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Old but gold? Examining the effect of age bias in reward-based crowdfunding

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ABSTRACT

While age is positively related to entrepreneurial success, the prevailing stereotype favors younger entrepreneurs. To better understand how these contradictory perspectives influence funding decisions, we examine the role of age in a sample of 41,602 reward-based crowdfunding campaigns from Indiegogo. We find a negative correlation between an entrepreneur's apparent age and funding performance, indicating a preference for younger entrepreneurs. However, we also find age-based homophily where older entrepreneurs' campaigns attract older backers. Our study distinguishes between statistical and status-based discrimination to understand the multi-faceted nature of age in reward-based crowdfunding and demonstrate how investment motives mitigate and reinforce age-based discrimination.

1. Executive summary

Despite evidence of a positive relationship between age and entrepreneurial success, the prevailing stereotype of entrepreneurship is one of youth. For reward-based crowdfunding backers, both of these contrasting interpretations of age in entrepreneurship are relevant. On the one hand, backers are motivated to fund entrepreneurs who will be able to deliver their products on time and with the promised quality. On the other hand, reward-based crowdfunding research indicates that backers are influenced by stereotypes that link demographic characteristics to entrepreneurship. To unpack the role of age in reward-based crowdfunding, we analyze 41,602 campaigns launched on Indiegogo between 2008 and 2021.

Our findings reveal that backers exhibit a bias against campaigns launched by older[1] entrepreneurs as these attract a lower percentage of their funding goal and fewer backers. However, we also find the presence of age-based homophily, suggesting a possible mitigating influence. Older backers tend to favor investing in campaigns launched by older entrepreneurs.

The implications of this research are twofold. First, our study points to the importance of distinguishing between statistical and status-based discrimination. Statistical discrimination occurs when individuals use observable characteristics to proxy for the statistical distribution of difficult-to-observe qualities, such as entrepreneurial success. Status-based discrimination stems from individuals' cognitive biases, such as those based on prevalent cultural beliefs. This distinction offers insights into how contradicting interpretations of age in entrepreneurship coexist and helps us to understand why crowdfunding backers favor younger entrepreneurs. Second, it extends our understanding of homophily within the reward-based crowdfunding context. Age-based connections do not

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[1] Relative to the age distribution of entrepreneurs using crowdfunding.

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confer the same funding advantage observed with gender. For women, activist-choice homophily leads to an overall advantage in reward-based crowdfunding. While we find evidence of interpersonal choice homophily associated with age, its effects appear to be insufficient to offset the overall negative relationship between age and crowdfunding performance. Our study thus enriches ongoing conversations surrounding age biases in entrepreneurship and the potential of reward-based crowdfunding platforms to democratize entrepreneurial finance.

2. Introduction

Age is an important sociodemographic attribute contributing to individuals' entrepreneurial abilities (Azoulay et al., 2020; Zhao et al., 2021). As individuals age, they gain more experience (Becker, 1962), refine their emotional regulation (Charles et al., 2001), enhance their decision-making and problem-solving skills (Baron, 2008), and broaden their professional networks (Colombo and Grilli, 2010). These factors contribute to an overall positive relationship between age and entrepreneurial success (see Zhao et al., 2021).

Despite evidence linking age to entrepreneurial success, the prevailing Western stereotype depicts the ideal entrepreneur as young (e.g., Azoulay et al., 2020; Lévesque and Minniti, 2006). At the core of this perception lie broadly held beliefs about younger individuals. They are often seen as cognitively adept, especially when faced with novelty or technology (see Posthuma and Campion, 2009), and more willing to take risks (Carland III et al., 1995). These stereotype attributes align with characteristics commonly ascribed to entrepreneurs (Azoulay et al., 2020). Public discourse about entrepreneurs further perpetuates the association between youth and entrepreneurship (Shane, 2008). For instance, stories such as Bill Gates dropping out of college to found Microsoft when he was 20 are commonly celebrated in popular press coverage of entrepreneurship.

This mismatch between empirical evidence associating entrepreneurial success with older age and societal stereotypes favoring youth poses significant challenges for entrepreneurs. Entrepreneurs frequently rely on external stakeholders for funding to launch and expand their ventures (Clough et al., 2019). If these stakeholders' funding decisions are negatively influenced by the entrepreneur's age, it could shrink the pool of critical resources available to entrepreneurs as they get older.

Research on discrimination and stereotyping provides a valuable lens through which to examine how resource providers respond to entrepreneurs' age (e.g., Thébaud, 2015; Thébaud and Sharkey, 2016). This literature identifies two overarching perspectives. On the one hand, statistical theories suggest that stereotyping occurs when individuals use readily observable attributes as proxies for harder-to-observe characteristics (e.g., Arrow, 1973; Phelps, 1972). On the other hand, status-based theories suggest that stereotyping reflects cognitive biases, often based on established cultural expectations or norms (e.g., Anglin et al., 2018b; Thébaud, 2015). In the case of an entrepreneur's age, these theories make contrasting predictions. Statistical discrimination would lead resource providers to prefer older entrepreneurs, associating age with the capabilities and resources necessary for entrepreneurial success. Status-based discrimination would lead resource providers to prefer younger entrepreneurs because they more closely embody societal expectations of entrepreneurs.

This dilemma is particularly salient in reward-based crowdfunding. Here, investors—called backers—make small contributions in exchange for rewards such as the product or service being developed by the entrepreneur (Mollick, 2014). From an economic perspective, this encourages backers to support campaigns where they believe the entrepreneur will successfully deliver their product (Seigner et al., 2022). Yet, the reward-based crowdfunding context is also characterized by a community institutional logic, giving rise to sociocultural investment motives such as shared values and unity (Fisher et al., 2017). These prompt backers to consider non-economic criteria in their decisions.

We theorize that backers' decision-making will lead to status-based discrimination and the stronger performance of campaigns launched by younger entrepreneurs despite their economic interest in receiving the reward as promised. Backers typically have limited information about the entrepreneur and their venture, and often lack the investment expertise to scrutinize this information (e.g., Anglin et al., 2018a; Colombo, 2021). This increases the likelihood of using stereotypes in their decision-making (e.g., Bodenhausen, 1990; Thébaud and Sharkey, 2016). However, this lack of investment expertise also suggests that backers may not have the knowledge to associate age with the drivers of entrepreneurial success or may not think to consider this association when evaluating the campaign. In contrast, stereotypes linking youth to quintessential entrepreneurial qualities such as innovation and risk-taking are widely recognized and easily understood (Azoulay et al., 2020), making discrimination based on these stereotypes more likely.

Despite this theorized age discrimination, homophily theory (e.g., Greenberg and Mollick, 2017; McPherson et al., 2001) suggests that there may be a countervailing influence of an entrepreneur's age. Age is a common source of homophily and one of the strongest predictors of voluntary interpersonal associations (such as friendships; Smith et al., 2014; Verbrugge, 1977). The community-oriented nature of reward-based crowdfunding prompts investment choices based on the shared attributes and values of the funding community (Fisher et al., 2017). Given that age is a readily observable attribute that triggers homophily, as backers age, they might also tend to invest in campaigns launched by older entrepreneurs.

To test these hypotheses, we analyzed 41,602 campaigns from the reward-based crowdfunding platform Indiegogo between 2008 and 2021. In multilevel regression models, we found that an entrepreneur's apparent age is negatively associated with crowdfunding performance in attracting funding and backers. We also found a positive relationship between an entrepreneur's age and that of their backers, suggesting backers become increasingly likely to fund entrepreneurs when the backer and entrepreneur are closer in age.

Our main contribution is to the literature examining age in entrepreneurship. This literature documents a positive correlation between age and entrepreneurial success (Zhao et al., 2021). This is relevant to reward-based crowdfunding backers because entrepreneurs on these platforms are often delayed in launching their products or services, if they are delivered at all (Mollick, 2014). From this perspective, backers should interpret an entrepreneur's age favorably, because it comes with an array of advantageous entrepreneurial capabilities such as enhanced experience (Becker, 1962) or refined problem-solving skills (Baron, 2008). However, we

theorize and find that an entrepreneur's apparent age is negatively associated with their campaign's funding performance. This suggests that backers rely on a stereotype rooted in cognitive biases that associate entrepreneurship with youth (Azoulay et al., 2020; Lévesque and Minniti, 2006). An entrepreneur's age is subject to varied interpretations that are influenced by characteristics of the contexts and audiences reacting to it. Engaging with theories of the origins of (entrepreneurial) stereotypes (e.g., Thébaud, 2015; Thébaud and Sharkey, 2016) offers pathways to disentangle these seemingly contradictory predictions related to age in entrepreneurship.

We also contribute to the reward-based crowdfunding literature examining homophily. This literature has predominantly focused on gender-based homophily, illuminating how female backers support female entrepreneurs who have faced similar hardships (e.g., Greenberg and Mollick, 2017; Groza et al., 2020; Wesemann and Wincent, 2021). Our research extends the focus to age-based homophily. We theorize that this form of homophily stems from shared experiences and values rather than a desire to support those who face similar hardships associated with age. We find that while age-based homophily does benefit older entrepreneurs in reward-based crowdfunding, its influence is insufficient to offset the overall negative effect of age on crowdfunding performance.

3. Literature review and theoretical background

Stereotypes are “beliefs about the characteristics, attributes, and behaviors of members of certain groups” (Hilton and Von Hippel, 1996, p. 240). While helpful as mental shortcuts, they oversimplify the complex and diverse characteristics of individuals (Allport, 1954; Nelson and Miller, 1995). These oversimplified views introduce biases when decision-makers rely on superficial, non-essential attributes over relevant criteria. For example, investors might be more likely to fund a technology startup led by a male entrepreneur based on stereotypic beliefs that men are more tech-savvy, neglecting a more thorough evaluation of the entrepreneur's and venture's merits.

Stereotypes, like other heuristics, become relevant during decision making when an individual is unable or unmotivated to adequately obtain and process relevant information (Bodenhausen, 1990; Thébaud and Sharkey, 2016). This is especially pronounced in entrepreneurship due to the unpredictable consequences of pursuing novel opportunities (McMullen and Shepherd, 2006). While entrepreneurs need to secure support from various key stakeholders to launch and grow their ventures (Clough et al., 2019; Cooper et al., 1994), this uncertainty makes stakeholders more susceptible to the sway of stereotypes associated with entrepreneurs.

The prevailing Western stereotype portrays the entrepreneur as a young man independently launching one or multiple high-growth ventures, offering a rather limited view of the diversity of entrepreneurial individuals and teams (Bakker and McMullen, 2023; Klotz et al., 2014; Krueger Jr et al., 2000). Although this stereotype is far from representative of most entrepreneurs, such preconceived notions have wide-ranging effects. Sociodemographic stereotypes have been shown to shape the ways individuals think about themselves as entrepreneurs—ultimately influencing their opportunity evaluation (Gupta et al., 2014), entrepreneurial intentions (Gupta et al., 2009), subjective well-being (Hmieleski and Sheppard, 2019), and expectations for venture growth (Martiarena, 2022). They also bias external resource providers' decisions on which entrepreneurial ventures to fund (McSweeney et al., 2022).

Research underscores the impact of entrepreneurial stereotypes across various resource providers. Entrepreneurial gender stereotypes, for instance, have been shown to bias fundraising from banks (e.g., Eddleston et al., 2016), venture capital (e.g., Malmström et al., 2017), angel investors (e.g., Edelman et al., 2018), microlenders (Calic et al., 2023), and crowdfunding backers (e.g., Anglin et al., 2018b). However, investors differ in ways that can impact how they engage with such entrepreneurial stereotypes. Professional investors, such as angel investors and venture capitalists, operate under institutional logics that prioritize economic returns (Fisher et al., 2017). These experienced investors' strategies involve extensive due diligence to gather relevant information about the entrepreneurs and their ventures (Dimov and Shepherd, 2005). They go to considerable lengths to mitigate uncertainty, centering on relevant information about the potential economic viability of a venture. As a result, while stereotypes influence decision-making across funding sources, some funding providers may be more resilient to superficial sociodemographic stereotypes than others. For instance, Balachandra et al. (2019) found that while stereotypically feminine behaviors influence venture capitalists, the penalties associated with these behaviors do not differ for male and female entrepreneurs.

While much of the entrepreneurial resource acquisition literature has focused on gender stereotypes, age stereotypes have received less attention. This presents a salient gap in our understanding of both venture funding and the role of age in entrepreneurship, given the importance of finances to venture success and that entrepreneurship is increasingly highlighted as a promising avenue for older individuals (Kautonen et al., 2017; Soto-Simeone and Kautonen, 2021). Younger age is typically associated with sharp cognition, risk-taking, fewer obligations and distractions, and a higher likelihood of being innovative (Azoulay et al., 2020; Carland III et al., 1995). Conversely, as individuals age, they are increasingly characterized as less adaptable, creative, and driven (North and Fiske, 2012; Posthuma and Campion, 2009). These beliefs reinforce a cultural association of entrepreneurship with youth because innovation, risk-taking, cognitive flexibility, and drive coincide with qualities commonly associated with entrepreneurs (e.g., Gupta et al., 2009). This association is perpetuated by popular culture through media narratives of young trailblazers such as Bill Gates launching high-growth ventures from their garages in their early 20s.

However, this entrepreneurial age stereotype is not grounded in a statistical association with entrepreneurial success. In fact, a recent meta-analysis points to a positive relationship between an entrepreneur's age and their success (Zhao et al., 2021). As individuals age, they often gather greater breadth and depth of experience and develop technical skills crucial for innovation (Jones, 2010). They also accumulate larger pools of personal funds to invest in their ventures (Cooper et al., 1994) and establish their professional networks (Colombo and Grilli, 2010), including connections with entrepreneurial peers (Obschonka et al., 2019). This accumulation of financial, social, and human capital is vital for entrepreneurship (e.g., Stam et al., 2014; Unger et al., 2011) and may explain why older individuals are more successful in entrepreneurship despite entrepreneurial stereotypes being associated with

youth.

The mismatch between age-related societal stereotypes and empirical evidence associating age with entrepreneurial success stresses the importance of understanding the role of age bias in entrepreneurial finance, and especially in reward-based crowdfunding. Crowdfunding is commonly lauded for its promise to democratize entrepreneurial finance for entrepreneurs who do not fit the stereotype (e.g., Mollick and Robb, 2016; Serwaah, 2022). Unfortunately, while this promise seems to hold true for women (Gafni et al., 2021; Greenberg and Mollick, 2017; Johnson et al., 2018), research also indicates that it is not realized for all marginalized entrepreneurs (e.g., Anglin et al., 2018b; Cumming et al., 2021; Younkin and Kuppuswamy, 2018). Notably, we lack sufficient understanding if age in crowdfunding helps level the playing field for individuals who launch new ventures later in their careers.

3.1. Age stereotypes in reward-based crowdfunding

In reward-based crowdfunding, entrepreneurs raise funds from a large 'crowd' of backers who each contribute small amounts of funds to selected campaigns (Chan et al., 2020; Mollick, 2014). In contrast to equity- or debt-based financing sources, backers in reward-based crowdfunding do not receive financial returns on their investments. Instead, they receive rewards from the entrepreneurs—often in the form of a product or service being developed as part of the crowdfunding campaign. This type of funding provides entrepreneurs with both financial resources and market validation information (Stevenson et al., 2022).

The characteristics that make reward-based crowdfunding an attractive alternative source of capital for entrepreneurs also influence how backers make funding decisions. Backers are not professional investors. Similar to consumers, they generally lack the information, inclination, and experience necessary to conduct formal due diligence (Agrawal et al., 2015; Allison et al., 2017; Johnson et al., 2018). In fact, backers' comparatively small individual investments might deter them from in-depth research before investing (Anglin et al., 2018a). Further, backers are characterized as prioritizing a community institutional logic, where sociocultural elements such as shared values and ideology take precedence over expected economic returns (Fisher et al., 2017; Murray et al., 2020). Collectively, these factors create an uncertain and information-constrained funding context conducive to stereotype-based heuristics (e.g., Bodenhausen, 1990; Thébaud and Sharkey, 2016).

Research from reward-based crowdfunding documents the influence of sociodemographic stereotypes on backer decisions. For example, Younkin and Kuppuswamy (2018) provide experimental evidence that African-American men face greater challenges in securing funding than their white counterparts, revealing an implicit stereotype against black entrepreneurs. Anglin et al. (2018b) found that sex, sexual orientation, and race influence how backers respond to the contents of crowdfunding campaigns. Similarly, Johnson et al. (2018) have experimentally shown that sex in reward-based crowdfunding impacts funding performance through gender stereotypes.

These sociodemographic stereotypes can be explained by statistical- or status-based theories of discrimination (Thébaud and Sharkey, 2016). Statistical theories (e.g., Arrow, 1973; Phelps, 1972) assume that individuals are rational and not inherently biased based on superficial attributes. Instead, discrimination occurs when individuals use surface-level attributes as indicators for the statistical distribution of underlying characteristics that are difficult to observe (Correll and Benard, 2006). A statistical explanation of age bias in entrepreneurship would suggest that age is used as a proxy for the statistical distribution of unobserved characteristics associated with entrepreneurial success. Given evidence that older entrepreneurs tend to possess such characteristics (Zhao et al., 2021), this perspective would predict that investors would favor older entrepreneurs.

In contrast, status-based theories posit that preconceived cultural norms and expectations shape individuals' perceptions, increasing the likelihood of cognitive biases (e.g., Anglin et al., 2018b; Thébaud, 2015). Here, individuals do exhibit an *a priori* social preference for individuals with certain attributes (Thébaud and Sharkey, 2016). This perspective suggests investors should prefer younger entrepreneurs because entrepreneurs are typically stereotyped as young.

Both predictions are germane to reward-based crowdfunding because backers both have an interest in the success of the entrepreneur and, at the same time, consider non-economic criteria in their decision making. However, we theorize backers are more likely to be influenced by stereotypes associated with status-based discrimination (e.g., Anglin et al., 2018b; Seigner and Milanov, 2023). Whereas statistical discrimination requires awareness and understanding of the underlying empirical association of age and entrepreneurial success, most reward-based crowdfunding backers lack the investment expertise that would prime them to associate the apparent age of the entrepreneur with the statistical distribution of human, social, and financial capital resources that contribute to venture success or the successful delivery of a product. In contrast, status-based discrimination relies on widely recognized and easily understood cultural associations linking youth to entrepreneurial qualities such as innovation and risk-taking (Azoulay et al., 2020).

In reward-based crowdfunding, entrepreneurs often do not disclose their actual age, precluding direct age discrimination. However, many campaigns include profile photos of the entrepreneur, enabling backers to form perceptions based on their apparent age. Building on status-based discrimination theory, this suggests that the entrepreneur's apparent age will negatively influence backers' investment decisions in reward-based crowdfunding campaigns. Put formally, we propose:

Hypothesis 1. **(H1):** In a crowdfunding campaign, the apparent age of the entrepreneur is negatively associated with the campaign's crowdfunding performance.

3.2. Age homophily in reward-based crowdfunding

Age is also a source of homophily—that is, individuals' tendency to associate or connect with similar others (McPherson et al., 2001). Homophily manifests in reward-based crowdfunding in two ways: interpersonal and activist choice (Greenberg and Mollick,

2017). Interpersonal choice homophily occurs when individuals choose to associate with others who resemble them, often on the basis of shared values or status characteristics and driven by "affinity, trust, or ease of communication and evaluation" (Ertug et al., 2022; Greenberg and Mollick, 2017, p. 346; Lazarsfeld and Merton, 1954). Activist choice homophily, on the other hand, reflects a desire to connect with individuals who share common disadvantages or have faced similar hardships, and is driven by an "underlying desire to help overcome them" (Greenberg and Mollick, 2017, p. 342).

Homophily is thought to be particularly prevalent in investment contexts where the stakes are low, the investment logics are not primarily focused on economic returns, or investors have limited experience (Bapna and Ganco, 2021). This is evident in reward-based crowdfunding where backers, who are often not experienced investors, pledge small amounts for rewards rather than equity. Indeed, research on reward-based crowdfunding (e.g., Greenberg and Mollick, 2017; Groza et al., 2020) and charitable crowdfunded microlending (e.g., Galak et al., 2011)—which shares characteristics with reward-based crowdfunding—provides empirical evidence of homophily.

Though much of the crowdfunding research employing homophily theory focuses on gender-related homophily (e.g., Greenberg and Mollick, 2017; Groza et al., 2020), broader organizational research has identified alternative sources of homophily that may be similarly pertinent in crowdfunding decisions. For example, studies have shown that occupational similarity can influence how individuals make investment decisions within charitable crowdfunded microlending (Galak et al., 2011). Likewise, shared educational and professional backgrounds increase entrepreneurs' likelihood of receiving venture capital funding (Franke et al., 2006).

Age is a well-established source of homophily (Ertug et al., 2022; Ertug et al., 2018; Phillips et al., 2013). However, the role of age in reward-based crowdfunding remains underexplored. Individuals tend to interact with and favor those who are closer in age (Smith et al., 2014). This can be attributed to shared sociocultural and economic experiences and leads to perceived similarity in values and preferences (e.g., Grossman et al., 2012; Kunze et al., 2021). These shared attributes facilitate communication and reduce conflict (e.g., Hegde and Tumlinson, 2014; Pelled et al., 2001; Zenger and Lawrence, 1989), which may be perceived as desirable by backers considering investing in an entrepreneur's venture.

The reward-based crowdfunding literature has mainly associated sociodemographic homophily with activist motives (e.g., Greenberg and Mollick, 2017; Groza et al., 2020; Wesemann and Wincent, 2021). While activist-choice homophily is an appropriate theory for understanding the intra-gender support among women in crowdfunding, we suggest that interpersonal choice homophily is more influential for age.

Age-related societal biases are more pronounced for the elderly, particularly those above the age of 70, who are often perceived as less competent (Cuddy et al., 2005). Considering the comparatively younger population of crowdfunding backers, we expect that these individuals have yet to face significant age-related hardships. This diminishes the likelihood that age would be a salient source of activist homophily because most backers would not share salient age-related hardships with entrepreneurs. Instead, we theorize that interpersonal choice homophily better explains why age-based homophily may occur in reward-based crowdfunding. The shared values reflected in interpersonal choice homophily closely align with reward-based crowdfunding's community institutional logic, which emphasizes sociocultural factors such as unity over economic returns (Fisher et al., 2017). Backers will tend to support entrepreneurs whom they perceive as closer in age, not out of activism, but because of a sense of community built on shared experiences and values. Consequently, as entrepreneurs appear older, they may increasingly attract older backers. Put formally, we propose:

Hypothesis 2. **(H2):** In a crowdfunding investment, the apparent age of the entrepreneur is positively associated with that of backers funding the campaign.

4. Empirics

4.1. Setting and sample

To test our hypotheses, we use data from the prominent reward-based crowdfunding platform Indiegogo. Since its launch in 2008, Indiegogo has grown to a community of over nine million backers who have funded >800,000 campaigns (Indiegogo, 2023), sparking growing scholarly interest (e.g., Cumming et al., 2020; Huang et al., 2021; Thies et al., 2016).

We used a publicly available web-crawled dataset from webrobots.io that covered all Indiegogo campaigns launched between May 2016 and April 2019 as a starting point for our data collection. With Indiegogo's API, we retrieved the Indiegogo profiles of all individuals who backed these campaigns and identified all 171,116 campaigns that these backers ever contributed to,[2] allowing us to collect a sampling frame from January 2008 to February 2021.[3] To test hypothesis 1, we selected the 41,602 campaigns that contained a face in the entrepreneurs' profile picture, following previous studies examining sociodemographic biases in reward-based crowdfunding (e.g., Seigner et al., 2022) and crowdfunded microlending (e.g., Davis et al., 2021). Specifically, we used face detection in *OpenCV*[4] (pypi.org/project/opencv-python/) to identify campaigns in which entrepreneurs' faces were present in their profile pictures.

[2] We used these campaigns to perform a Heckman correction to address potential selection bias arising from our focus on campaigns in which a face was present in the entrepreneurs' profile picture. The results affirmed the robustness of our findings.

[3] Despite our dataset spanning from 2008 to 2021, we conducted a robustness check focusing on the years with full coverage in our initial publicly available data—2017 and 2018. This check confirmed the robustness of our findings.

[4] This algorithm utilizes Haar-like features in a cascade of classifiers to efficiently identify and locate human faces in images by analyzing windowed sections of the image, filtering out non-facial structures, and using pre-trained classifiers for additional features making it particularly efficient (Goyal et al., 2017).

To test hypothesis 2, we needed to focus on the backers' investments while ensuring that there were also faces associated with the backers' profiles. Both the entrepreneurs' and backers' faces were present in 8337 investments spanning 4315 distinct campaigns.

4.2. Variables

4.2.1. Crowdfunding performance variables

To measure reward-based crowdfunding performance, we employed two well-established crowdfunding performance outcomes (e.g., Anglin et al., 2018b; Scheaf et al., 2018)[5]: (1) *percentage of funding goal*, operationalized as the fraction of the amount of money contributed to a campaign to the funding goal set by the entrepreneur for their campaign, and (2) *the number of backers*, operationalized as the number of individuals financially supporting an entrepreneur's campaign on the platform. These variables offer complementary perspectives on crowdfunding performance. While *percentage of funding goal* captures campaign performance from a financial perspective, the *number of backers* captures campaign performance from a market validation perspective (Belleflamme et al., 2014).

4.2.2. Age-related variables

Our age-related variables included (1) an *entrepreneur's apparent age* as our independent variable for hypotheses 1 and 2, and (2) a *backer's apparent age* as our dependent variable for hypothesis 2. Drawing on previous crowdfunding literature investigating the impact of sociodemographic stereotypes, we leveraged artificial intelligence-based facial recognition to derive these variables from users' profile pictures (Seigner et al., 2022). After collecting both entrepreneurs' and backers' pictures from their Indiegogo profiles, we utilized *DeepFace* (pypi.org/project/deepface/) to assess age. DeepFace uses well-established and renowned facial analysis software developed by Facebook to provide accurate measures of age (Taigman et al., 2014).

AI-based tools have been critiqued for reproducing human biases (e.g., Ganel et al., 2022) and producing less accurate age estimates for photos of older individuals (e.g., Albiero et al., 2020). However, these concerns are unlikely to threaten the validity of our measurements. First, because backers generally do not know the actual age of entrepreneurs, they respond to the apparent ages of entrepreneurs based on their photos—which is subject to human biases in age evaluation. As a result, the presence of bias in AI measurement that reproduces these human biases is appropriate for our measurements of apparent age. Second, over 90 % of the entrepreneurs and backers in our sample appear to be of young to middle age, ranges for which AI-based tools tend to produce more reliable estimates. Still, to provide a more comprehensive assessment of the validity and reliability of these AI-based assessments of apparent age, we present several analyses of the DeepFace tool in Appendix A.

4.2.3. Control variables

To rule out alternative explanations for our hypothesized relationships, we included several control variables related to the entrepreneur, the campaign, and the backer.

At the entrepreneur level, we accounted for the apparent sex of the entrepreneur because prior literature has extensively documented the importance of gender stereotypes in crowdfunding (e.g., Greenberg and Mollick, 2017; Johnson et al., 2018; Seigner et al., 2022). We operationalized *entrepreneurs' sex* using the DeepFace evaluations of their profile pictures. To control for stereotyping based on race (e.g., Younkin and Kuppuswamy, 2018), we used *race* dummies, also using the DeepFace evaluations of their profile pictures. We controlled for entrepreneurs' previous experience by including the number of crowdfunding *campaigns* launched (Colombo et al., 2015). Given reward-based crowdfunding's community-oriented nature (Murray et al., 2020; Nielsen and Binder, 2021), we accounted for the engagement with the platform's community through the number of *comments* and financial *contributions* entrepreneurs made on the platform. We controlled for credibility signals with dummies indicating whether an entrepreneur provided a verified *email* and/or *LinkedIn* account. We also controlled for entrepreneurs' online social capital using dummy variables indicating whether the entrepreneur posted a social media profile for *Twitter* (now also known as X) and Facebook (*FB*) on their profile page, as well as their number of *FB friends* (Skirnevskiy et al., 2017). We also included *country* dummies based on the entrepreneur's location (e.g., Allison et al., 2015).

Campaign-related control variables encompassed the *type of funding* (flexible or fixed), because Indiegogo permits setting up campaigns in a "keep-it-all" approach (coded as 1), which allows entrepreneurs to retain the funds they've raised even if their campaign falls short of its goal, as well as an "all-or-nothing" approach (coded as 0), whereby entrepreneurs only receive the funds if they at least meet their campaign goal (e.g., Huang et al., 2021). We also accounted for the funding *goal* of a campaign in US Dollars (USD) and its *duration* in days (e.g., Mollick, 2014). We controlled for the engagement of the campaign creator and the Indiegogo community with the campaign, respectively, by including count measures of *campaign updates* and *comments* (e.g., Younkin and Kuppuswamy, 2018). Because visuals typically signal a higher-quality campaign, we controlled for the inclusion of at least one *video* (Allison et al., 2015; Allison et al., 2017). To proxy emotional tone, we controlled for the *sentiment* polarity of the campaign title using the *textblob* (pypi.org/project/textblob/) Python package (Anglin et al., 2018a).

When testing hypothesis 2, we included the following backer-related controls. To control for backers' overall level of engagement with crowdfunding campaigns on Indiegogo, we collected each backer's number of launched *campaigns*, number of posted *comments*, and number of campaign *contributions* from their profile pages. We also included dummies for whether a backer's *email* and *LinkedIn*

[5] We also considered using funds pledged as a dependent variable. However, due to the international nature of crowdfunding, this approach introduces complexities in cross-country comparisons. Such a task would necessitate the conversion of multiple currencies over a decade-long period into a single unified currency, along with subsequent adjustments for purchasing power parity. These adjustments could skew the analysis.

were verified and whether they linked to a social media account on *Twitter* and *FB*, also collected from backers' profile pages, and for their number of *FB friends*. As we did with our sampled entrepreneurs, we used DeepFace estimates to produce controls for the backer's *sex* and *race* based on the backers' uploaded profile photo. For location effects, we included *country* dummies based on backers' location in their profiles.

4.3. Descriptive statistics

Tables 1 and 2 present the descriptive statistics for our two samples, along with the pairwise correlations of our non-categorical, non-transformed variables. Table 1 displays the data we used to estimate the relationship between entrepreneurs' apparent ages and the performance of their crowdfunding campaigns (i.e., hypothesis 1). Table 2 presents the data we used to estimate the relationship between entrepreneurs' and backers' apparent ages (i.e., hypothesis 2). Our samples are largely reflective of those employed in prior crowdfunding research. Concerning our variables of interest, our data featured an average *percentage of funding goal* of 0.96 (vs. 0.67 in Scheaf et al., 2018), an average *number of backers* standing at 109.00 (vs. 100.05 in Anglin et al., 2018b), and an average *entrepreneur age* of 30.37 (vs. 38.61 in Seigner and Milanov, 2023). The average *backer age* was comparably close at 32.02.

4.4. Empirical approach

We used multilevel generalized linear models to estimate the proposed relationships. This reflects the inherently nested structure of reward-based crowdfunding platforms. Multilevel models allowed us to account for unobserved heterogeneity and competition among campaigns in the same category and at the same time by nesting the campaigns in *categories* and *years*. To address the skewness of our two measures of crowdfunding performance, we applied an inverse hyperbolic sine (IHS) transformation (e.g., Anglin et al., 2018b; Seigner and Milanov, 2023). This transformation is similar to a logarithmic transformation but benefits by being defined at pre-transformation values of 0, which is common in our data (Friedline et al., 2015).

To examine the relationship between entrepreneurs' and backers' apparent ages, we used a negative binomial model because our dependent variable for testing hypothesis 2—*backer apparent age*—is measured in discrete years and is overdispersed. Given that our unit of analysis for examining the relationship between entrepreneurs' and backers' apparent ages is an investment, we nested these investments within individual crowdfunding campaigns to account for unobserved heterogeneity at the campaign level.

Supporting multilevel nesting, intraclass correlations for our null models largely fell within the range of 0.05 to 0.30, consistent with values typically observed in multilevel structures (Aguinis et al., 2013). For the null models, the intraclass correlations are 0.12 (for *categories*) and 0.36 (for *categories* and *years*) when predicting *percentage of funding goal,* 0.05 (for *categories*) and 0.16 (for *categories* and *years*) when predicting *number of backers*, and 0.23 (for *campaigns*) when predicting *backer age*. Additionally, our analyses revealed no indication of confounding multicollinearity, with maximum variance inflation factors for continuous variables, at 1.40 when predicting the *percentage of funding goal*, at 1.41 when predicting the *number of backers*, and at 3.09 when predicting *backer apparent age* (see Johnston et al., 2018). For all our models, we computed and report heteroskedasticity-robust standard errors.

4.5. Results

Table 3 shows our regression analyses. Models 1, 2, and 5 include only control variables. Models 3 and 4 (pertaining to hypothesis 1) and Model 6 (pertaining to hypothesis 2) test our proposed relationships.[6]

Hypothesis 1 contended that, in reward-based crowdfunding, the apparent age of the entrepreneur would be negatively associated with the campaign's crowdfunding performance. Both Model 3, which predicts *percentage of funding goal*, and Model 4, which predicts *number of backers*, produced negative and statistically significant estimates for *entrepreneur's apparent age* (Model 3: $b = -0.004$, $p < 0.001$; Model 4: $b = -0.005$, $p < 0.001$). Hence, the results for both dependent variables support our first hypothesis. For each year older an entrepreneur appears to be, they tend to get 0.583 % less of their funding goal and 0.535 % fewer backers.[7] A ten-year increase in the entrepreneur's apparent age would be expected to result in 5.83 percentage points less funding (i.e., USD 2933.42 for the average campaign in our sample) and 5.829 fewer backers.

Hypothesis 2 contended that, in reward-based crowdfunding, the apparent age of the entrepreneur would be positively associated with the apparent ages of backers funding their campaign. Model 6, predicting *backer's apparent age*, produced a positive and statistically significant estimate for *entrepreneur's apparent age* ($b = 0.005$, $p < 0.001$). Hence, the results support our second hypothesis. For each year older an entrepreneur appears to be, their campaign backers' apparent age increases by 0.466 %. A ten-year increase in the entrepreneur's apparent age would be expected to result in backers who are approximately 1.498 years older.

[6] The difference in the number of observations between models predicting *number of backers* and *percentage of funding goal* is due to the latter variable not being defined when a campaign's predetermined funding goal is set to 0.

[7] Given the IHS transformation, we calculate the effect of the estimate *b* of a one-year increase in the entrepreneur's age as being associated with approximately a $(b\sqrt{((y_{mean}\hat{}2 + 1)/y_{mean})} \times 100)\%$ change in the outcome variable *y* (i.e., *percentage of funding goal* or *number of backers*), holding all other variables constant (Bellemare and Wichman, 2020).

Table 1
Hypothesis 1 descriptive statistics and pairwise correlations of all non-categorical variables (non-transformed).

Variables	Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Percentage of funding goal	0.955	8.518	1.000								
(2) Number of Backers	109.001	701.723	0.244**	1.000							
(3) Entrepreneur apparent age	30.373	5.36	−0.007	0.002	1.000						
(4) Entrepreneur sex = woman	1.196	0.397	−0.014**	−0.026**	0.110**	1.000					
(5) Entrepreneur campaigns	1.847	2.134	0.081**	0.025**	0.019**	−0.036**	1.000				
(6) Entrepreneur comments	3.354	26.761	0.050**	0.117**	0.007	−0.025**	0.190**	1.000			
(7) Entrepreneur contributions	3.396	10.751	0.079**	0.042**	0.013**	0.002	0.181**	0.181**	1.000		
(8) Entrepreneur email verified	0.545	0.498	0.039**	0.061**	0.021**	−0.003	0.110**	0.030**	0.054**	1.000	
(9) Entrepreneur FB friends	445.87	924.99	0.042**	0.010*	0.006	−0.008+	0.159**	0.024**	0.086**	0.075**	1.000
(10) Entrepreneur LI Verified	0.083	0.276	−0.006	0.000	0.017**	−0.004	0.041**	0.006	0.033**	0.168**	0.163**
(11) Entrepreneur Twitter URL exists	0.409	0.492	0.011*	0.030**	0.005	−0.009+	0.121**	0.068**	0.085**	0.042**	0.118**
(12) Entrepreneur FB URL exists	0.573	0.495	0.000	0.009+	0.018**	−0.030**	0.103**	0.045**	0.040**	0.061**	0.143**
(13) Sentiment polarity	0.044	0.184	0.008+	0.013**	−0.003	0.008	−0.015**	0.005	−0.001	0.003	0.007
(14) Campaign funding type = flexible	0.964	0.185	−0.054**	−0.087**	0.011*	0.023**	−0.015**	−0.024**	−0.054**	−0.049**	0.006
(15) Campaign funding goal (USD)	50,315.432	4,906,810.3	−0.001	0.001	−0.002	−0.003	−0.003	−0.001	−0.001	−0.005	−0.002
(16) Campaign duration (days)	47.083	55.062	−0.006	−0.009+	0.030**	0.002	−0.034**	0.003	0.005	0.006	0.053**
(17) Campaign number of updates	5.207	9.265	0.084**	0.254**	0.033**	−0.032**	0.077**	0.248**	0.139**	0.098**	0.062**
(18) Campaign number of comments	19.218	212.987	0.161**	0.550**	0.003	−0.021**	0.017**	0.196**	0.022**	0.021**	−0.002
(19) Campaign video URL exists	0.793	0.405	0.009+	0.041**	−0.011*	−0.017**	−0.024**	0.021**	0.021**	0.085**	0.021**

Variables	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(10) Entrepreneur LI verified	1.000									
(11) Entrepreneur Twitter URL exists	0.115**	1.000								
(12) Entrepreneur FB URL exists	0.090**	0.500**	1.000							
(13) Sentiment polarity	0.009+	0.014**	0.017**	1.000						
(14) Campaign funding type = flexible	−0.016**	−0.022**	−0.009+	−0.009+	1.000					
(15) Campaign funding goal (USD)	−0.001	−0.004	−0.006	−0.001	0.001	1.000				
(16) Campaign duration (days)	0.052**	−0.007	0.007	−0.010*	0.025**	0.002	1.000			
(17) Campaign number of updates	0.058**	0.138**	0.092**	0.021**	−0.141**	−0.002	0.012*	1.000		
(18) Campaign number of comments	0.000	0.023**	0.011*	0.006	−0.047**	0.001	−0.002	0.182**	1.000	
(19) Campaign video URL exists	0.026**	0.073**	0.074**	0.017**	−0.015**	−0.009+	−0.061**	0.118**	0.024**	1.000

Notes.
** $p < 0.01$.
* $p < 0.05$.
+ $p < 0.1$.

Table 2
Hypothesis 2 descriptive statistics and pairwise correlations of all non-categorical variables (non-transformed).

Variables	Mean	Std. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Backer apparent age	32.02	6.113	1.000									
(2) Entrepreneur apparent age	30.62	5.567	0.131**	1.000								
(3) Entrepreneur sex = woman	1.15	0.357	0.001	0.092**	1.000							
(4) Entrepreneur campaigns	2.351	3.012	0.017	−0.075**	−0.070**	1.000						
(5) Entrepreneur comments	26.965	110.504	0.047**	0.049**	−0.091**	0.065**	1.000					
(6) Entrepreneur contributions	7.449	15.344	−0.018+	−0.024*	−0.001	0.316**	0.273**	1.000				
(7) Entrepreneur email verified	0.747	0.435	0.056**	0.015	−0.116**	0.138**	0.113**	0.057**	1.000			
(8) Entrepreneur FB friends	564.846	1120.039	−0.005	−0.036**	−0.025*	0.167**	0.010	0.221**	0.007	1.000		
(9) Entrepreneur LI verified	0.107	0.309	0.013	−0.006	−0.005	0.023*	0.015	0.039**	0.131**	0.159**	1.000	
(10) Entrepreneur Twitter URL exists	0.49	0.5	0.012	−0.027*	−0.031**	0.094**	0.132**	0.048**	0.060**	0.115**	0.121**	1.000
(11) Entrepreneur FB URL exists	0.606	0.489	0.025*	−0.021+	−0.036**	0.087**	0.093**	0.038**	0.072**	0.120**	0.104**	0.604**
(12) Backer campaigns	0.611	1.302	−0.103**	−0.019+	0.082**	0.081**	−0.081**	0.094**	−0.110**	0.014	−0.027*	−0.032**
(13) Backer comments	4.929	20.806	0.019+	−0.018+	−0.048**	0.021+	0.036**	0.027*	0.059**	−0.013	0.048**	0.000
(14) Backer contributions	16.234	23.999	0.074**	−0.001	−0.012	0.111**	0.029**	0.130**	0.102**	0.018+	0.028*	0.008
(15) Backer email verified	0.577	0.494	0.023*	0.013	−0.074**	0.069**	0.063**	0.023*	0.271**	−0.029**	0.062**	0.005
(16) Backer FB friends	362.777	729.466	−0.048**	−0.015	0.019+	−0.029**	−0.029**	0.031**	−0.036**	0.098**	0.023*	−0.023*
(17) Backer LI verified	0.071	0.257	−0.012	−0.008	−0.005	−0.024*	−0.008	0.002	0.062**	−0.011	0.156**	0.041**
(18) Backer FB URL exists	0.282	0.45	−0.012	0.007	0.028**	−0.017	−0.071**	0.022*	−0.093**	0.041**	0.037**	0.028**
(19) Backer Twitter URL exists	0.226	0.418	−0.029**	−0.005	0.037**	−0.008	−0.056**	0.003	−0.075**	0.009	0.033**	0.136**
(20) Backer sex = woman	1.172	0.378	0.055**	0.019+	0.181**	−0.043**	−0.008	−0.002	−0.065**	0.020+	−0.009	−0.006
(21) Sentiment polarity	0.064	0.2	−0.003	0.003	−0.001	−0.006	−0.043**	−0.014	0.045**	−0.033**	0.000	0.035**
(22) Campaign funding type = flexible	0.886	0.317	−0.015	0.030**	0.042**	−0.025*	0.008	−0.027*	−0.112**	0.017	−0.013	−0.060**
(23) Campaign funding goal (USD)	52,470.183	178,830.11	−0.004	0.100**	−0.058**	−0.063**	0.062**	−0.034**	0.056**	0.000	−0.028*	−0.021+
(24) Campaign duration (days)	43.7	33.238	−0.006	0.040**	0.011	0.000	0.057**	0.056**	−0.026*	0.051**	−0.001	−0.030**
(25) Campaign number of updates	18.185	24.046	0.026*	0.144**	−0.142**	0.005	0.341**	0.044**	0.238**	0.035**	0.043**	0.051**
(26) Campaign number of comments	751.602	2759.575	0.014	0.121**	−0.107**	−0.014	0.482**	−0.015	0.140**	−0.015	−0.054**	0.061**
(27) Campaign video URL exists	0.915	0.279	−0.015	−0.006	−0.047**	−0.022*	0.053**	−0.009	0.119**	0.000	0.035**	0.033**

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Table 2 (*continued*)

Variables	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(11) Entrepreneur FB URL exists	1.000											
(12) Backer campaigns	0.003	1.000										
(13) Backer comments	0.007	−0.005	1.000									
(14) Backer contributions	0.024*	0.016	0.216**	1.000								
(15) Backer email verified	0.024*	0.032**	0.047**	0.127**	1.000							
(16) Backer FB friends	0.015	0.105**	0.000	0.017	−0.025*	1.000						
(17) Backer LI verified	0.034**	0.010	0.019+	0.011	0.128**	0.115**	1.000					
(18) Backer FB URL exists	0.097**	0.231**	−0.012	−0.040**	−0.026*	0.192**	0.124**	1.000				
(19) Backer Twitter URL exists	0.057**	0.140**	−0.003	0.023*	−0.045**	0.120**	0.153**	0.517**	1.000			
(20) Backer sex = woman	−0.023*	0.013	−0.069**	−0.101**	−0.070**	0.022*	−0.014	0.003	0.036**	1.000		
(21) Sentiment polarity	0.053**	−0.030**	0.018+	−0.009	0.004	−0.014	0.016	−0.037**	−0.029**	−0.017	1.000	
(22) Campaign funding type = flexible	−0.049**	0.095**	−0.013	−0.058**	−0.056**	0.026*	−0.006	0.068**	0.058**	0.026*	−0.068**	1.000
(23) Campaign funding goal (USD)	−0.074**	−0.046**	0.002	−0.032**	−0.013	−0.018+	−0.016	−0.018+	0.009	−0.011	−0.041**	0.008
(24) Campaign duration (days)	−0.003	0.039**	0.004	−0.003	−0.034**	0.022*	−0.002	0.056**	0.015	−0.027*	−0.037**	−0.003
(25) Campaign number of updates	−0.016	−0.158**	0.072**	0.020+	0.072**	−0.049**	−0.001	−0.092**	−0.050**	−0.044**	−0.008	−0.089**
(26) Campaign number of comments	0.033**	−0.111**	0.057**	0.050**	0.080**	−0.060**	0.008	−0.078**	−0.057**	−0.055**	−0.027*	0.029**
(27) Campaign video URL exists	0.031**	−0.071**	0.013	0.007	0.062**	0.002	0.014	−0.051**	−0.026*	−0.049**	0.034**	−0.036**

Variables	(23)	(24)	(25)	(26)	(27)
(23) Campaign Funding Goal (USD)	1.000				
(24) Campaign Duration (Days)	0.078**	1.000			
(25) Campaign Number of Updates	0.362**	0.058**	1.000		
(26) Campaign Number of Comments	0.116**	0.060**	0.298**	1.000	
(27) Campaign Video URL Exists	0.026*	−0.042**	0.130**	0.071**	1.000

Notes.
** $p < 0.01$.
* $p < 0.05$.
+ $p < 0.1$.

Table 3
Entrepreneur apparent age effects on percentage of funding goal, number of backers, and backer age.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Controls percentage of funding goal	Controls number of backers	Main effect percentage of funding goal	Main effect number of backers	Controls backer age	Main effect backer age
Entrepreneur sex = woman	0.004	0.042*	0.010	0.050**	0.008	0.001
	(0.007)	(0.017)	(0.007)	(0.017)	(0.007)	(0.007)
Entrepreneur campaigns	0.026***	−0.014	0.026***	−0.013	0.002+	0.002*
	(0.006)	(0.013)	(0.006)	(0.013)	(0.001)	(0.001)
Entrepreneur comments	0.000+	−0.001*	0.000+	−0.001*	−0.000	−0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Entrepreneur contributions	0.003**	0.010***	0.003**	0.010***	−0.000	−0.000
	(0.001)	(0.002)	(0.001)	(0.002)	(0.000)	(0.000)
Entrepreneur email verified	0.019**	0.098***	0.020**	0.100***	0.013+	0.013*
	(0.007)	(0.015)	(0.007)	(0.015)	(0.007)	(0.007)
Entrepreneur FB friends	0.000	0.000***	0.000	0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Entrepreneur LI verified	−0.079***	−0.183***	−0.078***	−0.182***	−0.002	−0.003
	(0.010)	(0.025)	(0.010)	(0.025)	(0.008)	(0.008)
Entrepreneur Twitter URL exists	0.004	0.156***	0.003	0.155***	−0.000	0.000
	(0.006)	(0.016)	(0.006)	(0.016)	(0.006)	(0.006)
Entrepreneur FB URL exists	−0.039***	−0.047***	−0.038***	−0.046***	0.010	0.010
	(0.009)	(0.013)	(0.008)	(0.013)	(0.006)	(0.006)
Sentiment polarity	−0.011	0.002	−0.012	0.002	−0.000	−0.003
	(0.014)	(0.028)	(0.014)	(0.028)	(0.013)	(0.012)
Campaign funding type = flexible	−0.587***	−0.837***	−0.585***	−0.835***	0.003	0.001
	(0.032)	(0.066)	(0.032)	(0.065)	(0.008)	(0.008)
Campaign funding goal (USD)	−0.000**	0.000*	−0.000**	0.000*	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Campaign duration (days)	−0.001+	−0.001*	−0.001+	−0.001*	−0.000	−0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Campaign number of updates	0.012***	0.045***	0.012***	0.046***	0.000+	0.000
	(0.003)	(0.004)	(0.003)	(0.004)	(0.000)	(0.000)
Campaign number of comments	0.000*	0.001**	0.000**	0.001**	−0.000**	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Campaign video URL exists	−0.044***	0.442***	−0.044***	0.442***	−0.018*	−0.016+
	(0.010)	(0.026)	(0.010)	(0.026)	(0.009)	(0.009)
Backer campaigns					−0.013***	−0.013***
					(0.002)	(0.002)
Backer comments					0.000	0.000
					(0.000)	(0.000)
Backer contributions					0.000***	0.000***
					(0.000)	(0.000)
Backer email verified					0.001	−0.000
					(0.005)	(0.005)
Backer FB Friends					−0.000**	−0.000**
					(0.000)	(0.000)
Backer LI Verified					−0.014	−0.013
					(0.010)	(0.009)
Backer FB URL exists					0.016*	0.016*
					(0.007)	(0.006)
Backer Twitter URL exists					−0.012+	−0.011+
					(0.007)	(0.007)
Backer sex = woman					0.031***	0.031***
					(0.006)	(0.006)
Entrepreneur apparent age			−0.004***	−0.005***		0.005***
			(0.000)	(0.001)		(0.000)
Constant	1.232***	4.553***	1.348***	4.707***	3.190***	3.090***

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Table 3 (*continued*)

Variables	(1) Controls percentage of funding goal	(2) Controls number of backers	(3) Main effect percentage of funding goal	(4) Main effect number of backers	(5) Controls backer age	(6) Main effect backer age
	(0.059)	(0.080)	(0.057)	(0.079)	(0.068)	(0.069)
Observations	40,948	41,602	40,948	41,602	8337	8337
Number of groups	34	34	34	34	4315	4315
Entrepreneur country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Entrepreneur race dummies	Yes	Yes	Yes	Yes	Yes	Yes
Backer race dummies					Yes	Yes
Backer country dummies					Yes	Yes
Year launched dummies					Yes	Yes
Category dummies					Yes	Yes
Log pseudolikelihood	−28,185	−62,884	−28,144	−62,870	−26,141	−26,088

Notes. Robust standard errors in parentheses.
*** $p < 0.001$.
** $p < 0.01$.
* $p < 0.05$.
$^{+}$ $p < 0.1$.

4.6. Robustness analyses

We present the results of our robustness analyses in Table 4. To examine the robustness of our findings to outliers, we winsorized our dependent variables at the 5th and 95th percentiles. The results confirmed our main findings, supporting both hypothesis 1 (Models 1 and 2) and 2 (Model 19).

Crowdfunding campaigns with very high or low funding goals may systematically differ from campaigns with more moderate goals. As a result, some studies limit their samples to campaigns with funding goals ranging from USD 100 to USD 1,000,000 (e.g., Mollick, 2014; Seigner and Milanov, 2023). We replicated our main analyses, including only campaigns with funding goals in this range. The results again confirmed our main findings, supporting both hypothesis 1 (Models 3 and 4) and 2 (Model 20).

While our full dataset contained campaigns between 2008 and 2021, we examine the robustness of our findings based on years we had full coverage—2017 and 2018. These analyses reinforced our initial results, affirming both hypothesis 1 (Models 5 and 6) and 2 (Model 21).

Recognizing that differences among entrepreneurs of similar age might be insubstantial, we constructed age brackets of 5 and 10 years and revisited our hypothesis 2 model using an ordered logit estimation. This analysis reaffirmed the previously observed relationship, with estimated coefficients increasing with age (Models 7 & 8).

In our main analysis, we used negative binomial estimates to examine the relationship between entrepreneurs' and backers' apparent ages (i.e., hypothesis 2). We replicated this analysis using both Poisson estimates as they are relatively robust compared to negative binomial models (Blackburn, 2015) and linear estimates because age can also be considered as a continuous variable (Hailpern and Visintainer, 2003). Both results confirmed our main findings, supporting hypothesis 2 (Model 17 with Poisson and 18 with linear estimates).

Finally, we addressed three sources of potential endogeneity in our analyses. First, an entrepreneur's apparent age was not a randomly assigned treatment. An imbalance in ages observed in our sample could result in biased estimates for hypothesis 1. To address this concern, we employed coarsened exact matching to balance covariates between artificially created treatment (i.e., older entrepreneurs) and control (i.e., younger entrepreneurs) groups. Because coarsened exact matching requires a dummy treatment (Blackwell et al., 2009), we split entrepreneurs' ages at the 50th, 75th, and 90th percentiles to examine robustness to how the comparison groups were created. We used all nesting and control variables to create observational matches that share the same values. Any cases that did not have a match were excluded from the analysis dataset. Except for the 50th percentile split (in Model 10, where we found a negative but non-significant estimate of older age on *number of backers*), we found support for hypothesis 1 (see Models 9, 11, 12, 13, and 14).

The second endogeneity concern stems from our sample selection on the basis of campaigns where the entrepreneur's profile picture contains a face. If the choice to post a profile picture including a face is influenced by unobserved factors that also influence crowdfunding performance, this could result in selection bias. We employed a Heckman correction to assess the threat of this selection effect (Heckman, 1979). Specifically, we estimated a probit model using our collected data before filtering out campaigns without a face in the entrepreneur's profile picture to examine if entrepreneurs' faces in their profile photos depended on an exclusion restriction

Table 4
Robustness checks.

Variables	(1) Main effect percentage of funding goal winsorized	(2) Main effect number of backers winsorized	(3) Main effect percentage of funding goal w goal btw 100 & 1,000,000	(4) Main effect number of backers w goal btw 100 & 1,000,000	(5) Main effect percentage of funding goal years 2017 & 2018	(6) Main effect number of backers years 2017 & 2018	(7) Main effect backer age 10 year bins	(8) Main effect backer age 5 year bins
Entrepreneur Apparent Age	−0.004***	−0.005***	−0.003***	−0.005***	−0.003***	−0.007**		
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)		
…between 30 and 40							0.500***	
							(0.067)	
…between 40 and 50							1.087***	
							(0.167)	
…above 50							1.080*	
							(0.510)	
…between 25 and 30								0.247*
								(0.113)
…between 30 and 35								0.572***
								(0.113)
…between 35 and 40								0.765***
								(0.138)
…between 40 and 45								1.075***
								(0.196)
…between 45 and 50								1.596***
								(0.321)
…between 50 and 55								0.896
								(0.604)
…above 55								2.844***
								(0.481)
Constant	1.140***	4.567***	1.330***	4.711***	1.305***	4.687***		
	(0.045)	(0.061)	(0.051)	(0.080)	(0.067)	(0.108)		
Observations	40,948	41,602	40,873	40,873	6603	6603	8337	8337
Number of groups	34	34	34	34	33	33	4315	4315
Main analysis controls and specifications	Yes	Yes	Yes	Yes	Yes	Yes		
Main analysis controls							Yes	Yes
Log pseudolikelihood	−18,268	−58,106	−27,341	−61,205	−4223	−9680	−7755	−12,458

(*continued on next page*)

Table 4 (*continued*)

	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Variables	Main effect percentage of funding goal CEM	Main effect number of Backers CEM	Main effect percentage of funding goal CEM	Main effect number of Backers CEM	Main effect percentage of funding goal CEM	Main effect number of Backers CEM	Main effect percentage of funding goal Heckman	Main effect number of Backers Heckman	Main effect backer age poisson	Main effect Backer age linear	Main effect Backer age winsorized	Main effect Backer age w goal btw 100 & 1,000,000	Main effect Backer age w years 2017 & 2018
Entrepreneur apparent age							−0.004***	−0.005***	0.005***	0.148***	0.004***	0.005***	0.002*
							(0.000)	(0.001)	(0.000)	(0.016)	(0.000)	(0.001)	(0.001)
…in Top 50 %	−0.031***	−0.034											
	(0.009)	(0.024)											
…in Top 25 %			−0.040***	−0.060*									
			(0.010)	(0.026)									
…in Top 10 %					−0.038*	−0.102*							
					(0.015)	(0.040)							
Inverse Mills ratio							−0.010	−0.059+					
							(0.019)	(0.039)					
Constant	0.504***	4.161***	0.503***	4.171***	0.492***	4.169***	1.364***	4.809***	3.090***	20.983***	3.096***	3.104***	3.390***
	(0.007)	(0.018)	(0.007)	(0.018)	(0.009)	(0.024)	(0.071)	(0.110)	(0.069)	(2.242)	(0.064)	(0.075)	(0.059)
Observations	11,020	11,054	10,282	10,322	6473	6497	40,921	41,575	8337	8337	8337	7683	1923
Number of groups							34	34	4315	4315	4315	4130	891
Main analysis controls and specifications							Yes	Yes	Yes	Yes	Yes	Yes	Yes
Matched on main analysis controls	Yes	Yes	Yes	Yes	Yes	Yes							
Log pseudolikelihood	−6125	−16,836	−5818	−15,915	−3734	−10,047	−28,124	−62,835	−26,088	−26,281	−25,392	−23,971	−5981

Notes. Robust standard errors in parentheses.

*** $p < 0.001$.

** $p < 0.01$.

* $p < 0.05$.

+ $p < 0.1$.

variable (Certo et al., 2016). In line with prior crowdfunding studies, we considered the frequency of faces in profile pictures uploaded by entrepreneurs in the same category during the preceding month as this exclusion restriction variable (Duan et al., 2020; Seigner et al., 2022).[8] While this metric reflects the imitation behavior observed among crowdfunding campaign creators, faces in others' campaigns are unlikely to influence a focal entrepreneur's crowdfunding performance. This first-stage probit model validated the inclusion of the exclusion restriction variable, showing a significant estimate ($b = 3.345$, $p < 0.001$). We then included the resulting inverse Mills ratio in our initial models for hypothesis 1. The resulting models supported our initial results and revealed negative and statistically significant estimates for an entrepreneur's apparent age on crowdfunding performance (Models 15 and 16).[9]

A third potential endogeneity concern arises from omitted variable bias. Previous crowdfunding research suggests that structural characteristics of photos may influence crowdfunding performance (e.g., Blanchard et al., 2022; Zhang, 2022). If these characteristics are sufficiently highly correlated with both *entrepreneur's apparent age* and our measures of crowdfunding performance, this could lead to endogeneity concerns. To assess the threat of this concern, we examined the Impact Threshold of a Confounding Variable (ITCV) estimates for our models (see Busenbark et al., 2022). This approach quantifies the minimum partial correlation an omitted variable must possess with both the independent and dependent variables to invalidate the estimated relationship (Busenbark et al., 2022; Frank, 2000). We found ITCV estimates for hypothesis 1 of 0.184 for *percentage of funding goal* and 0.131 for *number of backers*, and for hypothesis 2 of 0.339. A common approach for evaluating the risk associated with estimated ITCV values is to examine the partial correlations of the included control variables with the independent and dependent variables (e.g., Gamache et al., 2019; Oliver et al., 2018; Yan et al., 2023). None of our control variables exhibit a partial correlation with both the predictor (*entrepreneur apparent age*) and outcome variables above the ITCV estimates, suggesting the risk of endogeneity from omitted variables is relatively low.

To evaluate whether structural photographic elements (i.e., brightness, contrast, blurriness) pose a risk in excess of our existing controls, we had 93 respondents from Mechanical Turk evaluate 30 entrepreneurs' profile photos for each structural element (see Appendix A for details regarding this data collection). We obtained partial correlations of *entrepreneur's apparent age* with blurriness ($r = 0.03$), brightness ($r = -0.01$), and contrast ($r = 0.02$). Because none of these estimates approach the calculated ITCVs, this suggests that the risk of these structural elements introducing sufficient endogeneity to invalidate our results is low.

4.7. Post hoc analyses

We conducted several *post hoc* analyses to explore relationships in our data that were not hypothesized *a priori*. Detailed results are presented in Appendix C.

Our first hypothesis concerns how the apparent age of entrepreneurs influences crowdfunding performance. We test this hypothesis using a sample of crowdfunding campaigns where all profile photos contain the entrepreneur's face. However, if this leads backers to provide less funding as the apparent age of the entrepreneur increases, older entrepreneurs may be incented not to use a photo of themselves in their profile to avoid triggering this bias. We conducted additional analyses in which we examined the effect of having a face in the profile photo.[10] Our analyses indicated that while a face in a profile picture is negatively correlated with the percentage of the funding goal achieved ($b = -0.011$, $p < 0.001$), it positively correlates with the number of backers supporting a campaign ($b = 0.043$, $p < 0.001$).

We were also interested in the extent to which age interacts with other sociodemographic attributes of entrepreneurs. For instance, research examining the role of age in organizations has also highlighted that evaluations of age and sex are frequently intertwined (e.g., Chatman et al., 2022; Zhao et al., 2021). We examined whether sex and age interacted to influence crowdfunding performance; however, we found no significant relationships.

Similarly, an individual's culture can influence how they view age (e.g., Löckenhoff et al., 2009). Building on Hofstede's (2011) cultural dimensions, scholars have argued that age stereotypes may differ, for example, in more collectivist (North and Fiske, 2015), masculine, and long-term oriented societies (Ng and Lim-Soh, 2021). To examine whether these dimensions influence how reward-based crowdfunding backers evaluate age, we replaced the country dummies with the Hofstede dimensions and estimated their interactions with *entrepreneur's apparent age* on crowdfunding performance. Surprisingly, we found no significant interaction estimates to empirically support the interaction of culture and age.

5. Discussion

Crowdfunding has been lauded for its potential to democratize capital access for marginalized entrepreneurs (Cumming et al., 2021; Mollick and Robb, 2016; Serwaah, 2022). Though it yields positive outcomes for women (Gafni et al., 2021; Greenberg and Mollick, 2017; Johnson et al., 2018; Wesemann and Wincent, 2021), evidence of racial discrimination suggests these effects are not

[8] For detailed results of the first stage regression, see Appendix B. In this model, we also controlled for all previously mentioned non-picture-related confounds and included categories and years as dummies.

[9] The differences in estimates for *entrepreneur apparent age* on *percentage of funding goal* ($b_{\text{main model}} = -0.0040269$ vs. $b_{\text{Heckman model}} = -0.0040175$, both $p < 0.001$) and number of backers ($b_{\text{main model}} = -0.0053477$ versus $b_{\text{Heckman model}} = -0.0053299$, both $p < 0.001$) are not directly evident from the tables, due to the limited decimals. However, the close similarity in coefficients, coupled with the insignificance of the inverse Mills ratio and the strong exclusion restriction variable, suggests that selection bias is not a concern.

[10] Face-related control variables were removed, as not all observations show a face. We included category and year dummies rather than using a multilevel nested structure to achieve convergence.

universal (Younkin and Kuppuswamy, 2018). This mixed evidence raises questions regarding which sociodemographic groups benefit from the emergence of reward-based crowdfunding as a fundraising tool for entrepreneurs: in particular, do older entrepreneurs benefit from reward-based crowdfunding?

Drawing from status-based discrimination (e.g., Thébaud, 2015; Thébaud and Sharkey, 2016) and homophily theories (e.g., Greenberg and Mollick, 2017; McPherson et al., 2001), we addressed this question by formulating hypotheses on how age bias influences crowdfunding backers' decisions. Our empirical analyses revealed two primary findings. First, as the apparent age of an entrepreneur increases, both the number of backers and the funding these backers contribute to the entrepreneur's campaign diminish. Second, older-looking entrepreneurs receive more support from apparently older backers, indicating age-based homophily. We also explored whether showing faces in profile pictures affects crowdfunding performance. Interestingly, while entrepreneurs whose profile pictures featured a face attracted more backers, they achieved a smaller portion of their funding goal. These findings reveal both challenges and opportunities in reward-based crowdfunding's potential to democratize capital access across age demographics.

5.1. Contributions

Our main contribution is to the literature examining age in entrepreneurship (e.g., Azoulay et al., 2020; Lévesque and Minniti, 2006; Zhao et al., 2021). This literature indicates that age and entrepreneurial success are positively correlated (Zhao et al., 2021). In reward-based crowdfunding, backers are motivated by the rewards—generally, the products and services being developed in the campaign. Given that over 75 % of campaigns fail to deliver on that promise in a timely manner (Mollick, 2014), backers should be especially sensitive to the characteristics of entrepreneurs that would contribute to the on-time delivery of high-quality rewards. Older entrepreneurs generally have more experience (Becker, 1962), stronger problem-solving skills (Baron, 2008), and established professional networks (Colombo and Grilli, 2010), which should help them outperform younger entrepreneurs in this regard. As a result, backers should view older entrepreneurs more positively, but our findings indicate they do not. An *entrepreneur's apparent age* is negatively related to their campaigns' funding performance.

Our findings shed light on how backers interpret age and how it influences their decisions. Distinguishing between statistical (Arrow, 1973; Correll and Benard, 2006; Phelps, 1972) and status-based discrimination (Anglin et al., 2018b; Thébaud and Sharkey, 2016) provides an explanation for the counterintuitive findings. Investors motivated by economic returns should interpret age as positive (Matthews et al., 2024), associating older age with the statistical probability of entrepreneurial success. While reward-based crowdfunding backers are motivated in part by economic returns, they are amateur investors with limited information about the entrepreneur and their venture. They might not possess this deeper knowledge associating entrepreneurial success with age (i.e., Zhao et al., 2021) or may fail to consider this association when confronted by a complex, uncertain investment decision. Instead, these crowds are more likely to base their evaluations on stereotypes associated with status-based discrimination of age in entrepreneurship (Azoulay et al., 2020). While entrepreneurs' sociodemographic attributes influence funding decisions across various contexts (e.g., Ahlers et al., 2015; Franke et al., 2008; Shepherd et al., 2000), the interpretation of individual attributes (e.g., age) may vary based on the investment context. Our evidence of age discrimination against entrepreneurs suggests that crowdfunding backers are more prone to stereotypes based on established cultural beliefs, painting entrepreneurship as a "young man's game" (Lévesque and Minniti, 2006, p. 177). This is in line with reward-based crowdfunding backers making less informed, rapid decisions about comparatively small amounts of money (Colombo, 2021; Mollick, 2014). Thus, when age is of interest in entrepreneurship, it is important to understand the idiosyncrasies of specific contexts and audiences.

We also contribute to research on homophily in crowdfunding (e.g., Greenberg and Mollick, 2017; Groza et al., 2020; Klepsch, 2023; Schweisfurth et al., 2023). A big part of this conversation has focused on gender-based homophily and used activist-choice explanations for findings indicating that campaigns launched by women outperform those launched by men (e.g., Greenberg and Mollick, 2017; Groza et al., 2020; Wesemann and Wincent, 2021). These studies suggest that female backers consciously aim to level the playing field by preferentially supporting campaigns launched by female entrepreneurs because they experienced similar hardships as the entrepreneurs (Greenberg and Mollick, 2017; Wesemann and Wincent, 2021). Such an approach is appropriate for understanding gender in crowdfunding because women face adversity, not only as entrepreneurs, but in society at large (Connell, 1987; Jennings and Brush, 2013). Many backers and entrepreneurs have experienced these adversities.

While our findings indicate age as a source of homophily in reward-based crowdfunding, age homophily is more likely the result of interpersonal choice rather than activism motives. Crowdfunding platforms' digital nature may inadvertently limit the presence of the elderly. Elderly individuals are less likely to adopt digital technologies (e.g., Niehaves and Plattfaut, 2014) and less likely to form entrepreneurial intentions (Gielnik et al., 2018; Kautonen et al., 2010). These trends are reflected in our sample; over 90 % of entrepreneurs appear to be under the age of 38. Because ageism in Western societies tends to be more pronounced for elderly individuals (Cuddy et al., 2005), it is unlikely that most 'older' backers in our sample have experienced considerable age-related discrimination. Because a shared experience of hardship is central to activist choice homophily, this suggests that this form of homophily may be less frequent for age than for gender and other more populous groups in reward-based crowdfunding. However, interpersonal choice homophily requires only the perception of salient shared characteristics and values between backers and entrepreneurs.

Taken together, our findings suggest the presence of age homophily in reward-based crowdfunding rooted in interpersonal choice. However, the estimated effect size of age homophily is small: a ten-year increase in the entrepreneur's apparent age is associated with an increase in average backer age of 1.498 years. As a result, while we find statistical support for hypothesis 2, the practical implications of this finding for entrepreneurs and crowdfunding platforms may be limited.

5.2. Limitations

Our study's findings should be understood in light of its limitations. Our investigation of how entrepreneurs' apparent age influences crowdfunding performance examined how backers responded to entrepreneurs' profile photos. When a profile photo contains a face, backers are likely to assume that the pictured individual is the entrepreneur, making these photos valuable for large-scale studies of the effects of stereotypes in crowdfunding (e.g., Duan et al., 2020; Seigner and Milanov, 2023; Seigner et al., 2022). However, not all entrepreneurs choose to use a personal photo for their profile picture. While our theory suggests that backers' responses to entrepreneurs' apparent ages should be similar when observed in other media (e.g., videos, photos, and linked social media or venture websites), these media are more likely to include individuals other than the entrepreneur, affecting the validity and reliability of measurements of the entrepreneur's age. Thus, we limited our investigation to the campaign creator's profile picture.

Relatedly, we used a pre-trained artificial intelligence tool to assess the apparent age of individuals in their profile photos (i.e., Taigman et al., 2014). While the reliability and validity of measures generated by AI-based facial recognition tools make them attractive for large-scale investigations into stereotypes associated with observable attributes (see Appendix A), it is important to consider the limitations of these tools. For instance, while AI tools are improving rapidly, they are currently less accurate at estimating age from photographs of older individuals (Albiero et al., 2020) and tend to reproduce and even exaggerate human biases in their evaluation (e.g., Ganel et al., 2022). Therefore, while AI-based measurement is appropriate for our study's context, we suggest further validation to ascertain the extent of these limitations when employing them in samples that include older individuals or when theorizing regarding the effects of an entrepreneur's actual age.

In our *post hoc* analyses, we examined the interaction between the age and culture of the entrepreneur on crowdfunding performance. This analysis follows a large body of crowdfunding research using campaign-level performance to understand how entrepreneurs can influence financial resource acquisition (e.g., Anglin et al., 2022; Davis et al., 2021). However, this approach is unable to include backer-level predictors because this would violate the independence assumptions of most regression-based analyses. Although our analysis found no significant difference in age bias between cultures, the culture of the backer might have a stronger impact on the funding decision than the culture of the entrepreneur. Thus, our study offers only a limited perspective on the potential role of culture in shaping the impact of age on crowdfunding outcomes. We call for future research to examine how the cultural background of individual backers influences their reactions to the entrepreneur's age in crowdfunding.

Finally, we employed coarsened exact matching to isolate the effect of age bias while holding observed confounds constant. This approach is valuable for its ability to rule out alternative explanations for the hypothesized relationships when using field data, thus striking a balance between external and internal validity. However, a limitation is the inability to isolate causal mechanisms that are not directly observable in the data. For this, crowdfunding research has employed experiments (e.g., Greenberg and Mollick, 2017; Johnson et al., 2018; Younkin and Kuppuswamy, 2018). We thus encourage future research to complement our study by isolating and examining the mechanisms through which age-based stereotyping and homophily affect reward-based crowdfunding.

5.3. Future research

In this paper, we studied backer behavior to understand age-based homophily in reward-based crowdfunding. Examining individual backer decision-making processes is a potentially fruitful way to expand upon our findings to better understand how backers actually use heuristics in their decision-making. Research has associated heuristics with relatively poor decisions that occur when individuals lack relevant information (Tversky and Kahneman, 1974). When it comes to assessing age, even professional investors can act against their own objectives due to heuristic decision-making (e.g., Hustedde and Pulver, 1992). However, research in cognitive science has also stressed that some heuristics can improve decision-making accuracy (Gigerenzer, 1996; Gigerenzer and Gaissmaier, 2011). Future research could examine ways in which backers learn heuristics that allow them to draw on information provided to them in a campaign—such as entrepreneurs' age—to deliberately and consistently produce more accurate decisions (Bingham and Eisenhardt, 2011; Eisenhardt and Sull, 2001). Such heuristics might be less prevalent in reward-based crowdfunding, but could be more likely in equity crowdfunding where backers have a clear interest in economic returns on their typically bigger investments (Matthews et al., 2024; Mochkabadi and Volkmann, 2020). Gaining an understanding of how backers learn such heuristics, leading to investment decisions comparable to those of professional investors (Mollick and Nanda, 2016), could, in turn, make crowdfunding platforms more attractive to a wider age range of entrepreneurs (Kretschmer et al., 2022).

We observed that the average age of entrepreneurs in our sample drawn from Indiegogo (i.e., 30.37) was younger than that of a recent study drawn from Kickstarter (i.e., 38.61; Seigner and Milanov, 2023). Both platforms have proven valuable for building our understanding of reward-based crowdfunding as a source of entrepreneurial funding (e.g., Anglin et al., 2018b; Chen, 2023; Li et al., 2017; Thies et al., 2016). Nevertheless, demographic variations across these platforms may suggest potential platform-specific influences on crowdfunding outcomes (e.g., Dushnitsky et al., 2022). An ANOVA analysis indicated a statistically significant difference in entrepreneurs' and backers' ages across different campaign categories ($p < 0.001$). If these platforms differentially attract entrepreneurs and backers across these categories, this could contribute to the observed age discrepancy. Moreover, it presents an avenue for future research to investigate the emergence and dynamics of these more specialized crowdfunding communities.

Finally, our data indicate that the age range of entrepreneurs involved in reward-based crowdfunding is narrower and younger than in other entrepreneurial fundraising contexts. This demographic skew may, in part, stem from older individuals' less favorable perceptions of online financial transactions (e.g., Mattila et al., 2003; Sum Chau and Ngai, 2010). However, as 'digital natives'—individuals more accustomed to online financial transactions—get older, the age ranges of backers and entrepreneurs on reward-based crowdfunding platforms may also grow. This shift introduces an interesting dynamic, given that the stereotypical entrepreneur is

usually depicted as young (Lévesque and Minniti, 2006). As the age range of entrepreneurs on crowdfunding platforms broadens, the average entrepreneur's apparent age will increasingly diverge from the stereotype of youth. This creates interesting avenues for future research. One promising direction is to explore whether there is a critical point beyond which entrepreneurs become so dissimilar to the entrepreneurial stereotype that the age-related penalty identified in our study intensifies. Such research would both deepen our understanding of how shifting narratives around age and changing demographics in the use of crowdfunding alter fundraising outcomes for entrepreneurs.

CRediT authorship contribution statement

Benedikt David Christian Seigner: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Aaron F. McKenny:** Conceptualization, Formal analysis, Methodology, Resources, Writing – review & editing. **David K. Reetz:** Conceptualization, Writing – original draft, Writing – review & editing.

Data availability

The authors do not have permission to share data.

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Appendices. Supplementary data

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