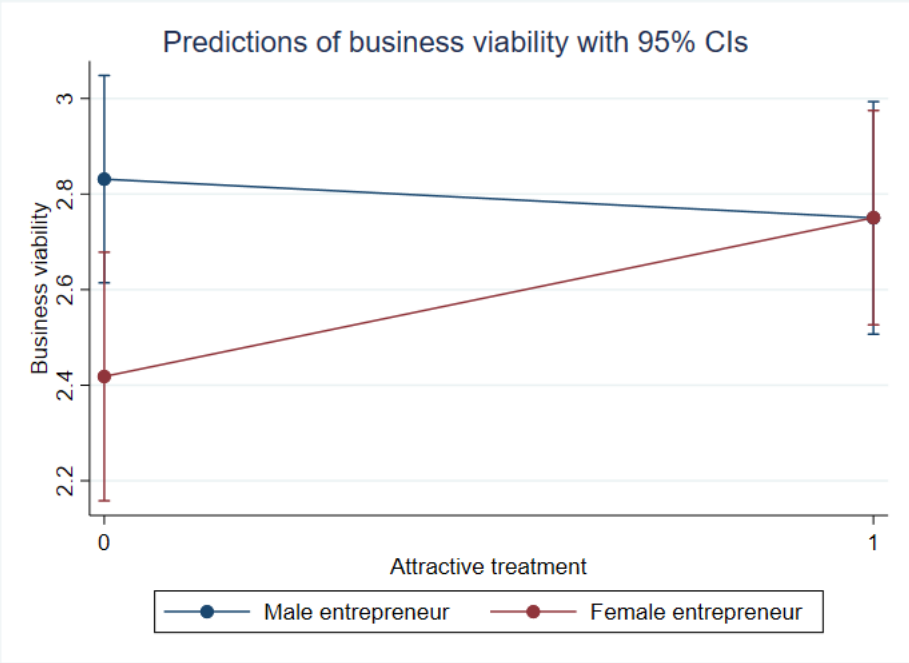

Figure 5 Treatment interaction plot for model (2) - Business viability

As for model (5), having controlled for the perception of the business viability, we see an increase in significance for our attractive treatment while observing an increase in effect size as well (β = 1.485, S.E. = 0.890, p = 0.095) compared to that of model (4) (β = 0.295, S.E. = 0.449, p = 0.511). Furthermore, we find that female treatment and its interaction effects lose significance in model (5), which leads us to believe that the effect of our treatment is partially mediated by the perception of business viability for female entrepreneurs, while we still observe the aforementioned direct effect of being exposed to attractive treatment. We also observe inconsistent mediation in models (4) and (5), as the interaction term's sign changes from positive to negative. Given the significance of the interaction effect in model (2), a change is not entirely unexpected. If treatment assignment would change, so would the viability of the business given model (2). However, as not only the magnitude changes but the sign as well, this negative direct effect stresses the need for Causal Mediation Analysis, exposing the relationship and proportions between the direct effect and the mediated effect of our attractiveness treatment.

Additionally, we observe that the perception of the business viability is a significant predictor for both deciding whether to invest or not ($\beta = 3.399$, S.E. = 0.476, $p = 0.000$) and how much respondents would offer for a 20% stake in equity ($\beta = 0.353$, S.E. = 0.126, $p = 0.006$), supporting Hypothesis H2b.

Concerning the amount investors would offer for a 20% stake in equity, we observe no significant effect for our treatments and their interaction.

Model differences

Due to the split regression approach and the multilevel operationalization of the investment decision into whether a business gets funded and to what extent the funding request has been met, we should cautiously interpret evidence for Hypothesis H5 – the direct effect of attractiveness on investment decisions. In our *Trustworthiness* regressions, we observe no significant direct effect for our attractive treatment for both the likelihood of funding the venture or the investment amount. However, we do see our attractive treatment being a moderate significant predictor ($\beta = 1.485$, S.E. = 0.89, $p = 0.095$) for the likelihood of funding the venture in our *Business viability* regressions. We do not observe this effect in the investment amount models for *Business viability*. Integrating these findings ultimately leads us to conclude that we fail to accept Hypothesis H5, given the inconsistency of the direct effect between models.

Table 11 Regression results - Trustworthiness

	Trustworthiness (Ordinary Least Squares)		Would invest (Logistic Regression)			Investment amount (Log-linear Regression)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	2.84***	2.815***	1.704***	1.828***	-4.638***	13.168***	13.039***	12.396***
	(.158)	(.18)	(.546)	(.624)	(1.121)	(.342)	(.421)	(.487)
Attractiveness		.076		.295	.109		.022	.002
		(.115)		(.449)	(.543)		(.195)	(.193)
Entrepreneur		-.113		-.792*	-1.019**		.198	.174
(0 = male, 1 female)		(.121)		(.409)	(.515)		(.212)	(.21)
Trustworthiness					2.635***			.302***
					(.375)			(.114)
Risk preference	.055***	.056***	.173**	.177**	.122	-.003	-.001	-.01
	(.019)	(.02)	(.076)	(.078)	(.092)	(.035)	(.036)	(.036)
Age	-.005	-.005	-.037***	-.036***	-.042**	-.018**	-.018**	-.018**
	(.004)	(.004)	(.013)	(.013)	(.017)	(.007)	(.007)	(.007)
Years of investment experience	.005	.006	.026	.026	.025	.006	.006	.005
	(.004)	(.004)	(.016)	(.016)	(.021)	(.006)	(.006)	(.006)
Sex	.001	-.007	.653**	.674**	1.011***	-.141	-.143	-.105
(0 = male, 1 = female)	(.085)	(.084)	(.296)	(.303)	(.382)	(.138)	(.136)	(.134)
Interaction effect		.115		.343	.529		-.083	-.071
		(.17)		(.604)	(.743)		(.276)	(.272)
Investment made						1.067***	1.094***	.868***
						(.223)	(.222)	(.227)
R-squared	.038	.051				.186	.191	.211
F-statistic (df1/df2) / Log likelihood[a] (df)	2.45** (4/247)	1.42 (7/244)	18.45*** (4)	25.91*** (7)	107.36*** (8)	5.80*** (5/218)	4.33*** (8/215)	4.27*** (9/214)
Test against competing models[b] (df)		1.06 (3/244)		7.46* (3)	81.44*** (1)		0.43 (3/215)	7.04*** (1/214)
AIC			289.3345	287.87	208.4268			

Notes: Standard errors are in parentheses. OLS and Log-linear standard errors are corrected for robustness.
[a]Likelihood ratio test of model fit against the null model. [b]For the OLS and Log-linear regression Wald's test (F-test) was used, the logistic regressions used a likelihood ratio test ($\chi 2$ statistic)
*** p<.01, ** p<.05, * p<.1

Table 12 Regression results - Business viability

	Business viability (Ordinary Least Squares)		Would invest (Logistic Regression)			Investment amount (Log-linear Regression)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intercept	2.801***	2.944***	1.704***	1.828***	-6.25***	13.168***	13.039***	12.47***
	(.236)	(.261)	(.546)	(.624)	(1.483)	(.342)	(.421)	(.469)
Attractiveness		-.081		.295	1.485*		.022	.059
		(.168)		(.449)	(.89)		(.195)	(.196)
Entrepreneur		-.413**		-.792*	-.327		.198	.217
(0 = male, 1 female)		(.172)		(.409)	(.711)		(.212)	(.21)
Business viability					3.399***			.353***
					(.476)			(.126)
Risk preference	.082***	.079***	.173**	.177**	.133	-.003	-.001	-.008
	(.028)	(.029)	(.076)	(.078)	(.141)	(.035)	(.036)	(.035)
Age	-.011*	-.011*	-.037***	-.036***	-.043*	-.018**	-.018**	-.019**
	(.006)	(.006)	(.013)	(.013)	(.023)	(.007)	(.007)	(.007)
Years of investment experience	.006	.007	.026	.026	.039	.006	.006	.007
	(.006)	(.006)	(.016)	(.016)	(.03)	(.006)	(.006)	(.006)
Sex	.252**	.251**	.653**	.674**	-.086	-.141	-.143	-.157
(0 = male, 1 = female)	(.12)	(.12)	(.296)	(.303)	(.533)	(.138)	(.136)	(.135)
Interaction effect		.413*		.343	-1.635		-.083	-.129
		(.241)		(.604)	(1.165)		(.276)	(.274)
Investment made						1.067***	1.094***	.583**
						(.223)	(.222)	(.294)
R-squared	.065	.091				.186	.191	.222
F-statistic (df1/df2) / Log likelihood[a] (df)	3.88*** (4/247)	3.21*** (7/244)	18.45*** (4)	25.91*** (7)	191.94*** (8)	5.80*** (5/218)	4.33*** (8/215)	5.06*** (9/214)
Test against competing models[b] (df)		2.10 (3/244)		7.46* (3)	166.03*** (1)		0.43 (3/215)	7.84*** (1/214)
AIC			289.3345	287.87	123.8402			

Notes: Standard errors are in parentheses. OLS and Log-linear standard errors are corrected for robustness.
[a]Likelihood ratio test of model fit against the null model. [b]For the OLS and Log-linear regression Wald's test (F-test) was used, the logistic regressions used a likelihood ratio test ($\chi 2$ statistic)
*** p<.01, ** p<.05, * p<.1

Causal Mediation Analysis

We performed a Causal Mediation Analysis for both suspected mediating variables independently and their effect on the two independent variables. The Average Causal Mediated Effects, the Average Direct Effects and the Total Effect resulting from these analyses are presented in Table 13.

Trustworthiness

Looking at our analyses of *Trustworthiness* as a mediator, we observe a moderate significant average total effect (p = 0.086), mainly because of the moderate significant total effect identified amongst respondents treated with the female entrepreneur (p = 0.06). As for the average causal mediated effect, we do see moderate significant mediation amongst all treatment groups (p = 0.097), initially supporting Hypothesis H1a, but lack statistical power for establishing claims on the ACME or ADE for female entrepreneurs itself or the difference between ACME for male or female entrepreneurs, failing to support Hypothesis H3. We see no evidence for neither a mediated nor direct effect for the amount respondents would invest in return for a 20% stake in equity.

Business viability

As for *Business viability* as a mediating variable, we observe a different structure of effects. We fail to identify mediated effects or direct effects for both male/female entrepreneur treatment groups but do see a moderate significant ACME (p = 0.058) among respondents treated with the female entrepreneur treatment. Moreover, we found a moderate significant difference in ACME between the male/female entrepreneur treatment groups (diff. = 0.1251; 95% BCa CI = [-0.0077 - 0.2760]; p = 0.062), supporting Hypothesis H4 and partially supporting H2a. While less significant (p = 0.11), the male entrepreneur ADE hints at a direct effect for male entrepreneurs, as opposed to the identified mediated effect for female entrepreneurs, further supporting the gender-specific

effect hypothesized in H4. Similar to *Trustworthiness*, we find no evidence for neither a mediated nor direct effect for the amount respondents would invest in return for a 20% stake in equity.

Integration with regressions

We observed moderate significant evidence for a total effect of attractiveness on assessment of trustworthiness for female entrepreneurs. Averaged confidence intervals hint of a roughly equally distributed mediated and direct effect, however, we lack statistical power to express this in estimates or to serve as evidence supporting Hypothesis H1a, H1a and H1b combined or the direct effect Hypothesis H5. Next to this, we fail to see evidence for this effect for male entrepreneurs.

As for the perception of the business's viability, we see that being exposed to the female attractive treatment results in a more positive evaluation as identified in our CMA, which in turn influences the likelihood of getting funding as shown in model (5) for *Business viability*. We lack statistical power for the identification of this total effect in our CMA, however, we do identify moderate significant differences between male and female entrepreneurs for the mediated effect, supporting both Hypothesis H2a and Hypothesis H4

Table 13 Causal Mediation Analysis – Results

		Would invest			Investment amount		
		Average	Male entrepreneur	Female entrepreneur	Average	Male entrepreneur	Female entrepreneur
Trustworthiness	ACME	0.0452*	0.0243	0.07329	0.0559	0.0611	0.0502
	(95% BCa CI)	(-0.00770 - 0.10)	(-0.0463 - 0.09)	(-0.01716 – 0.16)	(-0.0222 - 0.17)	(-0.0573 - 0.21)	(-0.0686 - 0.21)
	ADE	0.0489	0.0133	0.09342	0.00918	0.0290	-0.0125
	(95% BCa CI)	(-0.0422 - 0.14)	(-0.1045 - 0.14)	(-0.04846 - 0.22)	(-0.273 - 0.29)	(-0.3615 - 0.44)	(-0.3847 - 0.38)
	Total Effect	0.0940*	0.0376	0.16670*	0.0651	0.0901	0.0377
	(95% BCa CI)	(-0.0136 - 0.20)	(-0.1000 - 0.18)	(-0.00467 - 0.31)	(-0.221 - 0.35)	(-0.3037 - 0.51)	(-0.3434 - 0.46)
Business viability	ACME	0.0457	-0.0212	0.10632*	0.0365	-0.00847	0.0856
	(95% BCa CI)	(-0.0291 - 0.12)	(-0.1172 - 0.06)	(-0.00348 - 0.23)	(-0.0744 - 0.17)	(-0.16306 - 0.18)	(-0.0775 - 0.26)
	ADE	0.0550	0.1145	-0.01407	0.0286	0.09858	-0.0479
	(95% BCa CI)	(-0.0448 - 0.15)	(-0.0294 - 0.26)	(-0.15173 - 0.13)	(-0.245 - 0.31)	(-0.29624 - 0.49)	(-0.426 - 0.32)
	Total Effect	0.101	0.0933	0.09226	0.0651	0.09011	0.0377
	(95% BCa CI)	(-0.0267 – 0.22)	(-0.0738 - 0.27)	(-0.08523 - 0.28)	(-0.223 - 0.37)	(-0.32317 - 0.51)	(-0.380 - 0.43

Notes: BCa CI = Bias-corrected accelerated Confidence Intervals (10,000 bootstraps); ACME = Average Causal Mediated Effect; ADE = Average Direct Effect; Total Effect = ACME + ADE

*** p<.01, ** p<.05, * p<.1

Hypothesis overview

Overall, we find significant support for Hypothesis H1b and H2b, moderate significant support for Hypothesis H1ab, H2ab and H4 and no significant support for Hypothesis H1a, H2a, H3 and H5. Table 14 shows the statistical results related to respective hypotheses.

Table 14 Hypothesis overview

Hypothesis	Support
H1a	*Facial attractiveness of the entrepreneur is positively related to the perceived trustworthiness of the entrepreneur.* No significant pairwise correlation No significant predictor in regression model (2) of Trustworthiness
H1b	*An increase in perceived trustworthiness of the entrepreneur is positively related to the probability of acquiring funding, as well as the amount invested.* Significant correlation for probability of acquiring funding as well as amount invested ($p < 0.01$; $p < 0.01$) Significant predictor in model (5) of Trustworthiness regressions ($p < 0.01$) Significant predictor in model (8) of Trustworthiness regressions ($p < 0.01$)
H1ab	Moderate significant mediated effect of attractiveness on probability of acquiring funding through Trustworthiness ($p < 0.1$) No significant mediated effect of attractiveness on investment amount through Trustworthiness
H2a	*Facial attractiveness of the entrepreneur is positively related to the perceived viability of the business.* No significant pairwise correlation No significant predictor in model (2) of Business viability regressions, however, moderate significant interactions (see H4)
H2b	*An increase in perceived viability of the business is positively related to the probability of acquiring funding as well as the amount invested.* Significant correlation for probability of acquiring funding as well as amount invested Significant predictor in model (5) of Business viability regressions ($p < 0.01$) Significant predictor in model (8) of Business viability regressions ($p < 0.01$)
H2ab	Moderate significant mediated effect of attractiveness on probability of acquiring funding through Business viability for female entrepreneurs (see H4; $p = 0.058$)

H3	*The relationship between facial attractiveness and investors' perception of the trustworthiness of the entrepreneur differs for male entrepreneurs pitching compared to female entrepreneurs.* No significant predictor in regression model (2) of Trustworthiness No significant difference in mediated effects
H4	*The relationship between facial attractiveness and the investors perception of the viability of the business differs for male entrepreneurs pitching compared to that of female entrepreneurs.* Moderate significant predictor in model (2) of Business viability regressions ($p < 0.1$) Moderate significant mediated effect of attractiveness on probability of acquiring funding through Business viability for female entrepreneurs (see H4; $p = 0.058$) Moderate significant difference in mediated effect between male and female entrepreneurs ($p = 0.062$) Moderate significant predictor in model (2) of main effect models ($p < 0.1$)
H5	*Facial attractiveness of the entrepreneur is positively related to the probability of acquiring funding as well as the amount invested.* Moderate significant correlation for probability of acquiring funding No significant pairwise correlation for amount invested Moderate significant predictor in model (5) of Business viability regressions ($p < 0.1$) No significant predictor in model (5) of Trustworthiness regressions No significant predictor in model (8) of both Business viability and Trustworthiness regressions Moderate significant predictor in model (5) of main effect models ($p < 0.1$)

Robustness analysis

The regressions and causal mediation analyses presented for the variables *Trustworthy* and *Business viability* each do not include the other variable due to high correlation with each other (Pearson's R = 0.672, p = 0.000). Introducing these variables in each other's model results in multicollinearity, reducing the interpretability of regressive models as well as introducing overfitting problems, especially in analysis of mediation.

Conceptually, a reason for the presence of this multicollinearity could be the interdependence of one's perception of the business viability. Investors could believe that if an entrepreneur is unfit for the job, the business will become less viable. At the same time, if an entrepreneur would present a venture that does not seem viable, he/she will lose credibility. We relate this to the qualitive study conducted by Huang & Pearce (2015) which shows that business

angel investment motivations rely on interplay between entrepreneurial percptions and business viability. Another explanation could be common method bias due to the use of similar survey entry methods.

Next to that, we've included investment amounts for people who decided not to invest initially as well in models (6), (7) and (8) for both *Trustworthiness* and *Business viability*. Designing the survey in such way reduces susceptibility to sample selection bias. Executing *Business viability* model (8) with the subset of people that did decide to invest initially greatly reduces R^2 to 0.08, compared to an initial R^2 of 0.222. Regression estimates and their (in)significance remained consistent with that of the main analysis. ($\beta_{attractive}$ = 0.023, S.E. = 0.198, p = 0.908; $\beta_{female\ entrepreneur}$ = 0.123, S.E. = 0.194, p = 0.528; $\beta_{interaction}$ = -0.048, S.E. = 0.256, p = 0.851).

We choose not to include a same-sex interaction effect in our reported models. We verified the robustness of this assumption by re-analyzing models with this added same-sex interaction effect. The results of this analysis show that the OLS and LL models show minor improvement in R^2 , while the Logistic regression analyses show minor improvement in log-likelihoods compared to the main models. For the *Trustworthiness* regressions we observe R^2 of model (2) = 0.0574 and LL (df) of model (4) = 26.74 (8), compared to that of 0.051 and 25.91 (7) in our reported models. The *Business* viability regressions show R^2 of model (2) = 0.0936 and LL (df) of model (4) = 26.74 (8) compared to 0.091 and 25.91 (7) in our reported models. We also note that the introduced interaction is not significant in any of the models of this robustness check ($p_{Trustworthiness\ (2)}$ = 0.19; $p_{Trustworthiness\ (4)}$ = 0.362; $p_{Business\ model\ (2)}$ = 0.431; $p_{Business\ model\ (4)}$ = 0.362;. Finally, as for differences in significance, we only observe a minor drop in significance for the treatment interaction effect in model (2) of the *Business viability* regressions ($p_{main\ model}$ = 0.087; $p_{robustness\ model}$ = 0.103). No other models show any change in significance on 5% or 10% levels for our treatment variables or its interaction.

Discussion and Conclusion

This chapter discusses the results from our online experiment by describing how our findings relate to existing literature and theories and what the theoretical implications of our study are. We then describe limitations of our research and provide directions for future research regarding attractiveness biasing and biases in early-stage investment decisions. Finally, we conclude our research.

Theoretical implications

First, our findings are inconsistent with that of prior research on attractiveness in investment decisions. Up to now, existing literature mainly adopted methodologies in which attractiveness ratings were sourced from either non-investors or external beauty rating apps (Brooks et al., 2014; Smith & Viceisza, 2018), whereas we acquired perceptions of attractiveness directly from respondents. Brooks et al. (2014) found that attractiveness plays a role for male entrepreneurs pitching their venture, but our study found no such effect for male entrepreneurs. On the contrary, we identify this effect solely for female entrepreneurs. Smith & Viceisza (2018) identified attractiveness affecting investment decisions, however, fail to shed light upon gender-specific effects. We challenge existing literature streams by posing that not only there is a gender-specific effect for attractiveness and its biasing of investment decisions, but that this gender-specific effect is only present for female entrepreneurs.

Second, this inconsistency in results shows that investors do behave differently considering biases, which we believe is partly due to the use of 'gut feel' in decision-making (Huang, 2018; Huang & Pearce, 2015), and investment experience gained throughout the years (Feng & Seasholes, 2005; List, 2003) and thus leads us to question prior assumptions on the influence of other biases on investment decisions. In our hypothesis development, we've touched upon attractiveness

helping establish trust, an effect observed in prior research (Schmidt et al., 2012; van Leeuwen & Macrae, 2004; van 't Wout & Sanfey, 2008). As we find no such effect of attractiveness on the perception of trustworthiness, we claim that these prior findings do not hold for investment decisions. Our work thus motivates further research into biases in the context of early-stage investments specifically and stresses that caution is needed when transferring assumptions on bias effect sizes and bias presence between different domains of behavioral research even further. Next to this, future research should carefully design methodologies as to ensure samples represent the population to maximize external validity.

Third, our results support the importance of context in decision-making processes influenced by the beauty premium, as whereas we find partial support for its effect on the likelihood of wanting to invest, we do not find such support for the valuation of a business. The observed differences in effect paths for both male/female entrepreneurs and the mediating variables of business viability and trustworthiness further support the role of context in empirical research or assumptions on the prevailing of beauty premiums in general, in line with meta-analyses of Eagly et al. (1991) and Feingold (1992).

Fourth, building upon this context-specifity that we've observed, we argue that this attractiveness bias mainly affects the initial stage in investment decisions and that investors tend to display more rationality when valuing an investment opportunity after an initial assessment whether to invest or not. We integrate our findings with that of dual process theories, in which initial judgements are more likely to be susceptible to bias and heuristics as opposed to our rational system (Kahneman, 2003), the latter which we believe investors tend to employ estimating possible returns or risks on their investment.

Fifth, we found significant evidence supporting existing theories on early-stage investment decision-making, strengthening the academic foundation for future research. We found consistent results on the importance of building trust as an entrepreneur seeking funding, supporting prior

research of Harrison (1997) and Maxwell & Lévesque (2014). Moreover, this result serves as additional support for the role of trust in generalized decision-making processes as put forward by Van 't Wout & Sanfey (2008). Next to this, we've found significant support for the importance of the perception of the viability of the business model, which is in line with prior literature on informal investment decision-making (Huang, 2018; Paul et al., 2007; Wallnöfer & Hacklin, 2013)

Additionally, our results show that gender bias is present in early-stage investment decision-making, consistent with that of prior work (Alsos & Ljunggren, 2017; Edelman et al., 2018; Kanze et al., 2018; M. Lee & Huang, 2018) and confirms irrationality in investment decisions (Abdin et al., 2017; Kumar & Goyal, 2016; Yalcin et al., 2016; Zahera & Bansal, 2018). Finally, it has answered the call of Kumar & Goyal (2016) for quantitative research on biases in investment decisions.

Practical implications

As for practical implications, whereas we did not initially intend to research gender biasing in investment decisions, we find significant evidence for the presence of this gender bias in investment decisions. Our research shows that this gender bias seems to play less of a role if the female entrepreneur is perceived as attractive, which, although ethically questionable, could prove to be of use for female entrepreneurs trying to strengthen their position or managing their impression given this gender bias. Moreover, entrepreneurial teams seeking funding could carefully consider who to put on the forefront in funding rounds as for maximizing their chances of acquiring funding.

Moreover, this research sheds light upon bias susceptibility in investment decisions in general, helping us understand why some entrepreneurs seem to be better at raising funding. We've established evidence for gender biasing and attractiveness biasing, with possibly more biases to be uncovered in future research. Investors should be made aware of the presence of these biases in

their decision-making processes as to display less irrational use of information irrelevant to predicting chances of fruitful investments in their assessments.

Limitations and directions for future research

We have identified several limitations of our research that should be addressed designing future research into attractiveness biasing research or general bias research in the context of investment decisions.

First, we encountered several moderate significant results due to a lack of statistical power. Initial power analysis based on prior research showed a desired sample of n = 200. Whereas we did exceed this sample size in the process of data collection (n = 252), we suggest increasing either the sample size or focusing on either a male entrepreneur or a female entrepreneur if adopting a similar sample size to reduce the number of conditions, effectively increasing power. While we have reported these moderate significant results, few results have been reported with a significance level of 5% or lower which we consider as a major limitation for inferring causality, supporting hypotheses, or mapping the implications of this research from both a theoretical and practical perspective.

Second, we acknowledge that the use of a participant platform could result in different results comparing to replications in the field, especially given the context-specifity of the beauty premium we touch upon in our theoretical implications. We did screen respondents on stringent requirements, however, as participants are required to self-report such demographics to participant platforms, we depend on the participant platform's verification methods to ensure these demographics are authentic and reliable. Moreover, the use of a participant platform and its reward-like structure increases susceptibility to satisficing bias. We propose replicating this research in the field to address this limitation accordingly and to increase external validity further.

Third, we noticed how respondents struggle with distilling specific elements considered in investment decision-making processes that they prefer or do not prefer, resulting in a more general 'attitude' towards an investment opportunity as opposed to rational, operationalized constructs. While this supports the 'investor gut feel' described in prior research (Huang, 2018; Huang & Pearce, 2015), it problematizes statistical analysis because of multicollinearity issues as described in our robustness checks. Future research should either carefully design measurement methods to measure these constructs more reliably or revert to a single attitude model, which, while it could uncover the role of attractiveness as an effect more strongly, fails to identify the influence of attractiveness on specific elements considered in investment decision-making. Researcher should carefully plan their research goals as to adopt one of these strategies.

Adding to that, we acknowledge that real-life investment decisions are more complex than how we framed the investment opportunity in our research, as typical investment decisions consist of multiple stages (Maxwell et al., 2011; Paul et al., 2007). While we do show how attractiveness influences the first stage of investment decisions, the simplified representation of such an investment opportunity in our research could lead to different results when replicated in the field because of the multi-stage nature and the context-specifity of a beauty premium.

Finally, whereas this research has shown that attractiveness biasing is present in early-stage investment decisions, we call for future research to study effects of interventions combating biasing by attractiveness.

Conclusion

In this research, we aimed to answer the following research question by conducting a randomized, between-subjects online experiment aimed at informal investors:

'Through which mechanisms are business angels biased by the effect of facial attractiveness in early-stage investment decision-making processes?'

We have shed light upon how this effect works differently depending on the gender of the entrepreneur seeking funding by researching two mechanisms considered by business angels in their decision-making processes. The results from our online experiment reflect the presence of attractiveness biasing in investment decisions, but we find results inconsistent with that of previous research. Investors tend to attribute more positive qualities to attractive female entrepreneurs in comparison with average female entrepreneurs, which in turn leads investors to be more inclined to invest in a venture. Male entrepreneurs do not profit from exhibiting attractive features but have a higher chance of acquiring funding nevertheless because of gender bias. Using causal mediation analysis, we find that this attractiveness bias mainly affects the investment decision by mediation through perceptions of business viability. Investors show no sign of being biased in their evaluations of equity valuation for both male and female entrepreneurs perceived as attractive. This research tries to explain this inconsistency in results by relating findings to investor 'gut feel', context specificity of the beauty premium, and dual processing theories. Our research is the first to use primary data of investors to analyze the role of attractiveness in early-stage investment decisions by business angels. Our findings demonstrate the importance of context in domain-specific bias research and we call for future research to study effects of combating both gender bias and attractiveness bias in investment decisions.

Because you should never judge a book by its cover.

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Appendix A – Survey

Dear participant,

We kindly thank you for your interest in this survey. In this survey, you will be asked to watch and listen to a pitch for a new entrepreneurial venture. The entrepreneur is seeking funding to further develop and grow the start-up. You will be asked some questions about whether you're willing to invest and to what extent you are willing to meet the funding request. Next to this, you will be asked some questions about your thoughts about the opportunity and your demographic background.

To keep in mind
- Please answer honestly. There is no penalty or reward for answering questions in a specific way.
- Please read and follow the instructions accordingly.
- To ensure you follow the instructions, you are asked some 'attention questions'. You should answer these questions correctly. Failure to adhere to the instructions can result in declining of your Prolific pay-out.
- Your response is anonymous and cannot be traced back to you as an individual.

I thank you for your participation.

Kind regards,

Jesse de Vries
j.devries18@students.uu.nl

Please enter your Prolific ID

_____

Example attention question I have to answer attention questions correctly to ensure pay-out.

○ True (1)

○ False (2)

Please watch the following business pitch before proceeding to the next section.

<image>
<video>

Please read the following instruction about investing before proceeding to the next question.

Usually early-stage investors provide financial capital to entrepreneurs in exchange for some percentage of ownership of their venture (i.e., equity). In doing so, investors try to limit their risk exposure while maximize their expected return.

Consider this example: a venture is looking for a $100,000 investment, offering a 20% ownership stake for an investor, valuing the venture at $500,000. The venture may be an attractive opportunity because it promises extraordinary returns in the future to investors, expecting to increase their valuation tenfold in 5 years (i.e. $1,000,000 return to an investor providing $100,000). Nevertheless, the venture also appears highly risky to investors because of the uncertainty surrounding the venture's future. Hence, an investor may choose to provide $50,000 for 10% ownership stake instead of the full $100,000, limiting their risk exposure.

If an investor values the company differently they can also choose to demand more equity or offer less money. For example, if an investor thinks the company is more likely to be valued at $300,000, they could ask 30% equity ownership for a $100,000 investment, or offer only $60,000 for 20% equity.

<image>

Consider yourself an investor, typically investing in venturing opportunities while guiding and coaching the entrepreneur through the journey (a so-called "angel investor"). You're managing a

fund with lots of spare room for new ventures. Having watched the business pitch, would you invest in this opportunity?

- ○ Yes, I would invest in this opportunity. (1)
- ○ No, I would not invest in this opportunity. (2)

Robin is asking for $ 2,000,000 dollars in return for a 20% stake in equity. To what extent would you meet the funding request as presented by the entrepreneur for a 20% stake?

0 2000004000006000008000001000000120000014000001600000180000002000000

U.S. dollars you would invest in return for a 20% stake ()	

What do you think of Recruitify's business idea/model?

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Recruitify has a solid, promising business idea. (1)	○	○	○	○	○
The proposal of Recruitify is an attractive investment opportunity. (2)	○	○	○	○	○
I believe that Recruitify will become a successful business. (3)	○	○	○	○	○
I have paid attention: I must answer this statement with "Strongly disagree". (4)	○	○	○	○	○

<image>

What did you think of the entrepreneur?

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
I think the entrepreneur has a credible reputation. (1)	○	○	○	○	○
My first impression was that the entrepreneur is trustworthy. (2)	○	○	○	○	○
I would trust the entrepreneur with my invested funds. (3)	○	○	○	○	○
I believe that the entrepreneur would handle my funds responsibly. (4)	○	○	○	○	○
The entrepreneur seems like an honest person. (5)	○	○	○	○	○

<image>

Please rate the following statements

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
The entrepreneur knows the market well. (1)	○	○	○	○	○
The entrepreneur has a good vision of the company's future. (2)	○	○	○	○	○
The entrepreneur is very capable of performing its tasks as owner of Recruitify. (3)	○	○	○	○	○
The entrepreneur is well qualified to be owner of Recruitify. (4)	○	○	○	○	○
I feel confident about the entrepreneur's skills. (5)	○	○	○	○	○

<image>

Rate the following attributes of the entrepreneur.

	Far below average (1)	Somewhat below average (2)	Average (3)	Somewhat above average (4)	Far above average (5)
The attractiveness of the entrepreneur. (1)	○	○	○	○	○
How good-looking the entrepreneur is. (2)	○	○	○	○	○
The appearance of the entrepreneur. (3)	○	○	○	○	○
How appealing the entrepreneur's face is. (4)	○	○	○	○	○

We would like to know about your risk preferences. How much do you prefer winning **$ 1,000 for sure** or winning **$ 2,000 with a 50% chance**?

	Strongly prefer winning $ 1,000 for sure										Strongly prefer winning $ 2,000 with a 50% chance
	0	1	2	3	4	5	6	7	8	9	10
Preference ()											

Thank you for your answers. We now ask you to fill in some final questions about your background.

How many years of experience do you have in investing? Any form of investing is considered.

_____

Please state your highest level of completed education.

- ○ Primary school (1)
- ○ Secondary school or high school (2)
- ○ College (3)
- ○ University (bachelor) (4)
- ○ University (master) (5)
- ○ PhD (6)
- ○ Other (7)

Please share a rough estimate of your personal yearly income.

▼ 0 - 19.999 (1) ... 80.000+ (5)

Which of the following best describes you?

- ○ Asian or Pacific Islander (1)
- ○ Black or African American (2)
- ○ Hispanic or Latino (3)
- ○ Native American or Alaskan Native (4)
- ○ White or Caucasian (5)
- ○ Multiracial or Biracial (6)
- ○ A race/ethnicity not listed here (7)

If you want to share additional feedback or thoughts with the researcher, you are free to do so in the field below.

_____

_____

_____

_____

_____

Appendix B – Slide deck

Recruit Better. Faster. Fair.

Recruitify

ABOUT ME
ROBIN ANDREWS

- 28 years old
- Studied both Psychology and Human Resource Management
- Worked in the field of recruiting for >4 years
- Fascinated by technology

WHAT IS **HAPPENING**?

An average of **23%** of job applicants face hiring biases, reducing fairness.

At least **one-third** of job-seekers doesn't fit the company culture as expected, increasing turnover.

We need to **hire for culture**, but identifying those candidates is hard and prone to bias.

HOW TO IDENTIFY
THE RIGHT APPLICANTS?

GAMIFICATION

We use digital minigames, backed by science, to objectively identify personal traits.

Reduce social desirable answers

Improve candidate experience

Increase hiring efficiency

Hire objectively

Reduce employee turnover

Compare applicant's traits with your team's traits for culture-fit

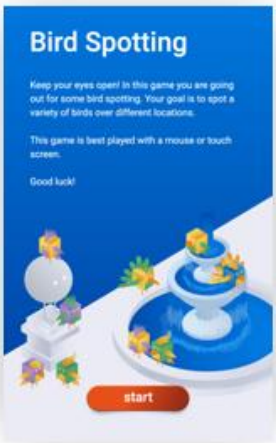
Identify gaps in your team

Implement latest neuroscience findings

Connect with existing hiring software

How it looks like.

THE PRODUCT

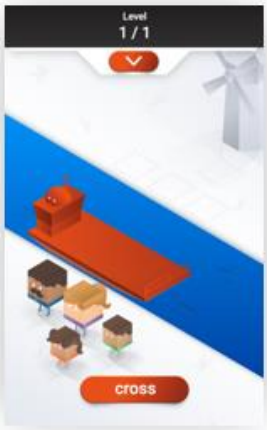

Bird Spotting
Keep your eyes open! In this game you are going out for some bird spotting. Your goal is to spot a variety of birds over different locations.
This game is best played with a mouse or touch screen.
Good luck!
start

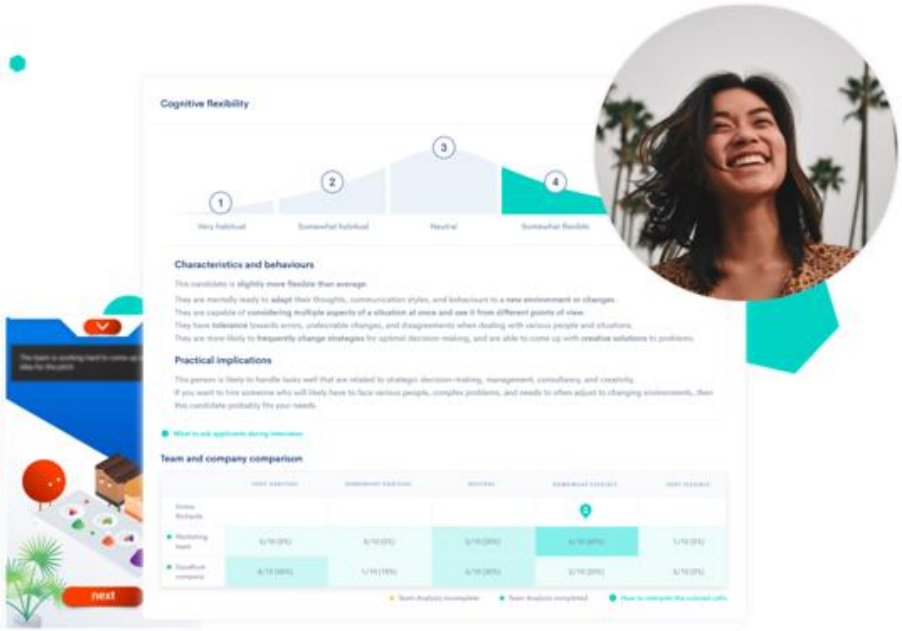

Found
0
Mistakes
0
Time left
practice level
Drag the screen to move the map.
(drag to continue)
Looking for:


CHANGING BIRDS
• Click this button to change the type of bird you're looking for.
• You don't have to find all birds before you start looking for a new type of bird. You decide when you want to change!
previous
next
change bird


The Ferry
In this puzzle game, your goal is to get all characters from one side of the river to the other side.
This demo contains 1 level. The full version has 6 levels.
Good luck!
start


Level
1 / 1
The ferry can only cross if there is at least one person on it.
The ferry can hold a combination of:
OR


Level
1 / 1
cross



WHAT WE HAVE ACHIEVED
THE NUMBERS.

Company valuation	**YOY Revenue Growth**
$ 10,000,000	+18%
Last year's revenue	**Average Revenue Per User**
$ 1,000,000	$ 1,400 / mo
Net profits	**Churn**
$ 120,000	5.2%

WHAT WE NEED
THE ROAD AHEAD.

- International expansion
- Further development of the product
- Marketing
- Attract talent

We are looking for a $ 2,000,000 investment in return for a 20% stake in our company.

Appendix C – Pitch narration

Hi, I'm Robin and I'd like to present to you today the opportunity to invest in Recruitify.

[pause 1 sec]

I'm 28 years old and have studied both Psychology and Human Resource Management. After my studies, I started working as a corporate recruiter. Next to this, I have a passion for technology.

[pause 1 sec]

During my work as a corporate recruiter, I encountered issues while seeing colleagues of mine selecting applicants to come in for an interview at first hand. We humans are flawed. Even when we don't want it, we are prone to biases.

On average, 23% of job applicants face hiring biases, resulting in unexplored potential of applicants. Promising candidates are not invited solely because of our unobjectiveness.

Moreover, even if we have invited promising candidates on a fair basis, there is no guarantee that they fit in with the people who already work at a company.

[pause 1 sec]

So, how do you identify the right applicants?

[pause 1 sec]

Well, the answer is gamification.

I started Recruitify four years ago, aiming to make recruiting better, faster and more fair. At Recruitify, we have developed the solution to both problems of culture fit and objective hiring. Using digital minigames backed by validated neuroscience, we can identify personal traits and compare them to your current team, anonymously. The use of Recruitify allows you to hire someone who fits right in your current culture, while at the same time eliminating any biasing in inviting for interviews. Identify gaps, make assessments fun and reduce social desirable answering - it's all possible with our solution.

[pause 1 sec]

We have developed a variety of minigames which applicants have to play, each taking 2 minutes on average. You can see some screenshots of the game on screen.

[pause 1 sec]

This game for example measures one's tendency to be flexible in situations under stress.

[pause 1 sec]

Whereas this game is designed to measure one's puzzle-solving skills.

[pause 1 sec]

After having completed the assessments, the recruiter can view a detailed report of the applicant's traits. This can be integrated with existing software of recruiters.

[pause 1 sec]

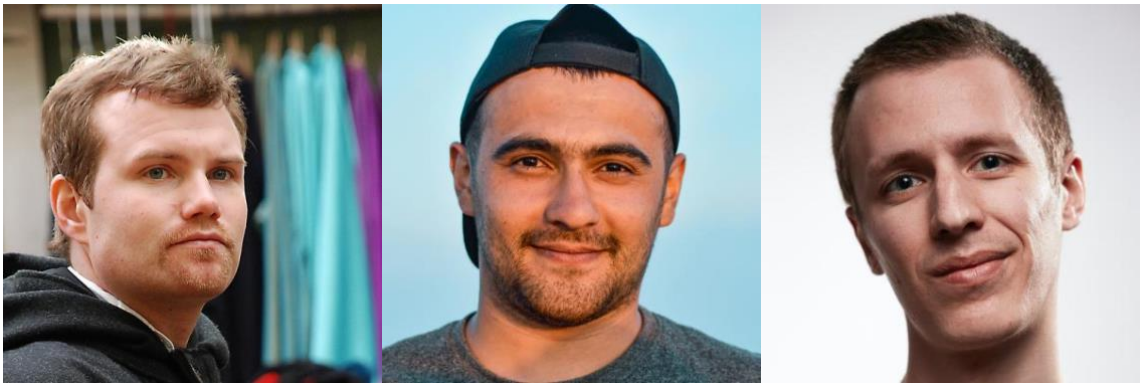
Last year, we made 1 million in sales revenue with net profits of 120 thousand. Compared to the year before, we've growed 18 percent in revenue. Our average client has a subscription of 1400 dollars / month. We value our business at 10 million dollars.

[pause 1 sec]

To further grow our business, we want to expand internationally and further develop our product. Additionally, we want to improve the marketing of Recruitify to reach more potential clients. To do so, we need to attract talent and thus funding. We are looking for a 2 million dollar investment in return for a 20% stake in our company.

Appendix D – Images per experimental condition

Average males



Attractive males

Average females

Attractive females