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How text sentiment moderates the impact of motivational cues on crowdfunding campaigns

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Abstract

Arousing funders' motives for crowdfunding participation is a challenge for every entrepreneur. According to self-determination theory, crowdfunding involvement is driven by two kinds of motivations: extrinsic and intrinsic motives. Campaign narratives with different sentimental orientations could act as cues triggering funders' motives of capital-giving differently. Thus, we focus on the moderating effect of text sentiment on the motivational cues in crowdfunding campaigns. We hypothesize that the sentiment of campaign narratives moderates the relationship between motivational cues and fundraising success. Data are selected from 270,000 campaigns of the crowdfunding website Indiegogo. Empirical analysis demonstrates that the sentiment strength positively moderates the effect of intrinsic motives on fundraising success but negatively moderates the impact of extrinsic motives on fundraising success. The findings provide managerial insights for practitioners to stimulate specified motives by using the narratives with proper sentiment strength.

Keywords: Crowdfunding, Motive, Sentiment analysis, Fundraising success

Introduction

Crowdfunding, a financing alternative, is becoming a crucial financing source for entrepreneurs and fundraisers worldwide. In 2018, the global turnover of the crowdfunding market reached USD 34 billion (Crowdfunding Statistics 2018). It is estimated to reach USD 300 billion by 2025 (Short et al. 2017). Despite the rapid development of crowdfunding, more than 80 percent of campaigns have not reached 20 percent of their target amount (Kickstarter 2017; Forbes and Schaefer 2017). Therefore, promoting the opportunity for fundraising success is a hot issue.

Scholars have studied the factors influencing the fundraising success of crowdfunding from different perspectives, such as those of the funder (Cholakova and Clarysse 2014; Wang et al. 2016; Mohammadi and Shafi 2018; Latysheva 2017; Giudici et al. 2018; Jancenelle et al. 2018; Zvilichovsky et al. 2018), fundraiser (Agrawal et al. 2013; Mollick 2014; Aprilia and Wibowo 2017), campaign (Mollick 2014; Zheng et al. 2017a, b; Barbi and Bigelli 2017; Roma et al. 2017; Kunz et al. 2017; Kuppuswamy and Bayus 2018a, b,

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Wang et al. 2017), platform (Burkett 2011; Tomczak and Brem 2013; Tep et al. 2017), and interaction among participants (Kunz et al. 2017; Wang et al. 2018a; b; Block et al. 2018).

Fundraising success is directly impacted by the funders' behavior, stimulated by their motives. Prior research has studied funding motives in crowdfunding (Schwienbacher and Larralde 2010; Jian and Shin 2015; Cholakova and Clarysse 2014; Ryu and Kim 2018; Planells 2017; Steigenberger 2017; Zvilichovsky et al. 2018; Cox and Nguyen 2018). Several theories have been employed to identify funding motives, such as altruism theory (Ryu and Kim 2018), self-determination theory (Cholakova and Clarysse 2014; Ryu and Kim 2018; Cox and Nguyen 2018), and donors' perspectives (Afsaneh et al. 2019). To promote the probability of fundraising success, fundraisers continue to struggle with how to arouse funders' motives. According to the Stimulus-Organism-Response (S-O-R) model (Mehrabian and Russell 1974), the motive is stimulated by the content that funders encounter on crowdfunding websites. The narrative of a campaign is essential on the main page of a campaign. Scholars have examined the association between fundraising success and the motivational cues of narratives. They find that different motivational cues, such as charity and reward cues (Allison et al. 2015), contribute to fundraising success.

However, funders' motives are affected by motivational cues and other factors, such as narratives' sentiment. Recent developments in sentiment analysis have led to a renewed interest in the association between the sentiment of campaigns and fundraising success. Sentiment refers to the attitude of a speaker or writer regarding the specified topic. Prior studies have verified the importance of sentiment in crowdfunding (Anderson and Saxton 2016; Reyes and Bahm 2016; Wang et al. 2017; Li et al. 2017). Particularly, sentiment influences narratives in campaigns (Wang et al. 2017). Although these studies have advanced our understanding of funding motives and sentiment in crowdfunding, little is known about whether or how sentiment moderates the association between motivational cues and fundraising success.

This study explores the moderating effect of sentiment on the association between fundraising results and campaign narratives' motivational cues. According to self-determination theory, we categorize motives into extrinsic motives (i.e., profit motive produced by external rewards or returns) and intrinsic motives (i.e., nonprofit motives produced by individual psychological needs) (Deci and Ryan 1985). We claim that the association between motivational cues and fundraising results is affected by narrative sentiment's strength and orientation. We test our hypotheses in the narratives of campaigns on the Indiegogo platform. Consistent with our prediction, sentiment strength positively moderates the effect of intrinsic motives on fundraising success, whereas it negatively moderates the effect of extrinsic motives on fundraising success. Sentiment orientation does not moderate the effect of both types of motives.

Our study contributes to the motive, sentiment, and crowdfunding literature in two significant ways. First, we pioneer in involving the sentiment feature in the study on crowdfunding motive, which extends this research stream. Prior studies have determined the association between motivational cues and fundraising success (e.g., Gerber and Hui 2013; Cholakova and Clarysse 2014; Latysheva 2017; Steigenberger 2017; Zvilichovsky et al. 2018) yet ignore the moderating effect of other linguistic features. Sentiment is an essential feature in linguistic study, significantly affecting the meaning of a

text. Second, we pioneer in involving motivational classification in sentiment analysis to identify the effect of sentiment on funders with different motives. Motives are the drivers of sentiments, and they have been used in sentiment detection. Prior studies have involved sentiment analysis in crowdfunding and investigated the overall effect of sentiment cues on fundraising success (e.g., Gao et al. 2014; Wang et al. 2017). However, these studies did not reveal the effect of sentiment on funders with different motives.

Beyond theory, these findings have important implications for practice. First, sentiment strength moderates the effects of intrinsic and extrinsic motives on fundraising success. Thus, platform managers and fundraisers should use different degrees of sentiment strength in attracting specific motives of funders. For example, when fundraisers describe a campaign's rewards, they should use words with an objective and rational sentiment. Second, positive and negative sentiments have a similar effect on stimulating funders' motives. Funders could consider different sentiment orientations in their narratives to maximize campaign appeal.

Literature review

Crowdfunding

Financial capital is a vital resource that supports entrepreneurial activities (Florin et al. 2003). Crowdfunding, a form of creative financing that persuades the public to fund via the Internet without a complex and strict standard, provides early capital support for entrepreneurs openly. Crowdfunding addresses the gap between entrepreneurs' capital needs and traditional financing modes (Mokhtarrudin et al. 2017; Paulet and Relano 2017) and offers a respite and fair financing approach for startups (Langley and Leyshon 2017).

Scholars have studied the factors related to fundraising success and funding behavior in crowdfunding. The first comprises the elements on platforms, such as page layout, the recommendation list, and the sequence of the campaign list (Burkett 2011; Qiu 2013; Colombo et al. 2015; Tep et al. 2017). The second factor is the essential attributes of a campaign, such as financing period, target amount, the return, graph, video, and endorser (Mollick 2014; Barbi and Bigelli 2017; Roma et al. 2017; Kunz et al. 2017; Kuppuswamy and Bayus 2018a, b; Wang et al. 2017; Zheng et al. 2017a, b). The third factor consists of funders' backgrounds, such as occupation, educational background, social network, and location (Agrawal et al. 2013; Conti et al. 2013; Mollick 2014; Aprilia and Wibowo 2017; Bernard and Gazel 2017).

Narratives and sentiment in crowdfunding

In crowdfunding, a campaign's information is conveyed to funders through labels, multimedia, and narratives. The campaigns' narratives, the core of the campaigns, are crucial factors in crowdfunding (Mollick 2014). Most fundraisers devote considerable effort to writing the narratives of campaigns to attract funders. Features of narratives that attract more funders remain a heated debate. A narrative's length is an essential feature, and a campaign could reach a higher funded amount with an extended narrative (Aprilia and Wibowo 2017). An extended narrative is commonly believed to express an attitude of seriousness and provides more opportunity to convince funders. In addition to narrative length, diverse language is associated with an increase in narratives' appeal (Aprilia

and Wibowo 2017). However, Block et al. (2018) argued that simple words in narratives could enhance funders' intentions, whereas the length of updates does not affect them. By combining two opinions, Moy et al. (2018) found that the relation between the length of narratives and fundraising success is a U-shaped curve, and the optimal length for narratives can be determined.

Persuasion is another consideration to influence funders (Mehlenbacher 2017; Parhankangas and Renko 2017). Based on Aristotle's persuasion theory, scholars have examined the persuasion mode in narratives and found that each mode of persuasion suits a specific campaign type (Wang et al. 2017). Similarly, other scholars divided the persuasion modes into three types (rational, credibility, or effective) and found that credibility is the most effective type in donation campaigns (Goering et al. 2011).

A crucial point of a narrative is its meaning, and fundraisers try to attract funders by expressing their advantages in narratives (Marom and Sade 2013). The words used in a narrative, such as "like" (Bi et al. 2017) and prosocial words (Pietraszkiewicz et al. 2017), could improve the model of fundraising success (Mitra and Gilbert 2014). Furthermore, Mitra and Gilbert (2014) counted all the words in narratives and found the different effects of words on fundraising success. In addition to word count, the subject described in narratives, including the fundraiser's educational background, challenges, and reason for creating the campaign, impacts fundraising success (Allison et al. 2017).

Sentiment reflects a fundraiser's attitude and state of mind in crowdfunding. Optimists are willing to create, whereas passionate creators are likely to self-achieve (Barak and Gluck-Ofri 2007; Rude et al. 2010; Zheng et al. 2016). Extant studies show that if authors like to use positive words, they are usually optimistic and highly self-confident (Wu et al. 2015). In crowdfunding, fundraisers with a positive attitude are more confident of success, and they tend to push a project forward, unlike fundraisers with a negative attitude.

Sentiment, which expresses the underlying attitude and character of a fundraiser, is an essential factor affecting funders (Wang et al. 2017; Pengnate and Riggins 2020; Morente-Molinera et al. 2018, 2019). Positive sentiment could increase the success rate of fundraising (Wang et al. 2017; Jiang et al. 2020). However, other studies found that the highly positive sentiment of narratives may decrease the intention of capital-givers to support financially (Gao et al. 2014). Particularly, prosocial funders prefer narratives with negative sentiments to positive sentiments (Jancenelle et al. 2018). Several studies have been devoted to the sentiment of narratives in crowdfunding. However, most of these studies focus on each narrative's overall sentiment on fundraising success, and only few of them consider the effect of sentiments on different themes of narratives.

Motives in crowdfunding

Motive is an essential foundation of individual behavior research. Various motives may produce similar behaviors (Hull 1943; Ajzen 1991). If underlying motives are not identified, then the behaviors caused by various motives may be considered identical. Thus, distinguishing underlying motives plays a vital role in studying behaviors. In crowdfunding, prior studies have examined funders' motives and found different types of motives, such as earning rewards, helping others, enjoying a sense of achievement, and building relationships. (Schwienbacher and Larralde 2010; Mason and Harrison 2008; Galak et al. 2011; Gerber and Hui 2013; Allison et al. 2015; Steigenberger 2017; Zvilichovsky et al.

2018; Zha et al. 2020). Profiting is a primary funding motive in traditional financing. Homo economicus theory (Persky 1995) claims that investors are rational profit seekers, and maximizing wealth is their primary concern. Similarly, scholars have found that profiting is an essential reason for funding in crowdfunding, and all other reasons are subordinate to profiting (Cholakova and Clarysse 2014; Kalecki and Toporowski 1986). The rewards of crowdfunding differ in types, such as cash, equity, souvenir, or commodity. Given the variety of rewards, crowdfunding could be used in different scenarios, such as fundraising, preselling, or promoting (Schwienbacher and Larralde 2010).

In addition to profiting, scholars have found other types of motives in crowdfunding (Nair and Ladha 2014; Lacan and Desmet 2017; Latysheva 2017; Zhao and Ying 2017; Zhao et al. 2017). Many fundraisers provide a "no-reward" option for nonprofit motives, such as funding to help others (Cholakova and Clarysse 2014; Allison et al. 2015) or funding to build a relationship (Allison et al. 2015; Cholakova and Clarysse 2014; Snyder et al. 2017). For instance, funders who engage in environmental protection projects try to join or establish related associations. Furthermore, achievement and participation are motives for funding in crowdfunding (Schwienbacher and Larralde 2010; Planells 2017), and both types of motives have been found in traditional financing (Muniz and O'Guinn 2001; Andreoni 1990; Titmuss 1970; Deakins et al. 1997).

In addition to determining funders' motives, scholars have attempted to find a framework for categorizing crowdfunding motives. Steigenberger (2017) used altruism theory in crowdfunding for identifying the altruism motive and the purchasing motive. He found that funders' behaviors are affected by both types of motives. According to altruism theory, other-oriented funders are willing to help others, while self-oriented funders seek rewards. Based on self-determination theory (Deci and Ryan 1985, 2000), other scholars have divided funders' motives into intrinsic and extrinsic motives. They found that funders have both types of motives (Cox and Nguyen 2018). Furthermore, Ryu and Kim (2018) tried to combine these two theories and categorized funders' motives into four types.

Funders' motives are stimulated by the information they read on the web pages of campaigns, especially narratives in crowdfunding. Allison et al. (2015) analyzed the linguistic cues of narratives and found that linguistic cues related to intrinsic and extrinsic motives affect fundraising success. Similarly, linguistic cues related to self-oriented and other-oriented motives affect fundraising success (Zhang and Chen 2018). These studies verified that linguistic cues in narratives stimulate funders' motives and finally affect fundraising success.

Research gaps

Although prior studies advanced our understanding of funding motives and sentiments in crowdfunding differently, the remaining gaps need to be addressed. First, prior studies investigated the motives and how a narrative affects funding results. However, only few studies explored the moderating effect of sentiment on motives. Different types of motives may differ in the inclination of attitudes and emotions. For example, donors may be more willing to help fundraisers when they read their stories of adversity (e.g., Persky 1995; Rhue and Robert 2018). Second, prior studies examined the association between the sentiment of narratives and funding behavior. However, only few studies identified

the motives of the sentiment of narratives and funding behavior. Funding behavior is produced through different motives, and the sentiment of narratives may have different effects on each type of motive.

Theory and hypotheses

Intrinsic and extrinsic motives

Self-determination theory (Deci and Ryan 1985) states that individuals' motives are classified into intrinsic and extrinsic motives. The extrinsic motive stems from external demands, whereas the spontaneous psychological needs of individuals produce the intrinsic motive. Extrinsic motive is produced in response to external rewards or returns. This type of motive is not produced spontaneously. For example, a child may be driven to complete a specific behavior by enticing the child with candy instead of an internal will. Intrinsic motive is produced in response to spontaneous psychological needs. Intrinsic motives stem from three basic psychological needs: autonomy, competence, and relatedness (Deci and Ryan 1985). (1) Autonomy refers to the self-control need of an individual. When individuals are restricted or controlled by others, their autonomy need is not fully satisfied. For example, when the teacher forces a boy to learn, his autonomy need is not satisfied, and he is likely to act rebelliously. (2) Competence refers to an individual's need to express ability and power, represented through competitions. For example, in competitive sports, athletes satisfy their competence needs by showing their ability. (3) Relatedness refers to an individual's need to build relationships with others. Relatedness needs can also be understood as an approach to feel self-existence. Building relationships with others satisfies relatedness. For instance, individuals may join a community to satisfy the need for relatedness.

In prior studies, self-determination theory has been applied to identify extrinsic and intrinsic motives (Tang et al. 2013; Allison et al. 2015; Hsieh and Chang 2016; Kelley and Alden 2016). Based on prior studies on funders' motives in crowdfunding, funders' motives are categorized into four types: helping others, a sense of achievement and enjoyment, relatedness, and rewards (Schwienbacher and Larralde 2010; Shin and Jian 2012; Cholakova and Clarysse 2014; Ryu and Kim 2018; Planells 2017; Steigenberger 2017; Zvilichovsky et al. 2018; Cox and Nguyen 2018). These motives are then generalized into intrinsic (helping others, a sense of achievement and enjoyment, relatedness) and extrinsic motives (rewards).

Motivational cues

Individuals' motives are stimulated by what they see or hear. For instance, a sense of achievement may be aroused by praise, or homesickness may be aroused if someone keeps talking about their family.

The S-O-R model is an approach to analyze the association between stimulus and behavior (Mehrabian and Russell 1974). According to the S-O-R model, stimulus (i.e., a linguistic cue), defined as factors that affect an individual's internal states, stimulates individuals to produce motives, creating the behavioral response. The S-O-R mechanism has been applied in analyzing Internet-based behavior, such as the website quality on consumers' behavior (e.g., Kim and Lennon 2013).

In crowdfunding, narratives are crucial in stimulating funders' motives. According to the S-O-R model, the narratives of campaigns motivate funding behaviors by stimulating funders' motives. Motivational cues, words related to specific motives, are a vital part of narratives to stimulate motives. Scholars have verified that many specified cues in narratives positively associate with the increasing rate of fundraising success (Mitra and Gilbert 2014). Allison et al. (2015) found that linguistic cues are related to intrinsic and extrinsic motives, and Zhang and Chen (2018) found that those related to self-oriented and other-oriented motives affect fundraising success. Therefore, we believe that motivational cues affect stimulating motives.

Hypothesis

Fundraisers may express their underlying attitudes or emotions in the narratives of campaigns. Sentiment, which reflects a fundraiser's attitude and state of mind in crowdfunding, may unconsciously affect funders (Wang et al. 2017). The narratives' sentiment and fundraising success are associated, and positive sentiment could increase fundraising success (Wang et al. 2017). However, other scholars argued that a strong positive sentiment of narratives decreases the intentions of capital-givers to support financially (Gao et al. 2014). Particularly, prosocial funders prefer narratives with negative sentiments to positive sentiments (Jancenelle et al. 2018). Prior studies focused on the effect of the overall sentiment of each narrative on fundraising success. Nevertheless, only few consider the effect of sentiment on different themes of narratives, especially motives.

Sentiment is assessed in two ways, the orientation and the strength (Thelwall et al. 2010). First, sentiment can be assessed for positive or negative orientation. A narrative with more positive words and less negative words expresses positive emotion, while a narrative with more negative words and less positive words expresses negative emotion. Second, sentiments can be assessed for strength: whether the narratives' emotion is rich or not. Subjective words (positive or negative) enhance the sentiment strength, while objective words reduce the sentiment strength. Therefore, a narrative with plenty of positive and negative words may have a neutral sentiment orientation, but it could have strong sentiment strength. The sentiment of narratives may have distinct effects on funders' different motives. According to prior studies, funders' intrinsic motives, such as helping others, building relations, or fulfilling achievement, can be identified in crowdfunding (Schwienbacher and Larralde 2010; Galak et al. 2011; Gerber and Hui 2013; Allison et al. 2015; Planells 2017; Steigenberger 2017; Zvilichovsky et al. 2018). Funders with intrinsic motives are less inclined than those who exhibit a desire for economic success with a positive attitude. They prefer to support those exhibiting hardships or concern for people (Jancenelle et al. 2018). For example, stories of adversity move people when they try to help others. Rhue and Robert (2018) proposed that negative sentiment impacts fundraising results because of empathy. These findings indicate that negative sentiment has a positive effect on intrinsic motives, and it enhances the effect of intrinsic motivational cues. Thus, we propose the following hypothesis.

H1 Negative sentiments enhance the effect of intrinsic motivational cues of narratives on fundraising success in crowdfunding.

Although intrinsic motivation is a reasonable cause of funding behaviors, scholars verified that profiting is an essential reason for funding, and all other reasons are subordinate to profiting (Cholakova and Clarysse 2014). Additionally, the increasing amount of the rewards is associated with a higher fundraising success rate (Barbi and Bigelli 2017). Extrinsic motives result in the expectation of obtaining the return promised by a fundraiser is due to (Deci and Ryan 1985). Sayim et al. (2013) proposed that positive sentiment could enhance a funder's confidence in returns. For example, funders may feel safe and excited if fundraisers praise the bright future of campaigns. However, the extrinsic motive is reduced by negative sentiment, causing the fear of uncertainty (Al-Fayoumi et al. 2019). These findings indicate that positive sentiment has a positive effect on extrinsic motives and motivational cues. Thus, we propose the following hypothesis.

H2 Positive sentiments enhance the effect of extrinsic motivational cues of narratives on fundraising success in crowdfunding.

In addition to sentiment orientation, sentiment strength reflects emotional richness. Subjective cues enhance sentiment strength, whereas objective cues weaken sentiment strength. Scholars found that rich emotional and prosocial cues of narratives positively affect prosocial funders, inclined to fund based on intrinsic motives (Pietraszkiewicz et al. 2017). Strong sentiment strength represents high emotional volatility, having significant power to move individuals' intrinsic motives. For example, prosocial funders, who are willing to help others or wish to build relationships, are easier to be moved by rich emotional narratives instead of flat narratives. Thus, we propose the following hypothesis.

H3 Strong sentiment strength enhances the effect of intrinsic motivational cues of narratives on fundraising success in crowdfunding.

Homo economicus theory claims that funders are rational profit seekers, and maximizing wealth is their primary concern (Persky 1995). These rational profit-seekers are inclined to objective and rational sentiment. Similarly, emotional volatility reduces the inclination of funders, with extrinsic motives, to fund in banking marketing, especially during financial crises (Al-Fayoumi et al. 2019). These findings indicate that weak sentiment strength positively affects extrinsic motives, enhancing the effect of extrinsic motivational cues. Thus, we propose the following hypothesis.

H4 Weak sentiment strength enhances the effect of extrinsic motivational cues of narratives on fundraising success in crowdfunding.

Figure 1 illustrates the research model. We propose that sentiment strength and orientation affect motivational cues of narratives on fundraising and affect the effects of motives on fundraising success in crowdfunding.

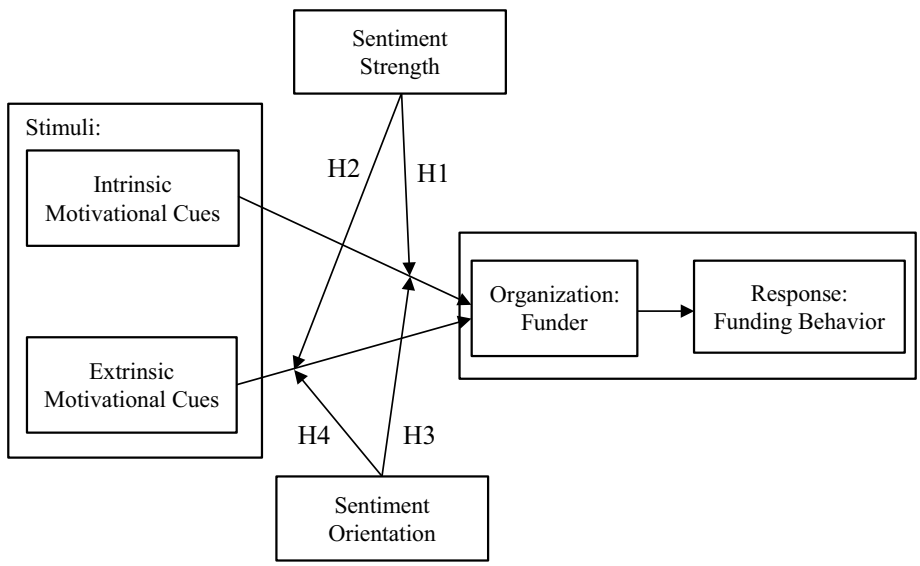

Fig. 1 Research model

Table 1 Summarization of data

Project category	Count	Success rate (%)	Funded amount (S.D.)	Average fund days (S.D.)
Community	12,111	14	2202.52(8923.94)	42.44(16.99)
Creative works	15,391	20	3103.04(16,285.93)	40.65(15.48)
Tech and innovation	16,162	15	11,695.35(113,529.28)	43.40(15.48)

Data and method

Sample

Data for our study were collected from Indiegogo, one of the world's largest crowdfunding platforms. Indiegogo has over 270,000 campaigns from 233 countries and has raised more than USD 1 billion successfully. Indiegogo tracks all fundraising information, including those related to our study and many prior studies (Heller and Badding 2012). Over 50,000 campaigns are captured in this study.

Table 1 shows a summary of the data. Indiegogo categorizes campaigns into three types: community project, creative work, and technology and innovation. Community projects include campaigns of different communities and social activities, such as environment protection, animal rights, local businesses, and community-based activities. Campaigns of creative works consist of artwork and media activities, like film, music, photography, podcasts, and TV shows. Campaigns of technology and innovation are those that improve our lifestyles, such as fashion and wearables, phones and accessories, productivity, education, and health and fitness. Among all the categories, the campaigns of creative works achieve the highest success rate of 20%, whereas community campaigns have the lowest success rate of 14%. The average funded amount is the highest in technology and innovation campaigns, reaching USD 11,695.35, whereas the average

Table 2 Samples of narratives

Category	Definition	Samples of narratives
Community	The campaigns of community and society activities	It's tough to be a small arts organization. It's tough to be a small town. But we've learned a lot in the four years that we've organized The Festival of Women Writers in the small, Catskills town of Hobart, New York. Creative, hard-working and determined people can accomplish a lot with the help of their local community and their global community. They can make a platform to raise the visibility of creative women and nurture the blossoming of others
Creative works	The campaigns of artwork and media activities	Been looking to get music out to you and with recording costs it will take a while to get anything out and I'm not looking to drag this project. I would appreciate any bit that will help, I'm not one for begging for money, but since you contribute what you like, you will be rewarded with some cool merch. If you enjoy supporting the scene and art then you know how much this would mean to me. Thank you!
Tech and innovation	The latest technical campaigns that improve our lifestyle	THE IDEA Our goal is to launch automatic heart monitoring sensor kit, based on the electrocardiography method that will be connected with the healthcare organisation server. Using end-client kit software, system will analyze heart activity and inform server in two ways: (1) Call to the ambulance if case of heart attack, providing live information about patient to the crew. (2) Warning message in case of dangerous heart activity (preventive diagnostics) This is extremely important for the people, who are living distant from the relatives and often are unable to call an ambulance. HOW CAN I HELP? Please use Indiegogo share tools to help our project

funded amount is the lowest in community campaigns at USD 2,202.52. The average fundraising duration in all categories is approximately 40–50 days.

The measure of motivational and sentimental cues

We quantify motives and sentiments through the narratives of campaigns displayed on the campaigns' main pages of their website to introduce detailed information. Table 2 shows the samples of narratives. The narratives of campaigns significantly impact fundraising success, and fundraisers are strongly recommended to provide an elaborate narrative (Mitra and Gilbert 2014; Bi et al. 2017; Pietraszkiewicz et al. 2017). The textual analysis conducted in this study provides another approach to analyze campaigns in crowdfunding, in addition to surveys.

Linguistic cues, a collection of words or signals that textually express specific meanings, are essential for stimulating readers' motives or sentiments (Mitra and Gilbert 2014). Tables 3 and 4 show the samples of motives and sentiments, respectively. By

Table 3 Samples of motivational cues

Motive	Segments of narratives
Intrinsic motive	Other Ways You Can Help If you can't contribute you can still help! If you can get the word out and spread our campaign it would be greatly appreciated! Don't forget to use the Indiegogo share tools! Thank you so much for taking the time to visit our page! We hope you have enjoyed learning about our project!Thanks again from the team at Jam-e Productions
Extrinsic motive	Ultimately, I would be able to share my gift of music with more of YOU!" It's not too late! There are plenty of rewards available and still 10 days to be a part of this project. Budget (everyone's favourite part!) Here's a basic breakdown: What My Supporters Receive In addition to being able to pre-order the album (digitally or physically), I'm offering some great rewards for my faithful and generous supporters

Table 4 Samples of sentimental cues

Sentiment	Segments of narratives
Positive sentiment	What you can do to help With €1500 we can: Design and make an amazing set. We can pay for fantastic costumes for our cast, an essential part of our storytelling. We can light our set and give you an exhilarating (Yes. We promise!) theatre experience. The impact In the past we have been lucky to fund and create hit shows like WRAPPED and HARDER FASTER MORE on a shoestring budget
Negative sentiment	It is a pity but our city is not present a complete and well-equipped animal shelter, and cannot help all the animals because there are a lot of them. All created by human hands! On the streets of our city thousands of starving cats and dogs. A lot of people who would like to help, but not everyone is able to! And how many on the streets of stray animals as kittens and puppies are dying of hunger! How many dogs that would become fast friends for each of us! So let's create a good, feed, drink, and cure each pet!

extracting linguistic cues from campaigns' narratives, we could count the stimulation of funders' motives and sentiments. For instance, in the sentence "It's not too late! There are plenty of rewards available and still ten days to be a part of this project," the word "reward" may stimulate readers who want to earn rewards. In the sentence "How many stray animals like kittens and puppies on the streets are dying of hunger," the words "dying" and "hunger" may enhance negative sentiment.

Linguistic Inquiry and Word Count (LIWC) and WordNet software packages were used to extract linguistic cues of motives and sentiments. These software packages assume that linguistic cues signal psychological information beyond their literal meaning and independent of their semantic context (Pennebaker et al. 2003, 2015). Under this assumption, extracting linguistic cues using these software packages has advantages and disadvantages. On the positive side, they outperform human-performed content analysis by offering better stability of the coding scheme and explicit and perfect coder reliability (Ober et al. 1999; Noh et al. 2015). Additionally, textual analysis is ideal for uncovering some underlying aspects of language that may easily be missed by the human eye (Bligh and Hess 2005). However, textual analysis is crude and tends to ignore context, irony, sarcasm, idioms, or implicit meanings (Tausczik and Pennebaker 2010).

The LIWC and WordNet software package are commonly used language analysis tools for examining the relation between linguistic cues and psychological variables (Tausczik and Pennebaker 2010). The validity and reliability of LIWC have been verified (Schultheiss 2013) and applied in many studies (Kahn et al. 2007; Zhao et al. 2016; Pennebaker 2017; Proyer and Brauer 2018). Words analyzed using LIWC have previously been assigned by independent judges into three dimensions and over 70 linguistic subdimensions. Most LIWC categories classify linguistic cues into different psychological themes, such as sentiment, motive, or cognition (Pennebaker et al. 2003). As LIWC may not cover all dimensions for the current analysis, WordNet is utilized to complement the generation of the specific corpus. WordNet is an e-dictionary based on psychological classification (Miller 1995). In WordNet, synonymous relations are built as a vocabulary tree based on psychological classification and applied in crowdfunding (e.g., Wang et al. 2016). We utilize the dictionary targeting psychological classification to filter words or word groups for expressing specific psychological needs.

Motivational cues and sentimental cues are calculated in different ways. Following prior research on funders' motives in crowdfunding (Schwienbacher and Larralde 2010; Shin and Jian 2012; Cholakova and Clarysse 2014; Ryu and Kim 2018; Planells 2017; Steigenberger 2017; Zvilichovsky et al. 2018; Cox and Nguyen 2018), we categorize funders' motives into intrinsic (gratitude and helping others, a sense of achievement, and relatedness) and extrinsic motives (rewards). Motivational cues related to specific motives in narratives are extracted using LIWC and WordNet. These motivational cues are calculated using the frequency-inverse document frequency (TF–IDF) value of motivational cues. The TF–IDF algorithm is applied to evaluate the importance of a word or a cue. For example, suppose the TF–IDF value of a motivational cue type is higher in a campaign's narrative than other narratives. In that case, this type of motivational cue is much more important in this narrative than other narratives. The TF–IDF algorithm is defined in Formula 1. A cue's importance is directly proportional to its appearance in a narrative but inversely proportional to the frequency of its concentrated appearance in

the whole set. Term frequency refers to the frequency of a cue that appears in a narrative. Inverse document frequency represents the frequency of a cue that appears in all narratives. TF and IDF are defined in Formulas 2 and 3. The TF–IDF algorithm can be applied in calculating the weight of linguistic cues. Given the increase in data quantity, the TF–IDF algorithm's complexity shows an increasing linear trend. Therefore, TF–IDF applies to large-scale textual quantity statistics.

$$TF-IDF(w) = TF(w) \times IDF(w) \tag{1}$$

$$TF(w) = f(w)/n \tag{2}$$

$$IDF(w) = log\frac{D}{d+1} \tag{3}$$

Sentimental cues related to narratives are extracted using SentiWordNet. SentiWordNet is the sentimental component of WordNet. It is a sentiment analysis tool derived from the WordNet database where each term is associated with some numerical scores indicating positive and negative sentiment information. In SentiWordNet, each word is automatically annotated in the range [0, 1] according to positivity, negativity, and neutrality. Based on prior studies, the measure of sentimental cues is divided into two values: sentiment orientation and sentiment strength (Gao et al. 2014; Wang et al. 2016; Jancenelle et al. 2018). Each word in the narrative is given a positive and a negative score, ranging from 0 to 1. The difference between the two scores is the sentiment value (Formula 4). Negative and positive sentiments are denoted by negative and positive values, respectively. The sentiment orientation is the average sentiment value of all words in this narrative (Formula 5). The sentiment strength is the mean of absolute sentiment value of all words in this narrative (Formula 6).

$$sentiment_value_i = positive_i - negative_i \tag{4}$$

$$sentiment_orientation = \frac{1}{n}\sum_{i=1}^{n} sentiment_value_i \tag{5}$$

$$sentiment_strength = \frac{1}{n}\sum_{i=1}^{n} \left|sentiment_value_i\right| \tag{6}$$

Manual annotation verifies the reliability of textual analysis in this study. The reliability test process is described as follows. (1) Three verifiers are invited to the test, and the definitions of motives and sentiments are explained to them. (2) After aligning their understanding of the motive and sentiments, the verifiers test their standards through the data samples and form the uniform evaluation criteria. (3) We randomly select 300 samples from the campaigns' narratives, and the verifiers conduct manual annotation. We use the Intraclass Correlation Coefficient (ICC) (Formula 7, 8, 9) for the reliability test on the verification results (Fisher 1954; Kou et al. 2020). The ICC values are 0.75 (motive) and 0.81(sentiment), indicating that the three results of manual classification are consistent. (4) After verifying the reliability of the experts' results, we use the results as a standard of classification and involve the kappa statistic (Formula 10) in the reliability test between the manual

classification and the corpus classification (Cohen 1960). The kappa value is 0.71 (motive) and 0.74 (sentiment), meaning that the corpus classification result is consistent with the result of the manual classification.

$$r_{Fisher} = \frac{1}{n-1}\sum_{i=1}^{n}\left(\frac{x_{i1}-\overline{x}_p}{s_p}\right)\left(\frac{x_{i2}-\overline{x}_p}{s_p}\right) \tag{7}$$

$$\overline{x}_p = \frac{1}{2n}\sum_{i=1}^{n}(x_{i1}+x_{i2}) \tag{8}$$

$$s_p^2 = \frac{1}{2n-1}\left[\sum_{i=1}^{n}\left(x_{i1}-\overline{x}_p\right)^2 + \sum_{i=1}^{n}\left(x_{i2}-\overline{x}_p\right)^2\right] \tag{9}$$

$$kappa = \frac{p_a - p_e}{1-p_e} \tag{10}$$

Model

We built two linear regression models: the sentiment orientation model (Formula 11) and the sentiment strength model (Formula 12).

$$Result_i = \alpha + M_i\beta + SO_i\delta + M_i \times SO_i\delta' + Z_i\gamma + \varepsilon_i \tag{11}$$

$$Result_i = \alpha + M_i\beta + SS_i\delta + M_i \times SS_i\delta' + Z_i\gamma + \varepsilon_i \tag{12}$$

$Result_i$ represents the dependent variable. In both models, "Fundraising Result" is the dependent variable, indicating the funded rate of campaigns. M_i represents the independent variables. We use two variables, "Cues of Intrinsic Motives" (CIM) and "Cues of Extrinsic Motives" (CEM) as independent variables to represent the extent to which narratives are linguistically related to intrinsic and extrinsic motives, respectively. Higher values of these two variables denote a stronger inclination of specific motives.

The sentiment orientation model builds the moderating effect of sentiment orientation between motivational cues and fundraising success. We use the moderator variable SO_i (Sentiment Orientation) to indicate the sentiment orientation of a narrative. The sentiment strength model builds the moderating effect of sentiment strength between motivational cues and fundraising success. We use the moderator variable SS_i (Sentiment Strength) to measure the sentiment strength of a narrative in a campaign.

$Z_i^{'}$ is the control variable set. Based on prior studies in crowdfunding (Martens and Jennings 2007; Agrawal et al. 2013; Kuppuswamy and Bayus 2018b; Mollick 2014; Ahlers et al. 2015; Aprilia and Wibowo 2017; Barbi and Bigelli 2017; Roma et al. 2017; Block et al. 2018; Wang et al. 2018a, b), we control for seven factors associated with campaigns from five dimensions (narratives, attributes, social network, interaction,

multimedia), such as "Narrative Length" (the length of narratives), "Duration" (the number of fundraising days), "Target Amount" (the amount of fundraising target), "Social Attribute"(the number of fundraiser's friends in Facebook), "Video"(whether a campaign has a video; "0" represents "no" and "1" represents "yes"), "Updates" (the number of updates in a campaign), and "Comments" (the number of comments in a campaign). Moreover, α is the intercept of the model; ε_i represents the random disturbance factor. In general, $\varepsilon_i = N\left(0, \delta^2\right)$.

Results

Table 5 shows the descriptive statistics of variables. The average target amount is USD 1,382,289, and the average duration is 44 days. Each campaign has an average of more than seven comments and one update. Fundraisers have an average of more than 157 friends on Facebook. Almost half of the campaigns present a video, and the mean of the narrative length is 853.24 words. The mean of the TF–IDF value of extrinsic motives (0.0012) is nearly equal to the mean of the TF–IDF value of intrinsic motives (0.0018). The mean of sentiment length (0.123) is almost seven times more than the mean of sentiment orientation (0.0182). The amount funded for the campaigns reaches an average of 20 percent of the target amount, indicating that the fundraising success rate has significant scope for improvement.

To rule out multicollinearity, we examine correlation coefficients between independent and control variables. Table 6 shows the correlation coefficients of variables. The results indicate that all correlations and multicollinearity are generally moderate or low. To test the hypotheses, we run three regressions for the sentiment orientation and sentiment strength models. All control variables are entered in model 1. Independent variables are added in model 2. Moderator variables are added in model 3 (see Tables 7, 8).

All the control variables affect fundraising success in both models except the target amount (− 0.001; $p > 0.05$). "Comments" (0.319; $p < 0.001$) and "Updates" (0.064; $p < 0.001$) have positive effects on fundraising success. Frequent updating may enhance funders' confidence (Block et al. 2018), and the number of comments could enhance the popularity of campaigns (Wang et al. 2018a; b). "Social Attribute" (0.043; $p < 0.001$), positively

Table 5 Descriptive statistics

Variables	Mean	Min	Max	S.D
Target amount	1,382,289.242	0	2.0e+9	4.47e+7
Duration	44.108	1.0	60	16.5990
Comments	7.327	0	8497	69.3264
Updates	1.106	0	138	4.0502
Society attribute	157.024	0	202,850	1432.0185
Narrative length	4266.212	0	71,107	5322.3621
Video	0.426	0	1	0.4944
Cues of extrinsic motives	0.0012	0	0.187	0.0026
Cues of intrinsic motives	0.0018	0	0.0458	0.0016
Sentiment direction	0.0182	− 0.468	0.625	2.1133504
Sentiment strength	0.123	0	0.650	3.1627290
Fundraising result	0.203	0	3.43	2.23

Table 6 Correlations and multicollinearity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Target amount	1										
Duration	0.019**	1									
Comments	− 0.001	− 0.011*	1								
Updates	− 0.006	− 0.028**	0.312**	1							
Society attribute	− 0.002	− 0.010*	0.344**	0.223**	1						
Narrative length	− 0.005	0.002	0.123**	0.314**	0.139**	1					
Video	− 0.006	− 0.031**	0.053**	0.195**	0.084**	0.329**	1				
Cues of extrinsic motives	− 0.007	− 0.004	0.052**	0.165**	0.075**	0.555**	0.185**	1			
Cues of intrinsic motives	− 0.005	− 0.006	0.055**	0.221**	0.091**	0.655**	0.275**	0.567**	1		
Sentiment direction	− 0.001	− 0.007	0.001	0.006	0.003	0.024**	0.007	0.017**	0.039**	1	
Sentiment strength	− 0.004	− 0.011*	0.035**	0.098**	0.047**	0.245**	0.182**	0.021**	0.033**	0.175**	1
VIF	1.001	1.003	1.219	1.24	1.161	3.366	1.152	1.737	2.48	1.649	1.051

*$p < 0.05$, **$p < 0.01$

Table 7 Results of sentiment orientation model

Variable	Model1		Model2		Model3	
	Coef	Sig	Coef	Sig	Coef	Sig
Target amount	−0.001	0.768	−0.001	0.767	−0.001	0.768
Duration	−0.033***	0.000	−0.033***	0.000	−0.033***	0.000
Comments	0.319***	0.000	0.318***	0.000	0.318***	0.000
Updates	0.064***	0.000	0.064***	0.000	0.064***	0.000
Society attribute	0.043***	0.000	0.043***	0.000	0.043***	0.000
Narrative length	0.040***	0.000	0.052***	0.000	0.049***	0.000
Video	0.011*	0.013	0.012**	0.007	0.012**	0.007
Cues of extrinsic motives (CEM)			0.000	0.968	0.006	0.393
Cues of intrinsic motives (CIM)			0.023***	0.000	0.023***	0.000
Sentiment orientation (SO)			0.005	0.332	0.011	0.111
CEM * SO					0.000	0.968
CIM * SO					0.010	0.188
N	48,241		48,241		48,241	
R^2	0.116		0.118		0.118	

*$p<0.05$, **$p<0.01$, ***$p<0.001$

Table 8 Results of sentiment strength model

Variable	Model1		Model2		Model3	
	Coef	Sig	Coef	Sig	Coef	Sig
Target amount	−0.001	0.768	−0.001	0.757	−0.001	0.767
Duration	−0.034***	0.000	−0.034***	0.000	−0.033***	0.000
Comments	0.319***	0.000	0.318***	0.000	0.319***	0.000
Updates	0.064***	0.000	0.064***	0.000	0.063***	0.000
Society attribute	0.043***	0.000	0.043***	0.000	0.044***	0.000
Narrative length	0.040***	0.000	0.052***	0.000	0.050***	0.000
Video	0.011*	0.013	0.012**	0.007	0.012*	0.011
Cues of extrinsic motives (CEM)			0.001	0.878	0.069***	0.000
Cues of intrinsic motives (CIM)			0.023***	0.000	0.005	0.547
Sentiment strength (SS)			−0.003	0.570	0.002	0.670
CEM * SS					−0.022**	0.010
CIM * SS					0.071***	0.000
N	48,241		48,241		48,241	
R^2	0.116		0.118		0.121	

*$p<0.05$, **$p<0.01$, ***$p<0.001$

affecting fundraising success. However, "Duration" (−0.033; $p<0.001$) negatively affects fundraising success. Funders' social backgrounds could attract more funders, especially in the initial stage (Agrawal et al. 2013). "Narrative Length" (0.040; $p<0.001$) and "Video" (0.011; $p<0.05$) have positive effects on fundraising success. A campaign could reach a higher funded amount with a longer narrative, and an extended narrative generally provides more opportunity for convincing funders (Aprilia and Wibowo 2017). Video is an essential way to convince funders, and an elaborate video helps fundraise (Mollick 2014). "Cues of Extrinsic Motives" (0.000; $p>0.05$) does not affect fundraising success, whereas "Cues of Intrinsic Motives" (0.023; $p<0.001$) significantly affects fundraising success. Emphasizing funders' intrinsic motives, such as helping others or building relationships,

contribute to fundraising success. Although profiting is a primary motive for funding in traditional financing and crowdfunding (Persky 1995; Cholakova and Clarysse 2014), emphasizing the profiting cues does not affect fundraising success.

In Table 7, "Sentiment Orientation" (0.005; $p > 0.05$) does not affect fundraising success. We cannot find the moderation effect on sentiment orientation, and both "CEM × SO" (0.000; $p > 0.05$) and "CIM × SO" (0.010; $p > 0.05$) do not affect fundraising success. In Table 8, "Sentiment Strength" (−0.003; $p > 0.05$) does not affect fundraising success. "CEM × SS" (−0.022; $p < 0.01$) has a significant negative effect on fundraising success, whereas "CIM × SS" (0.071; $p < 0.001$) has a significant positive effect on fundraising success. Moreover, sentiment strength reduces the effect of extrinsic motives on fundraising success while enhancing the effect of intrinsic motives on fundraising success.

Hypothesis 1 expects that negative sentiment enhances the effect of intrinsic motivational cues of narratives on fundraising success in crowdfunding. However, we do not find support for this hypothesis (0.010; $p > 0.05$). Hypothesis 2 states that positive sentiment enhances the effect of extrinsic motivational cues of narratives on fundraising success in crowdfunding. However, we do not find support for this hypothesis (0.000; $p > 0.05$). Hypothesis 3 states that strong sentiment strength enhances the effect of intrinsic motives on fundraising success in crowdfunding; this hypothesis is supported (0.071; $p < 0.001$). Strong sentiment strength represents high emotional volatility, which has great power to move individuals' intrinsic motives. Hypothesis 4 states that weak sentiment strength enhances the effect of intrinsic motives on fundraising success in crowdfunding; this hypothesis is supported (−0.022; $p < 0.01$). Funders with profit motives possess objective and rational sentiment.

We use "Complete Rate" (indicating whether the campaign successfully reaches the target amount; "0" represents "no" and "1" represents "yes") as the dependency variable

Table 9 Robust check of sentiment orientation model

Variable	Model1		Model2		Model3	
	Coef	Sig	Coef	Sig	Coef	Sig
Target amount	−0.005	0.268	−0.005	0.268	−0.005	0.268
Duration	−0.129***	0.000	−0.129***	0.000	−0.129***	0.000
Comments	0.019***	0.000	0.021***	0.000	0.021***	0.000
Updates	0.218***	0.000	0.217***	0.000	0.217***	0.000
Society attribute	0.052***	0.000	0.052***	0.000	0.052***	0.000
Narrative length	0.047***	0.000	0.021***	0.001	0.019**	0.006
Video	0.083***	0.000	0.078***	0.000	0.078***	0.000
Cues of extrinsic motives (CEM)			−0.030***	0.000	−0.027***	0.000
Cues of intrinsic motives (CIM)			0.055***	0.000	0.054***	0.000
Sentiment orientation (SO)			0.018***	0.001	0.021**	0.003
CEM * SO					0.002	0.665
CIM * SO					0.005	0.471
N	48,241		48,241		48,241	
R^2	0.105		0.107		0.107	

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 10 Robust check of sentiment strength model

Variable	Model1		Model2		Model3	
	Coef	Sig	Coef	Sig	Coef	Sig
Target	−0.005	0.268	−0.005	0.238	−0.005	0.245
Duration	−0.129***	0.000	−0.129***	0.000	−0.129***	0.000
Comments	0.019***	0.000	0.021***	0.000	0.022***	0.000
Updates	0.218***	0.000	0.216***	0.000	0.216***	0.000
Society attribute	0.052***	0.000	0.052***	0.000	0.051***	0.000
Narrative length	0.048***	0.000	0.007	0.266	−0.003	0.630
Video	0.082***	0.000	0.072***	0.000	0.073***	0.000
Cues of extrinsic motives (CEM)			−0.024***	0.000	−0.001	0.953
Cues of intrinsic motives (CIM)			0.066***	0.000	0.053***	0.000
Sentiment strength (SS)			0.046***	0.000	0.040***	0.000
CEM * SS					−0.023**	0.007
CIM * SS					0.023*	0.043
N	48,241		48,241		48,241	
R^2	0.105		0.109		0.111	

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 11 Results of hypothesis

Hypothesis	Result
H1. Negative sentiments enhance the effect of intrinsic motivational cues of narratives on fundraising success in crowdfunding	False
H2. Positive sentiments enhance the effect of extrinsic motivational cues of narratives on fundraising success in crowdfunding	False
H3. Strong sentiment strength enhances the effect of intrinsic motivational cues of narratives on fundraising success in crowdfunding	True
H4. Weak sentiment strength enhances the effect of extrinsic motivational cues of narratives on fundraising success in crowdfunding	True

and run a robustness check for the two models. Tables 9 and 10 demonstrate the robustness of our results.

Overall, these results partly confirm our hypotheses that strong sentiment strength may enhance the effect of intrinsic motives on fundraising success in crowdfunding. Weak sentiment strength may enhance the effect of intrinsic motives on fundraising success in crowdfunding. In a narrative with greater sentiment strength, intrinsic motivational cues affect fundraising success better, while extrinsic motivational cues affect fundraising success poorly. Additionally, sentiment orientation does not contribute to the effect of motivational cues. The sentiment strength and sentiment orientation results reveal that positive sentiment and negative sentiment may have a similar effect on specified motivational cues. Crowdfunding campaigns need to adopt the sentiment strength of linguistic narratives to stimulate specific motives. Table 11 provides a list of the result of the hypotheses.

Discussion and contributions

Discussion

Our study suggests that sentiment strength is an essential factor that affects funding motives among funders in crowdfunding, based on previous research on motives and sentiments in entrepreneurial fundraising and crowdfunding. First, our study examines the sentiment strength cues of narratives and finds that sentiment strength does not affect fundraising success directly. Furthermore, our study examines the moderating effect of sentiment strength on the motivational cues of campaign narratives. The results show that sentiment strength positively moderates the effect of intrinsic motivational cues, whereas it negatively moderates the effect of extrinsic motivational cues. Sentiment strength indicates the degree of sentiment richness. Different types of investors may have their preferred sentiment strength. In behavioral finance theory, investors are of two types: rational arbitrageurs who are sentiment-free and irrational traders prone to exogenous sentiment (Baker et al. 2007). Rich emotional and prosocial cues of narratives positively affect prosocial funders, who are inclined to fund based on intrinsic motives (Pietraszkiewicz et al. 2017). Wang et al. (2021) suggest that crowdfunding's textual description should be phrased subjectively to court investors, and subjective description will have strong sentiment strength. Similarly, emotional volatility could reduce funders' extrinsic motives in banking marketing, especially during financial crises (Al-Fayoumi et al. 2019). In crowdfunding, rational profit-seeking funders inclined to fund based on extrinsic motives are inclined to objective and rational sentiment (Persky 1995).

Other than sentiment strength, sentiment orientation has little influence on fundraising success. Prior studies argued whether positive sentiment helps or harms fundraising success (Gao et al. 2014; Wang et al. 2017). Courtney (2017) and Wang et al. 2018a, b) found that sentiment positively moderates the relationship between narrative quantity and crowdfunding success, and other studies found that highly positive sentiment of narratives may decrease the intention of capital-givers to support financially (Gao et al. 2014). Particularly, prosocial funders prefer narratives with negative sentiments to positive sentiments (Jancenelle et al. 2018). However, our study finds that the sentiment orientation does not affect overall fundraising success directly. We also examine the moderating effect of sentiment orientation on the motivational cues of campaign narratives. The result shows that sentiment orientation does not moderate the effect of motivational cues either.

Based on behavioral finance theory, rational funders prefer sentiment-free messaging, while irrational funders are prone to exogenous sentiment (Baker and Wurgler 2007). Rational funders prefer weaker sentiment strength and neutral orientation. Therefore, neither positive nor negative sentiment orientation affects these funders. Furthermore, irrational funders who have more intrinsic motives prefer stronger sentiment strength, and most sentiment studies focus on these funders in crowdfunding (Gao et al. 2014; Wang et al. 2017). Although these funders prefer stronger sentiment strength, our study reveals that these funders have no preference for sentiment orientation. Therefore, these funders may have both positive and negative sentiment orientation, which removes the relation between the sentiment orientation and fundraising success.

In this research, we have not categorized campaigns. However, funders of different campaign categories may have different preferences of sentiment orientation. In the

future, the effect of sentiment orientation in each campaign category may be examined (e.g., community and technology).

Theoretical contributions

Our study contributes to the growing literature on motive and sentiment in crowdfunding. Most of the previous literature focused on the type of motives that funders have (e.g., Gerber and Hui 2013; Cholakova and Clarysse 2014; Latysheva 2017; Steigenberger 2017; Zvilichovsky et al. 2018) and how these motives affect fundraising success (e.g., Allison et al. 2015; Ryu and Kim 2018). Prior research has determined the association between motivational cues and fundraising success. However, they ignored the moderating effect of other linguistic features. Sentiment is an essential feature in linguistic studies because it significantly affects a text's meaning. Therefore, we pioneer in involving the sentiment feature in the study of motives in crowdfunding, providing practice for extending the motive study. As sentiment strength impacts funders' different motives, it should be considered in the study of motives in crowdfunding. Based on the results, we confirm that sentiment strength positively moderates funders' intrinsic motives, while it has a negative moderating effect on funders' extrinsic motives.

Accordingly, we are the first to introduce motivational categories into sentiment analysis to identify the impact of sentiment on funders with different motives. Prior studies involved sentiment analysis in crowdfunding and investigated the overall effect of sentiment cues on fundraising success (e.g., Gao et al. 2014; Wang et al. 2017). However, these studies did not identify the effect of sentiment on funders with different motives. Motives are the drivers of sentiments and have been used in sentiment detection (Otani and Hovy 2019). Therefore, our study divides funders' motives into intrinsic and extrinsic motives, then examines the effect of sentiment on fundraising success under the context of different motivational cues. We supplement sentiment analysis with motivational classification, and we confirm that sentiment strength has different effects on funders with different motives.

Practical implication

Beyond theory, these findings have important implications for practice. Our results suggest that sentiment strength moderates the effects of intrinsic and extrinsic motives on fundraising success. Moreover, crowdfunding platforms should consider sentiment strength in different motivational cues. Although most crowdfunding platforms try to feature funders of both motives, only few platforms pay attention to the sentiment strength of narratives. As the moderating effect of sentiment strength, crowdfunding platforms and fundraisers should use different degrees of sentiment strength in attracting funders' specific motives. For example, when fundraisers describe a campaign's rewards, they should use words with objective and rational sentiments. However, when fundraisers seek help or describe their adversity, they should use words with strong sentiment strength. These findings could significantly improve the effect of narratives in attracting funders with different motives.

Additionally, sentiment orientation does not moderate the effect of different motivational cues. Different sentiment orientations always occur in specific scenarios. For example, when fundraisers seek help, they often use negative sentiment to appeal to

funders' mercy. Similarly, fundraisers always avoid using specified sentiment orientation in the relevant scenarios; for example, using positive sentiment in seeking help. Our result reveals that positive and negative sentiments have a similar effect on stimulating funders' motives. Funders could consider the different sentiment orientations in their narratives to maximize their appeal.

Avenues for further research

As with all studies, this work leaves us with many unanswered questions. First, intrinsic and extrinsic motives are simple classifications of motives. Several other motive theories, such as altruism theory, could be used to classify funders' motives. According to different motive theories, the moderating effect of sentiment may not be the same for all types of motives. Thus, an exciting avenue for future research is the moderating effect of sentiment on other motives. Second, we only extract sentiment cues from narratives, but other texts may also affect fundraising results in crowdfunding. We call for future studies to analyze the sentiment of other crowdfunding texts to explore the effect of sentiment on fundraising success. Third, sentiment is only one of the essential factors in linguistic features; other linguistic features, such as the rhetoric mode, are found in narratives. Thus, a potential avenue for future research is to identify other linguistic features' moderating effect on fundraising success. Fourth, the funders of different campaign categories may have different preferences of sentiment orientation. In the future, we could examine the effect of sentiment orientation in each campaign category separately (e.g., community and technology).

Conclusion

Our study focuses on the moderating effect of sentiment on the motivational cues of campaign narratives and suggests that sentiment strength positively moderates the effect of intrinsic motives on fundraising success. However, it negatively moderates extrinsic motives' effect on fundraising success. Given the moderating effect of sentiment strength, crowdfunding platforms and fundraisers should use different degrees of sentiment strength in attracting funders' specific motives. Future research may examine detailed motives and other linguistic features and the association between motive and linguistic features in other campaign texts.

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Abbreviations
USD: United States dollar; S-O-R: Stimulus-organism-response; LIWC: Linguistic inquiry and word count; TF–IDF: Term frequency–inverse document frequency; ICC: Intraclass correlation coefficient; CEM: Cues of extrinsic motives; CIM: Cues of intrinsic motives; SO: Sentiment orientation; SS: Sentiment strength.

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Authors' contributions
XY collected data and wrote the main paper. LW contributed to the data analysis. XY revised the paper and provide the English proofreading. HW gave the main idea and improvement suggestions. All the authors read and approved the final manuscript.

Availability of data and material
Data is publicly collected from Kiva online (www.kiva.org).

Declarations

Competing interests
The authors declare that they have no competing interests.

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