FACULTEIT ECONOMIE
EN BEDRIJFSKUNDE

TWEEKERKENSTRAAT 2
B-9000 GENT
Tel. : 32 - (0)9 – 264.34.61
Fax. : 32 - (0)9 – 264.35.92

WORKING PAPER

When does promotion focus predict entrepreneurial intentions? Only in favorable conditions [1]

Maw Der Foo[2]

Mirjam Knockaert[3]

Truls Erikson[4]

February 2011
2011/706

[1]

[2] Corresponding author. University of Colorado at Boulder, 419 UCB, Boulder, Colorado, 80303 USA and University of Ghent, Belgium---foom@colorado.edu
[3] University of Ghent, Tweekerkenstraat 2, 9000 Gent, Belgium---mirjam.knockaert@ugent.be and University of Oslo, Norway
[4]University of Oslo, Gaustadalleen 21, 0318 Oslo, Norway---truls.erikson@sfe.uio.no

D/2011/7012/11

ABSTRACT

We investigate the effects of promotion focus on the entrepreneurial intentions of a group of 208 research scientists based in a university in Norway. Previous researchers have suggested that the risk taking and creativity which promotion focus is linked to should predict entrepreneurial behavior. However, the results supported our assertion that promotion focus by itself does not predict entrepreneurial intentions. Instead, these predictions depend on the promotion focus together with family and environmental conditions. Our study also shows that under some circumstances, specifically intellectual property engagement, individuals low in promotion focus report higher entrepreneurial intentions than their high promotion focused counterparts. Our study provides a new perspective on promotion focus effects, showing the joint individual and environment factors, not either factor alone, to predict entrepreneurial intentions. We discuss implications for multi-level and self-regulation research.

WHEN DOES PROMOTION FOCUS PREDICT ENTREPRENEURIAL INTENTIONS? ONLY IN FAVORABLE CONDITIONS

Technology related firms comprise a disproportionate number of high growth companies. Indeed, New Technology-Based Firms are especially seen as offering a significant potential contribution in four cardinal areas of economic activity: innovation, new employment creation, export sales growth, and regional development (Rothwell and Zegveld, 1982; Freeman, 1983; Oakey, 1995). As a result, new technology based firms have received a lot of attention from academics over the past two decades (Gans and Stern, 2003). Within the entrepreneurship and innovation literatures, there is further a substantial research interest in the entrepreneurial intentions of people engaged in technological activities. For example, Lee, Wong, Foo, and Leung (2011) studied factors predicting the likelihood of people working in companies engaged in innovation activities leaving their companies to start new ventures. Within research on entrepreneurial intentions, there is a growing interest in regulatory focus since Brockner, Higgins and Low (2004) detailed how regulatory focus is a fundamental cognitive framework influencing entrepreneurial success.

Regulatory focus, an extension of the wider concept of regulatory fit, is defined as how people approach achievement oriented situations. Regulatory fit is a type of subjective experience of feeling "right", attained when the manner of goal pursuit sustains the individual's regulatory orientation. Entrepreneurs face high levels of unambiguity and uncertainty, and for all their efforts and investments into the venture, success is uncertain. In such an environment, it may seem obvious that individuals who focus on successes, rather than dwell on failures—i.e., individuals high in promotion focus—are more likely to be entrepreneurs. While the creativity and risk taking propensities of promotion focus may be beneficial for entrepreneurial activities (Brockner et al.,

2004), we reason that promotion focus by itself does not predict entrepreneurial intentions. Individuals high in promotion focus tend to pursue activities to achieve their idealized selves and as such, high promotion focused individuals are likely to pursue entrepreneurial activities if such activities are part of their idealized self. Hence, as we theorize, promotion focus should be viewed in conjunction with family and environments encouraging and developing entrepreneurial interests. Individuals in such situations tend to value entrepreneurship activities with promotion focus acting as a lever to strengthen entrepreneurial intentions. Most pertinently, numerous research has found that being raised in entrepreneurial families infuse individuals with norms, attitudes, and preferences for entrepreneurial activities (Duchesneau & Gartner, 1990; Katz, 1992; Kolvereid, 1996; Lu & Tao, 2010; Scherer, Adams, Carley, & Wiebe, 1989).

Beyond parental impact, the environment infuses us with norms, values, and attitudes relating to entrepreneurial intentions. For instance, Lu and Tao (2010) found that after 1989 having a parent who has started a business did not predict entrepreneurial intentions. They reasoned that as institutions supporting entrepreneurship became established, the environment can influence a person's entrepreneurial preferences. Fairchild's (2010) findings are consistent with this statement. He studied the influence of the ethnic enclave people were raised, discovering the likelihood of self-employment went up as the proportion of self-employed in the enclave increased. Most relevant to our study, he explained that a person raised in an area of high self-employment becomes socialized with attitudes and values congruent with being an entrepreneur. These include the willingness to bear risk, to defer income, work long hours, and thrift. Other factors also account for self-employment, including knowledge about the market opportunities, tastes, and needs of the enclave.

In sum, our study provides a new perspective of when promotion focus leads to entrepreneurial intentions. Instead of assuming this regulatory mechanism predicts entrepreneurial

activities, we suggest that only when the environment encourages entrepreneurial activities, will individuals high in promotion focus also report entrepreneurial intentions. Interestingly, our findings show that in some circumstances, individuals low in promotion focus will report higher entrepreneurial intentions than their high promotion focused counterparts. Hence, future studies on regulatory focus should examine how situational and background factors play a role in influencing the impact of promotion focus on entrepreneurial activities. Absent these complementary factors, even those high in promotion focus may not report entrepreneurial intentions.

In the next section, we explain the two regulatory mechanisms of promotion and prevention focus. We also explain why we only investigate promotion focus. Following this section, we explain the research context of research scientists. Following that, we develop the hypotheses of how the research scientists' family and work environments predict entrepreneurial intentions. The methods and results sections follow. In the last section, we discuss the implications of our study to promotion focus research in entrepreneurship. We also discuss implications of this study to multi-level and self-regulation entrepreneurship research.

THEORETICAL DEVELOPMENT

The research context is research scientists based in a University in Olso. Over the past decade, there has been a substantial increase in the creation of academic spin-offs (Wright et al., 2007; Clarysse and Moray, 2004). This rise stems from the pressure faced by public research institutes (PRIs), including universities, to commercialize at least part of their research results through licensing and/or new ventures. Yet despite such pressures, universities are still faced with the innovation paradox (Pavitt, 1991), in which many research results do not get commercialized (O'Shea, Allen, Chevalier, & Roche, 2005). It is important to study factors influencing the

entrepreneurial intentions of research scientists since they are involved in the universities' innovation activities. In this and the following sections, we theorize how family and work environments together with regulatory focus can predict entrepreneurial intentions of research scientists.

Regulatory focus, a self-regulatory processes, is defined as how people approach achievement oriented situations. Self-regulatory processes include self-efficacy where some individuals are more confident of achieving their goals than others, and goal-setting where people set different goals and adopt different strategies to achieve these goals. According to regulatory focus theory, individuals adopt one of two contrasting perspectives in regulating their behaviors towards achieving their goals—promotion focus and prevention focus. The strength of the regulatory foci determines individuals' choice of strategy and action in achieving desired goals. Individuals high in promotion focus are likely to use approach means to attain desired end-states, while individuals with strong prevention focus are likely to use vigilant means towards attaining their goals (Higgins, 1997). Approach means are strategies seeking to obtain matches to the desired end-state while vigilant means are strategies avoiding mismatches to the goal.

The nature of an individual's regulatory focus is in part due to people's subjective history of success (Higgins et al., 2001). This is based on McClelland and Atkinson's classic theory of achievement motivation. As McClelland (1961) and Atkinson (1964) asserted, over time a new achievement task elicits feelings associated with past task engagements. Subsequently, individuals with subjective histories of successes tend to feel pride when given new tasks; while individuals who experience failure tend to feel shame when faced with such tasks. Regulatory focus theory extends this achievement motivation theory from between-valence success versus failure, to within-valence success and failure. Hence, regulatory focus addresses subjective histories of success only

or subjective histories of failures only. Because the histories are viewed separately, prevention and promotion focus are separate concepts and individuals can be high or low in each concept. Supporting this position, most studies report prevention and promotion focus to be only weakly negatively correlated. In fact, a study by Wu, McMullen, Neubert, and Yi (2008) even found a negative, though non-significant, correlation between prevention and promotion focus. Therefore, in this study, we refer to individuals high or low in promotion or prevention focus and not to promotion focus individuals or prevention focus individuals. People can be both, although these regulatory foci are usually weakly negatively correlated.

Theoretically, prevention and promotion focus are distinct regulatory focus states such that one regulatory focus type does not exclude the other (Higgins, 1997, 1998). Promotion regulatory focus emphasizes reaching one's idealized self while prevention regulatory focus emphasizes attaining what is expected (ought goals). Therefore, the entrepreneurial motives, goals and what's salient for promotion and prevention focused individuals differ (Brockner et al., 2004). Family and work environments encouraging reaching one's ideal self vs. sought self should lead to entrepreneurial intentions of individuals high in promotion and prevention focus respectively. For instance, individuals high in promotion focus may start businesses in industries they are interested in; on the other hand, their high prevention focused counterparts may succeed their family businesses because that is what they should do. Hence to understand what drives promotion and prevention regulatory focus requires two entirely different set of circumstances.

We concentrate only on the set appealing to individuals high in promotion focus because these individuals more so than their high prevention focused counterparts are likely to take risks and to uncover novel ideas forming the basis for new businesses (Brockner et al., 2004). For example,

Crowe and Higgins (1997) showed participants a list of items. After a delay, they were asked to identify from a new list, containing both original target items and new distracter items. They were instructed to respond "Yes" if they thought an item was a target item and "No" if they thought an item was a distracter item. Consistent with regulatory focus theory, individuals high in promotion focus exhibited a risky bias and tended to give a "Yes" response resulting in more false positives. In contrast, individuals high in prevention focus exhibited a conservative bias and tended to give more "No" responses. Echoing the theme of individuals high in promotion focus willingness to take risks, Liberman, Idson, Camacho, and Higgins (1999) found that these individuals are more willing to switch to new activities. Turning to the entrepreneurship literature, there are few empirical studies on regulatory focus. One such study (Bryant, 2009) found entrepreneurs' regulatory focus to influence the moral issues they are concerned with. Entrepreneurs high in promotion focus attend to dilemmas of a profit nature such as whether to bribe officials to gain profits. In comparison, entrepreneurs high in prevention focus attend to dilemmas of a loss nature such as establishing procedures to avoid lawsuits. Another entrepreneurship study by Wu et al. (2008) found promotion focus to positively predict creativity. Because individuals high in promotion focus are interested in hits even when success chances are low (Higgins et al., 2000), they may be particularly suited for entrepreneurial activities where the success chances are uncertain. However, while individuals high in promotion focused are particularly suited for entrepreneurial activities, in the next section we theorize for promotion focus to predict entrepreneurial intentions when coupled with environments supporting such activities. This is because these individuals tend to go after their dreams and unless their dreams include entrepreneurial activities, then their promotion focus levels may not predict entrepreneurial intentions. We summarize these relationships in Figure 1.

Insert Figure 1 about here

HYPOTHESES DEVELOPMENT

Since a characteristic of individuals high in promotion focus is they seek to reach their idealized selves, they will find entrepreneurial activities attractive if this activity enables them to achieve their idealized selves. Numerous studies show that entrepreneurial goals, attitudes, and norms are influenced by the family environment (Duchesneau & Gartner, 1990; Katz, 1992; Lu & Tao, 2010; Scherer, Adams, Carley, and Wiebe, 1989). Hence, we explore how the family environment--specifically whether parents owned businesses—together with promotion focus level, predict the entrepreneurial intentions of a group of research scientists. Apart from the family, an environment that supports entrepreneurship also encourages such activities (Fairchild, 2010; Lu & Tao, 2010). Referring to universities, Henrekson and Rosenberg (2001) observed that financial incentives for researchers and industry financed research encourage science-based commercialization. Consistent with their observation, we investigate how promotion focus together with the work environment—specifically the extent to which the research laboratory has a commercial culture, engagement in industry financed research, and intellectual property rights (IPR) engagement—predict entrepreneurial intentions.

Family environment- Parent who has started a business

There are several conditions making it more likely individuals are interested in entrepreneurship, such as whether their parents have owned businesses. There is some literature showing that people are more likely to start businesses when their parents have owned businesses (Duchesneau & Gartner, 1990; Lu & Tao, 2010; Scherer, Adams, Carley, and Wiebe, 1989). Parents act as role models and people raised in entrepreneurial families tend to develop positive attitudes towards entrepreneurial activities. Stating a similar view, Katz (1992) proposed a psychosocial cognitive model to explain self-employment versus wage-or-salary employment. Using heuristics

theories, he suggested a person's background provides early memories about employment situations. When deciding which profession to go into, a person may first use his or her memories (availability) as the starting point. While the individual may decide not to go into self-employment (e.g., other thoughts, memories, and experiences can suggest self-employment is not what they like), self-employment becomes the starting point or the anchor.

Studies confirm that having a parent who has owned businesses leads to outcomes favorable to entrepreneurial activities. For example, a study in China found that a person is more likely to start a business if at least one parent started a business (Lu & Tao 2010). This tendency is especially prevalent prior to 1989 when institutions supporting entrepreneurial activities were weak; subsequently, attitudes towards entrepreneurship came mostly from parents. Further empirical evidence is provided by Scherer, Adams, Carley, and Wiebe (1989) who found parents' entrepreneurial role-model to predict preferences for an entrepreneurial career. Moreover, these individuals desired education and training opportunities to develop skills entrepreneurs require. These individuals also had greater task confidence to succeed in entrepreneurial tasks. Duchesneau and Gartner (1990) discovered that the benefits of having a parent who started business extends to entrepreneurial success; belonging to entrepreneurial families may provide the entrepreneurs with role models valuable to business success including realistic expectations from self-employment, attitudes and behaviors to overcome business challenges.

The above review suggests having a parent who has started a business should lead to attitudes, norms, and skills favorable to entrepreneurial intentions. Extending this logic, individuals high in promotion focus, compared to individuals low in promotion focus, should be keen to start their own businesses. This is because starting a business is fraught with uncertainties. A person who grows up in an entrepreneurial family is likely to hear of both triumphs and tribulations of running a

business venture. An individual high in promotion focus is likely to attend to the successes because promotion focus is characterized by attention to success. Moreover, promotion focus is characterized by working towards attaining one's idealized self. Dreading the possibility of failure, people lower in promotion focus may be less enthused to start businesses. In sum, promotion focus serves as a moderator of the parents who had started business to entrepreneurial intentions relationship. Hence we hypothesize:

H1: Promotion focus strengthens the parents who own business to entrepreneurial intentions relationship.

Work environment - Organizational culture and activities relating to entrepreneurship

Our environment may also infuse some of the norms and attitudes relating to entrepreneurial preferences (Lu & Tao, 2010). In a research context, there are huge differences between institutions in the extent to which they engage in industry-science relations, amongst others entrepreneurial activities (Wright et al., 2008, Ambos et al. 2008, Landry et al. 2006), indicating that environmental factors may also affect entrepreneurial intentions. In this section, we explain how the work environment of the research scientists in our study, together with promotion focus level, predicts entrepreneurial intentions. Specifically, we theorize how promotion focus strengthens the commercial culture to entrepreneurial intentions relationship. We also explain how a research environment characterized by high levels of industry financed research should lead to entrepreneurial intentions and why this relationship is strengthened by promotion focus. Finally, IP (intellectual property) engagement should spur entrepreneurial intentions but as we explain, especially among individuals low in promotion focus. In total, this set of hypotheses predicts how

the research laboratory conditions the research scientists are in influence promotion focus's impact on entrepreneurial intentions.

Commercial culture and industry financed research

It is widely recognized that building industry-science relations is difficult, and the heart of the problem is the inherent tension between academic and commercial demands (Hackett, 2001; West, 2008). Ambos et al. (2008) indicate that tensions exist due to the differences in time horizon between academic and industry research. Further, academia encourages knowledge dissemination, whereas the commercial sector seeks ownership and tight control of IPR, and incentives differ between academia and industry. Despite such tensions, some research laboratories encourage commercialization due to government and industry pressures (Wright et al., 2007; Clarysse and Moray, 2004). In particular, research laboratories that do industry financed research are likely to favor technology commercialization as these laboratories are often expected to transfer technologies for commercial purposes (Henrekson & Rosenberg, 2001; Steffensen, Rogers, & Speakman, 1999). Further, researchers working in laboratory with industry interactions may be in a better position to produce commercial outputs (Gulbrandsen and Smeby, 2005), which was confirmed by Steffensen et al. (1999), observing that we often see university based-spin offs when the research is industry financed. Thus research scientists can face very different work environments, with some laboratories encouraging commercialization, such as when the research is industry financed, while other shunning such activities.

A person working in a laboratory endorsing research commercialization is likely to view entrepreneurial activities favorably. This is because individuals are usually attracted to organizations whose norms are congruent to theirs. Organizations on their part are more likely to

hire applicants sharing the organizations' norms (Schneider, 1987). Moreover, when individuals join organizations, they are subjected to formal and informal socialization activities reinforcing these norms (Van Maanen & Schien, 1979). Formal methods include orientation and matching new employees with mentors; informal methods include socializing with senior members in the organization, on the job training, and interactions with other colleagues. Van Maanen and Schien (1979) further noted that new employees face a transition period where they feel anxious and are motivated to learn their organizations' norms to reduce this anxiety. Through these socialization processes, people change (or at the least tweak) their self-concepts to be in-line with their organizations (Pratt, 2000) and deepen their understanding of their roles (Pratt, 2006).

When misfit occurs employees are motivated to use techniques, including patching, and splinting to manage this discomfort (Pratt, 2006). Patching occurs when employees are strong in one area but weak in another. They then use areas they are strong at to patch (overcome) areas they are weak at until overtime they become strong in both areas. For example, a research scientist who works in a laboratory valuing commercialization may initially focus on research and gradually learn about research commercialization until overtime the person is strong in both areas. Another strategy to manage mismatch is splinting where people revert to their original identities (e.g., I am a researcher and do not commercialize technology). However splinting is an uncomfortable stage highlighting deficiencies and is usually a temporary state (Pratt, 2006). If patching, splinting and other strategies to align person-organization fit fails, that person is more likely to leave the organization (Schneider, 1987). Therefore through the attraction, selection, and retention (Schneider, 1987), through socialization (Jen-te, 2009; Van Maanen & Schein, 1979), and through patching and splinting strategies (Pratt, 2006), employees tend to adopt norms consistent with their organizations. In the case of this study, research scientists working in laboratories that value

commercialization are likely to value commercialization. In the previous section we explained that individuals high in promotion focus, compared to their counterparts low in promotion focus, are likely to work towards achieving their ideal selves. Therefore, promotion focus should strengthen the commercial culture and entrepreneurial intentions relationship. Similarly, since laboratories engaged in industry financed research should encourage research commercialization favorably, promotion focus should also strengthen the industry financed research and entrepreneurial intentions relationship. Hence we offer the following hypotheses:

H2: Promotion focus strengthens the commercial culture to entrepreneurial intentions relationship.

H3: Promotion focus strengthens the industry financed research to entrepreneurial intentions research relationship.

IP engagement

IP activities have begun to grow, and since the mid-1990s, especially among universities outside of North America (Wong & Singh, 2010). Patenting activity in universities are influenced by factors such as research quality and quantity (Wong & Singh, 2010), research area affecting the ease of patenting (Gans and Stern, 2003), extent administrators value research commercialization, and pressures for industry transfer technology (Lopez, Otero, Rodeiro, & RodriGuez, 2009, Mowery, Nelson, Sampat, & Ziedonis, 2001, Mowery & Ziedonis, 2002). Hence, the degree a researcher is exposed to IP activity is affected by environmental factors in the research area or the university culture. Being involved in IP activities can lead to entrepreneurial intentions because patent applications require thought into how the technology is commercially useful. Landry et al. (2006) indicate that patents, which are an element of IP activity, are the indicator that is the most frequently used to reflect the entrepreneurial activities of university researchers. Given that patents

represent alternative sources of financing for universities, researchers are induced to invest in activities aimed at the protection of research that has commercial potential (Landry et al., 2006). Furthermore, involvement in innovation activities can spur the discovery of business ideas. For instance, Wong et al. (2008) found exposure to a firm's innovation activities predicted the probability of employees leaving the organization to start their ventures. Innovation activities was measured by the number of product or process innovations the firm introduced over the last three years. Wong et al. (2008) argued that employees who are involved in innovation activities acquired knowledge spillovers for commercialization ideas, ideas which led them to leave their companies to start a venture. The story of the "Fairchild view" (Gompers, Lerner, and Scharfstein, 2003) corrobate Wong, Lee, Foo 's (2008) findings. This view chronicles a group of employees who left Shockley Semiconductor Laboratory and founded the then highly successful Fairchild Semiconductor. The entrepreneurs had a head start through knowledge gained from Shockley Semiconductor.

As IP activities should spur commercialization interests, this involvement should positively influence entrepreneurial intentions. However, we expect IP involvement to stimulate entrepreneurial intentions for individuals low in promotion focus more so than their high promotion focused counterparts. A patent provides the holder the right to exclude others from using the technology, thereby reducing technological and market uncertainty (McKelvie et al., in press). In a conjoint study, McKelvie, Haynie, and Gustavsson found reducing the rate of technological change and the effect of technological change on the viability of the product predicted entrepreneurial intentions. The monopoly rights and subsequent uncertainty reduction should be especially attractive to individuals low in promotion focus as compared to their high promotion focused counterparts—individuals high in promotion focus concentrate on achieving their goals instead of

taking steps to reduce uncertainty or to prevent others from competing. We offer the following hypothesis:

H4: Low promotion focus, compared to high promotion focus, strengthens the intellectual property engagement to entrepreneurial intentions relationship.

In sum, our hypotheses suggests promotion focus by itself may not predict entrepreneurial intentions. Instead, promotion focus acts as a lever to strengthen entrepreneurial intentions when conditions favor positive attitudes towards entrepreneurial activities, such as when parents have owned businesses. Individuals are also influenced by their work environments. Therefore we predict that promotion focus strengthens entrepreneurial intentions when the research laboratory values commercialization; similarly, promotion focus strengthens entrepreneurial intentions the more the research laboratory uses industry financed research. Since individuals high in promotion focus are less concerned with uncertainty, we predict that individuals low in promotion focus strengthens the intellectual property engagement to entrepreneurial intentions relationships.

RESEARCH METHODS

Sample and Procedures

We build upon a sample of 208 doctoral and post-doctoral researchers from a university in Norway. Data were collected in February 2010, using an online questionnaire. The data collection phase was preceded by a pilot phase during November 2009-January 2010, during which respondents were also requested to provide comments on the questionnaire itself, allowing refining of the instrument. The survey population consists of 690 doctoral and post-doctoral researchers in

the Faculty of Mathematics and Natural Sciences. They received a request to complete the online questionnaire through email, sent by the central administration, and signed by the research team and the vice-dean. The first mailing resulted in a response of 170 researchers, and was followed by a second email request one week later, resulting in 112 additional responses. From the total of 282 responses, 91 were eliminated due to missing data, resulting in 191 full questionnaires – an effective response rate of 28%. *T* tests showed no significant differences between early and late respondents in age, type of research scientist (postdoc vs. doctoral researcher) and time employed at the university. The average age of the entrepreneurs was 32 (s.d. 5.90), and 37.2% of the total sample were women. Some 72% were doctoral researchers while the rest were post-doctoral researchers. They had been employed by the university for an average of 3.24 years (s.d. 3.19).

Measures

Dependent variables

Promotion focus. This variable was measured using the scale developed by Lockwood, Jordan, and Kunda (2009). The regulatory focus scale is particularly suited for an academic setting because some of the items were specifically developed with students in mind. Nine questions were used to measure promotion focus on a scale of 1 (disagree to a large extent) to 9 (agree to a large extent). Sample items include: "I frequently imagine how I will achieve my hopes and aspirations", "I often think about the person I would ideally like to be in the future", "I typically focus on the success I hope to achieve in the future", and "I often think about how I will achieve my academic success." Scale reliability measured by Cronbach's Alpha was .82. The average promotion focus was 6.39 with a s.d. of 1.22.

Entrepreneurial Intentions. Entrepreneurial intentions were measured using Linan and Chen's (2009) 3-item scale. Respondents were asked to rate on a 7 point scale from 1 (unlikely) to 7 (likely) they will start a business. The items are: "You will pursue a career as an entrepreneur", "you will pursue a career as employed in an organization" (reverse coded), and "you will start a business" (Cronbach's Alpha = .71, average = 2.80, s.d. = 1.26).

Parents owned business. Following the wording used in the Global Entrepreneurship Monitor surveys, participants were asked the question: "has either of your parents ever owned a business." The responses were coded as 1 (28% of the sample) if either of their parents had owned a business and 0 otherwise.

Commercial culture. We created six questions to measure the extent to which the participants' department valued commercialization of research. Participants were asked to respond on a 5 point scale from 1 (very untrue) to 5 (very true) the extent to which they agreed with the following statements: "The commercialization of research is one of the core objectives of my department", "The commercialization of research is encouraged by my department", "Researchers in my department engage in entrepreneurial activities", "Faculty in my department engage in entrepreneurial activities", "My advisor encourages us to commercialize our technologies", and "People in my department engage in business venturing activities." The scale was reliable (Cronbach's Alpa = .87), with a mean of 2.62 (s.d. = .84).

Industry financed research. Participants answered the following question "What percentage of your research time was dedicated to research financed by industry over the previous year." Some 9.7 percent of the respondents spent all their time on industry financed research while 70.6% did not do any industry financed research. The mean was 16.83% (s.d. = 32.87).

Intellectual Property Rights (IPR) engagement. We created 3 items to measure the extent to which the participant is engaged in IPR activities. The items on a 7 point scale from 1 (unlikely) to 7 (likely) are: "You will apply for a patent over the next 5 years", "You will license some of your technological developments to industry over the next 5 years", and "You will become the owner of intellectual property rights (patent, copyright, trademark,….) over the next 5 years." The scale was reliable with Cronbach's Alpha of .89 (average = 2.92, s.d. = 1.60).

In addition to the independent variables, we controlled for individual and work factors that predict entrepreneurial activities such as age (Reynolds, Carter, Gartner, & Greene, 2004), startup attempts (Alsos & Kolvereid, 1998; Farmer, Yao, & Kung-Mcintyre, 2009), entrepreneurial identity aspiration (Farmer et al., 2009), and novelty or research (Landry et al., 2006). The next section reports the results of our hierarchical regressions.

RESULTS

Table 1 shows the descriptive statistics and zero-order correlations of the variables of interest, while Table 2 shows the results of the regression analyses for the hypothesized relationships.

Insert Table 1 about here

The correlation table (Table 1) indicates that for the control variables, entrepreneurial intentions correlated positively to novelty of research ($r = .13$, $p < .05$), previous startup attempts or experiences ($r = .38$, $p < .01$), and entrepreneurial identity aspirations ($r = .73$, $p < .01$). With the exception of novelty of research, the correlations were in the direction we expected. For the

independent variables, entrepreneurial intentions correlated positively with a commercial culture (r = .25, p < .01), and IPR engagement (r = .37, p < .05). Interestingly, promotion focus was not linked to entrepreneurial intentions (r = .08, *n.s.)* supporting our contention in the hypotheses development section that having a promotion focus by itself does not imply an individual pursues entrepreneurial activities. Table 2 shows the regression analyses on predictors of entrepreneurial intentions. Model 1 includes only the control variables, Model 2 adds the independent variables, and Model 3 adds the interaction terms.

Insert Table 2 about here

Results in Model 1 of Table 2 show that the control variables as a whole predicted entrepreneurial intentions (F = 59.55, p < .001), with an R^2 of .56 and adjusted R^2 of .55. In particular, entrepreneurial intentions were positively predicted by having previous startup attempts or experiences (b = .53, p < .01), and an entrepreneurial identity aspiration (b = .59, p < .001). However, as shown in Model 2, the inclusion of the independent variables as a group did not increase R^2 significantly over Model 1 (R^2 = .58, R^2 change = .02 *n.s.*). The main model of interest in this study is Model 3 which examines how promotion focus together with family and organizational characteristics predict entrepreneurial intentions. Many papers have cited Aiken and West (1991) and centered the variables used in the interaction terms to reduce multicollinearity. In this paper we did not center the variables because while centering reduces the product term correlations of the variables, the inference statistics do not change as a result of centering (Belsley, 1984, Judge, Griffiths, Hill, Lutkepohl, and Lee et al., 1985). To test the robustness of the results, we reran all analyses using centered variables. The results are similar to the results when using the uncentered variables. As elaborated in the next paragraph, significant interaction effects of

promotion focus were found for parents owned businesses, industry financed research, and IPR engagement. Moreover, the F statistics for Model 2 (i.e., main effects over the control variables) was not significant but the F statistics for Model 3 (i.e., interaction effects over Model 3) was significant.

Model 3 shows that the interaction terms as a group significantly increased the amount of variance explained in entrepreneurial intentions (R^2 = .62, R^2 change over Model 2 = .04, $p < .01$). Three of the four interaction terms were significant; only the interaction term for promotion focus x commercial culture (b = -.09, n.s.) was not significant. Thus, H2 was not supported. Supporting H1, promotion focus x parents owned business positively predicted entrepreneurial intentions (b = .32, $p < .05$). We graphed the moderating effects in Figures 2 and 3 with high and low defined as +1 s.d. and -1 s.d. respectively. Figure 2 showed that having a parent who owned a business predicted higher entrepreneurial intentions among individuals high in promotion focus but lower entrepreneurial intentions among individuals low in promotion focus. The interaction of promotion focus x industry financed research was significant (b = .004, $p < .05$). However, the results were only partially supported. The results support our contention that industry financed research should predict entrepreneurial intentions for individuals high in promotion focus rather than their low promotion focused counterparts. But as Figure 3 shows, industry financed research predicted lower entrepreneurial intentions among individuals low in promotion focus. We explain the reasons for these findings in the next section. The findings also showed that promotion focus x IPR engagement was significant (b = -.07, $p < .05$). Figure 4 shows that IPR engagement predicted higher entrepreneurial intentions especially among individuals low in promotion focus, supporting H4.

Insert Figures 2, 3 and 4 about here

DISCUSSION

The paper provides a new perspective of when regulatory focus predicts entrepreneurial intentions. While high promotion focused individuals may be particularly suited for activities with uncertain outcomes (cf. Higgins, et al., 2000), such as entrepreneurial activities, we theorize this occurs when coupled with favorable environment characteristics. Since promotion focus is only a general concept of individual preferences to approach success, and to work towards one's ideal self, we theorize for promotion focus to impact entrepreneurial intentions when environment conditions lead to attitudes, values, and norms favorable to entrepreneurial activities. Specifically, in this study, having a parent who has owned a business venture, and a work environment conducive to entrepreneurial activities. With some variation, the results supported this assertion.

Figure 2 demonstrates individuals high in promotion focus and whose parents owned businesses reported higher entrepreneurial intentions than their low promotion focused counterparts. Interestingly, for individuals low in promotion focus, having parents who had owned business actually predicted lower entrepreneurial intentions. Since running a business entails successes and failures, individuals low in promotion focus can be threatened by stories of trails, tribulations, and failures accompanying the entrepreneurial journey and prefer to avoid these experiences. Such fear of failure should be less prevalent among individuals high in promotion focus who prefer to dwell on and attend to successes. Also supported was our hypothesis that intellectual property engagement predicts high entrepreneurial intentions especially among individuals low in promotion focus (documented by Figure 4). A patent holder has a monopoly over a particular technology, thereby creating an entry barrier. Individuals high in promotion focus go for what they desire and are less concerned with the safety, uncertainty reduction, and monopoly rights a patent provides. In

comparison, an individual low in promotion focus may especially be attracted to this monopoly power.

An interesting finding as Figure 3 shows is that industry financed research predicted lower entrepreneurial intentions among individuals low promotion in focus. A reason is that researchers engaging in industry-funded research may have better chances of finding a job in industry and are therefore less likely to start up their own company. Another reason is that industry financed research provides job security as continued employment sometimes depends on external funding. This situation is not unique to our sample as many engineering and science based doctoral students are funded this way (Landry et al., 2006). As McMullen and Shepherd observed certainty in general is detrimental to entrepreneurial activity. The job security explanation is consistent with Figure 3 showing that industry finance level did not predict less entrepreneurial intentions for individuals high in promotion focus; these individuals tend to work towards their idealized selves instead of obsessing on safety factors.

Although the data were collected from one person and at one point in time, common method variance is unlikely to account for the results of our hypotheses as these hypotheses are based on joint promotion focus and environment factors. It has been mathematically shown that interaction terms cannot be artifacts of common method variance. In fact as Siemsen et al. found, common method variance mostly attenuates the interaction effects.

Theoretical contributions

Our study provides a new perspective of when regulatory focus matters. More specifically, our findings indicate that to understand the effects of regulatory focus, and in particular promotion focus, researchers should also consider the environment a person is in. Promotion focus by itself

may not give rise to entrepreneurial intentions because promotion focus refers to the preference to achieve one's ideal self. Unless starting a business is part of one's ideal self, promotion focus level is unlikely to result in entrepreneurial intentions. In environments encouraging entrepreneurial activities, individuals high in promotion focus should respond positively and report high entrepreneurial intentions. However, low promotion focus does not imply a lack of entrepreneurial intentions. If the environment provides some level of security, such as the monopoly a patent bestows, even low promotion focus may not hinder entrepreneurial intentions.

More generally, this study supports the assertion by Hmieleski and Baron (2009) and Lee et al. (2011) that to understand entrepreneurial processes, a multi-level perspective should be used. Such multilevel effects can include the effects of individual factors on firm outcomes (Hmieleski and Baron, 2009) or the mix of individual and organizational factors on individual outcomes (Lee et al., 2011). Interestingly, for the main effects, neither regulatory focus nor the environment factors (parents who owned businesses, intellectual property engagement, and industry financed research) related to entrepreneurial intentions. Research by for instance Landry et al (2006) and Ambos et al (2008) also found that organizational factors did not affect the likelihood of spin-off creation. Instead, as our study suggests, it is the connection between promotion focus level and environment characteristics that impacted entrepreneurial intentions. Hence, it is the right individuals under favorable environments where entrepreneurship activities flourish. Fortunately, recent studies in entrepreneurship are adopting a multi-level perspective. For instance, Lee et al. (2011) found individual factors of innovation orientation and self-efficacy, and organizational factors of innovation climate and technical excellence incentives to predict entrepreneurial intentions. Echoing a multi-level perspective, in a theory paper Shepherd (2009) suggested that the grief recovering processes depends on the individual's emotional intelligence and the family business's emotional

capability. We recommend that more studies should incorporate the nexus of individual and environment factors.

More broadly, the findings of this study indicate self-regulation to be central to the entrepreneurial processes. Entrepreneurial activities come about as individuals navigate uncertain, dynamic environments, often requiring sacrifice of time, efforts, money, and even work-family balance. Hence, entrepreneurs have to regulate their thoughts, emotions, and actions to survive this roller coaster journey unscathed. Self-regulation studies have made inroads into the entrepreneurship literature, although the authors may not label their research as such. For instance, in a theory paper Shepherd (2003) claimed that emotion management affects the entrepreneurs' ability to learn from failure. Shepherd, Wiklund, and Haynie (2009) also suggested that out-going entrepreneurs need a grieving period before leaving their ventures. More broadly, self-efficacy, a type of self-regulation, is increasingly studied in entrepreneurship research. For instance, Zhao, Seibert, and Hills found self-efficacy to mediate the effects of individual factors on entrepreneurial intentions. In an edited handbook, Vohs and Baumeister (2011) included topics on various self-regulation mechanisms including those of affect, attention, attitudes, working memory, self-efficacy, and impulsivity. These concepts provide fruitful areas for research into how self-regulation shapes the entrepreneurial journey.

Limitations and future research

Does it make any difference whether one or both parents are entrepreneurs? For instance, if one parent is an entrepreneur and the other is a stay at home parent, we expect employment preferences to reflect self-employment as people raised in such families may look towards the employed parent as the work model. However, what happens if one parent is an entrepreneur and

the other works in a major corporation? Which attitudes, norms, and behaviors do people adopt? Moreover, does it depend on how the parent owned the business? Does it matter whether the business was inherited, or whether the parent started the business? People who view their parents as work role models may be particularly keen to start businesses if they see or hear about their parents' experiences of starting one; in this instance, individuals high in promotion focus may be especially keen to start their businesses. As we noted, high promotion focus is characterized by a desire to achieve one's idealized self and their activities and work preferences reflect the attitudes, norms which their value. Future studies should therefore have a more fine-grained analysis of family backgrounds and how these backgrounds shape entrepreneurial desires.

The type of IP activity can also influence a person's desire to be an entrepreneur as some IP activities are easier to commercialize than others. For instance, Wong et al. (2008) found that exposure to product type innovation more so than process type innovation led to employees' leaving their companies to start ventures. This is because process technologies usually need to be combined within a larger system to be useful. Hence, a person who owns a process technology may have to license the technology to an existing company instead of starting his or her company. A related issue is technology licensing policies which influence the extent technologies created in the university are commercialized (Markman, Phan, Balkin, and Gianiodis, 2005). A broad license, for example, provides more incentives for a person to start a business since several product lines can materialize from the technology. A broad license may be especially attractive for individuals low in promotion focus than their high promotion focused counterparts as the latter should be less concerned with the monopoly rights and uncertainty reduction a patent gives.

Since the sample comprises research scientists, the paper should be generalizable to research scientists in universities and other research institutes. More broadly, promotion focus may

moderate the effects of work environments advancing commercialization activities, such as in R&D, product development, and market development. Future research can explore how activities favorable to commercialization such as those identified above and family environments more generally (e.g. whether parents owned the business or inherited the business) together with promotion focus predict entrepreneurial intentions.

Practical implications

The study has practical implications for encouraging technological based entrepreneurship in research universities in the areas of selection, education and training, and environment characteristics. For selection, under the correct circumstances, individuals high in promotion focus may be interested in engaging in entrepreneurial activities. Currently, numerous scales exist to measure promotion focus levels. For example, the Higgins et al. (2001) RFQ is commonly used to measure promotion focus level. The scale used in this study by Lockwood et al. (2002) was especially designed to be used in an academic setting. Recently, scales on regulatory focus for work contexts have been developed (Wallace & Chen, 2006; Wallace, Johnson, and Frazier, 2006). Using assessment scales as part of selection criteria is routinely used in many organizations. To our knowledge, adoption of such scales is unusual in the hiring of research scientists. Research laboratories should consider these scales to select individuals that can create an environment favorable to research commercialization.

Apart from selection, entrepreneurial attitudes, norms, and values can be created through entrepreneurship education. Research laboratory managers can encourage the research scientists to attend some of these courses. Moreover, since many universities have business plan or business idea

competitions, the research scientist can be encouraged to participate in these activities. These activities stimulate thoughts into how the technologies they work with can have commercial applications. Further, the talks, mentoring sessions, and other entrepreneurial knowledge, and skill building activities can spur the research scientists to be interested in entrepreneurship activities.

Finally, as our findings indicate, the right people require the right environment for entrepreneurial intentions to flourish. As commercial culture did not predict entrepreneurial intentions, research laboratory managers can use specific actions, such as IP engagement, to encourage entrepreneurial activities. Companies such as 3M allow employees time off to pursue activities of their interest. Research laboratory managers can allow the research scientists time to work on product commercialization. Together with the right people, such as those high in promotion focus, the right environment can stimulate technology commercialization.

To conclude, our study provides a new perspective of promotion focus effects on entrepreneurial intentions specifically and entrepreneurial activities in general. We theorize and show promotion focus to predict entrepreneurial intentions only when conditions favor entrepreneurial activities. Moreover, given the right conditions, individuals low in promotion focus can even report higher entrepreneurial intentions than their high promotion focused counterparts. More broadly, our results suggest a multi-level approach is valuable to understand who engages in entrepreneurial activities, since as our results indicate, promotion focus (an individual level factor), and environment factors only predict entrepreneurial intentions when studied together. Finally, given the need for entrepreneurs to navigate uncertain environments, we call for more research on self-regulation mechanisms and how these mechanisms shape entrepreneurial activities, processes, and outcomes.

REFERENCES

Aiken, L. S., & West, S. G. (1991). *Multiple Regression: Testing and interpreting interactions. Thousand Oaks: Sage.*

Allen, N. J., & Meyer, J. P. (1990). Organizational socialization tactics: A longitudinal analysis of links to newcomers' commitment and role orientation. *Academy of Management Journal, 33*(4), 847-858.

Alsos, G. A., & Kolvereid, L. (1998). The business gestation process of novice, serial and parallel business founders. *Entrepreneurship: Theory and Practice, 22*.

Ambos, T. C., Mäkel, K., Birkinshaw, J., & D'Este, P. (2008). When does university research get commercialized? Creating ambidexterity in research institutions. *Journal of Management Studies, 45*(8), 1424-1447.

Belsley, D. A. (1984). Demeaning conditioning diagnostics through centering. *The American Statistician, 38*(2), 73-77.

Brockner, J., Higgins, E. T., & Low, M. B. (2004). Regulatory focus theory and the entrepreneurial process. *Journal of Business Venturing, 19*(2), 203-220.

Bryant, P. (2007). Self-regulation and decision heuristics in entrepreneurial opportunity evaluation and exploitation. *Management Decision, 45*(4), 732-748.

Bryant, P. (2009). Self-regulation and moral awareness among entrepreneurs. *Journal of Business Venturing, 24*(5), 505-518.

Burke, A. E., FitzRoy, F. R., & Nolan, M. A. (2002). Self-employment wealth and job creation: The roles of gender, non-pecuniary motivation and entrepreneurial ability. *Small Business Economics, 19*(3), 255-270.

Crowe, E., & Higgins, E. T. (1997). Regulatory Focus and Strategic Inclinations: Promotion and Prevention in Decision-Making. *Organizational Behavior and Human Decision Processes, 69*(2), 117-132.

Duchesneau, D. A., & Gartner, W. B. (1990). A profile of new venture success and failure in an emerging industry. *Journal of Business Venturing, 5*(5), 297-312.

E., H. (2001). Science as a vocation in the 1990s: the changing organizational culture of academic science. In C. J. & S. Restivo (Eds.), *Degrees of Compromise* (pp. 101-138). Albany, NY: State University of New York Press.

Fairchild, G. B. (2010). Intergenerational ethnic enclave influences on the likelihood of being self-employed. *Journal of Business Venturing, 25*(3), 290-304.

Farmer, S. M., Yao, X., & Kung-Mcintyre, K. (2009). The behavioral impact of entrepreneur identity aspiration and prior entrepreneurial experience. *Entrepreneurship: Theory and Practice*, DOI: 10.1111/j.1540-6520.2009.00358.x.

Freeman, C. (1983). *The economics of industrial innovation*. Cambridge, MA: MIT Press.

Gans, J., & Stern, S. (2003). The product market and the market for "ideas": commercialization strategies for technology entrepreneurs. *Research Policy, 32*(2), 333-350.

Gompers, P., Lerner, J., & Scharfstein, D. (2003) Entrepreneurial spawning: Public corporations and the genesis of new ventures, 1986-1999. Cambridge, Massachusetts.

Gulbrandsen, M., & Smeby, J.-C. (2005). Industry funding and university professors' research performance. *Research Policy, 34*, 932-950.

Hao, Z., Seibert, S. E., & Hills, G. E. (2005). The mediating role of self-efficacy in the development of entrepreneurial intentions. *Journal of Applied Psychology, 90*(6), 1265-1272.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist, 52*(12), 1280-1300.

Higgins, E. T. (Ed.). (1998). *Promotion and prevention: regulatory focus as a motivational principle.*

Higgins, E. T., Friedman, R. S., Harlow, R. E., Idson, L. C., Ayduk, O. N., & Taylor, A. (2001). Achievement orientations from subjective histories of success: Promotion pride versus prevention pride. *European Journal of Social Psychology, 31*(1), 3-23.

Hmieleski, K. M., & Baron, R. A. (2009). Entrepreneurs' optimism and new venture performance: A social cognitive perspective. *Academy of Management Journal, 52*(3), 473-488.

Jen-te, Y. (2009). Facilitating or inhibiting newcomer socialisation outcomes in international hotels. [Article]. *Tourism & Hospitality Research, 9*(4), 325-339.

Judge, G. G., Griffiths, W. E., Hill, C., Lutkepohl, H., & Lee, T.-C. (1985). *The Theory and Practice of Econometrics*. New York, NY: John Wiley and Sons.

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal, 33*(4), 692-724.

Katz, J. A. (1992). A psychosocial cognitive model of employment status choice. *Entrepreneurship: Theory & Practice, 17*(1), 29-37.

Kolvereid, L. (1996). Prediction of employment status choice intentions. *Entrepreneurship: Theory*

& Practice, 21(1), 47-57.

Landry, R., Amara, N., & Rherrad, I. (2006). Why are some university researchers more likely to create spin-offs than others? Evidence from Canadian universities. *Research Policy, 35*(10), 1599-1615.

Landry, R., Saïhi, M., Amara, N., & Ouimet, M. (2010). Evidence on how academics manage their portfolio of knowledge transfer activities. *Research Policy, 39*(10), 1387-1403.

Lee, L., Wong, P. K., Foo, M. D., & Leung, A. (2011). Entrepreneurial intentions: The influence of organizational and individual factors. *Journal of Business Venturing, 26*(1), 124-136.

Liberman, N., Idson, L. C., Camacho, C. J., & Higgins, E. T. (1999). Promotion and prevention choices between stability and change. *Journal of Personality & Social Psychology, 77*(6), 1135-1145.

Liñán, F., & Chen, Y.-W. (2009). Development and cross-cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship: Theory & Practice, 33*(3), 593-617.

Lockwood, P., Jordan, C. H., & Kunda, Z. (2002). Motivation by positive or negative role models: Regulatory focus determines who will best inspire us. *Journal of Personality and Social Psychology, 83*(4), 854-864.

Lopez, S. F., Otero, L., Rodeiro, D., & RodrÍGuez, A. (2009). Entrepreneurial university, transfer technology and funding: An empirical analysis. *Journal of Enterprising Culture, 17*(2), 147-179.

Lu, J., & Tao, Z. (2010). Determinants of entrepreneurial activities in China. *Journal of Business Venturing, 25*(3), 261-273.

Markman, G. D., Phan, P. H., Balkin, D. B., & Gianiodis, P. T. (2005). Entrepreneurship and university-based technology transfer. *Journal of Business Venturing, 20*(2), 241-263.

McClelland, D. C. (1961). *The achieving society.* Princeton, NJ: Van Nostrand.

McKelvie, A., Haynie, J. M., & Gustavsson, V. (in press). Unpacking the uncertainty construct: Implications for entrepreneurial action. *Journal of Business Venturing, In Press, Corrected Proof*.

Mowery, D. C., Nelson, R. R., Sampat, B. N., & Ziedonis, A. A. (2001). The growth of patenting and licensing by U.S. universities: an assessment of the effects of the Bayh-Dole act of 1980. *Research Policy, 30*(1), 99-119.

Mowery, D. C., & Ziedonis, A. A. (2002). Academic patent quality and quantity before and after the Bayh-Dole act in the United States. *Research Policy, 31*(3), 399-418.

O'Shea, R., Allen, T., Chevalier, A., & F., R. (2005). Entrepreneurial orientation, technology transfer and spinoff performance of U.S. universities. *Research Policy, 34*(7), 994–1009.

Oakey, R. (1995). *High technology new firms: variable barriers to growth*. London: Paul Chapman.

Pavitt, K. (1991). Key characteristics of the large innovating firm. *British Journal of Management, 2*, 41-50.

Pratt, M. G. (2000). The Good, the Bad, and the Ambivalent: Managing Identification among Amway Distributors. *Administrative Science Quarterly, 45*(3), 456-493.

Pratt, M. G., Rockmann, K. W., & Kaufmann, J. B. (2006). Constructing professional identity: The role of work and identity learning cycles in the customization of identity among medical residents. *Academy of Management Journal, 49*(2), 235-262.

Rasmussen, E., & Borch, O. J. (2010). University capabilities in facilitating entrepreneurship: A longitudinal study of spin-off ventures at mid-range universities. *Research Policy, 39*(5), 602-612.

Reynolds, P., Carter, N., Gartner, W., & Greene, P. (2004). The Prevalence of Nascent Entrepreneurs in the United States: Evidence from the Panel Study of Entrepreneurial Dynamics. *Small Business Economics, 23*(4), 263-284.

Rothwell, R., & Zegveld, W. (1982). *Industrial innovation and small and medium sized firms*. London: Francis Pinter.

Scherer, R. F., Adams, J. S., Carley, S. S., & Wiebe, F. A. (1989). Role model performance effects on development of entrepreneurial career preference. *Entrepreneurship: Theory & Practice, 13*(3), 53-71.

Schindehutte, M., Morris, M., & Allen, J. (2006). Beyond achievement: Entrepreneurship as extreme experience. *Small Business Economics, 27*(4-5), 349-368.

Schneider, B. (1987). The people make the place. *Personnel Psychology, 40*(3), 437-453.

Shepherd, D. A. (2003). Learning from business failure: Propositions of grief recovery for the self-employed. *Academy of Management Review, 28*(2), 318-328.

Shepherd, D. A. (2009). Grief recovery from the loss of a family business: A multi- and meso-level theory. *Journal of Business Venturing, 24*(1), 81-97.

Shepherd, D. A., Wiklund, J., & Haynie, J. M. (2009). Moving forward: Balancing the financial and

emotional costs of business failure. *Journal of Business Venturing, 24*(2), 134-148.

Siemsen, E., Roth, A., & Oliveira, P. (2010). Common Method Bias in Regression Models With Linear, Quadratic, and Interaction Effects. *Organizational Research Methods, 13*(3), 456-476.

Steffensen, M., Rogers, E. M., & Speakman, K. (2000). Spin-offs from research centers at a research university. *Journal of Business Venturing, 15*(1), 93-111.

Van Maanen, J., & Schein, E. H. (Eds.). (1979) (Vols. 1). Research in Organizational Behavior.

Vohs, K. D., & Baumeister, R. F. (Eds.). (2011). *Handbook of self-regulation: Research, theory, and applications* (2nd ed.). New York, NY: The Guilford Press.

Wallace, C., & Gilad, C. (2006). A Multilevel integration of personality, climate, self-regulation, and performance. *Personnel Psychology, 59*(3), 529-557.

Wallace, J. C., Johnson, P. D., & Frazier, M. L. (2009). An examination of the factorial, construct, and predictive validity and utility of the regulatory focus at work scale. *Journal of Organizational Behavior, 30*(6), 805-831.

West, J. (2008). Commercializing open science: deep space communications as the lead market for Shannon Theory, 1960-73. *Journal of Management Studies, 45*, 1506-1532.

Wong, P. K., Lee, L., & Foo, M. D. (2008). Occupational choice: The influence of product vs. process innovation. *Small Business Economics, 30*(3), 267-281.

Wong, P. K., & Singh, A. (2010). University patenting activities and their link to the quantity and quality of scientific publications. *Scientometrics, 83*(1), 271-294.

Wright, M., Clarysse, B., Lockett, A., & Knockaert, M. (2008). Mid-range universities' linkages with industry: knowledge types and the role of intermediaries. *Research Policy, 37*, 1205-1223.

Wu, C., McMullen, J. S., Neubert, M. J., & Yi, X. (2008). The influence of leader regulatory focus on employee creativity. *Journal of Business Venturing, 23*(5), 587-602.

Table 1

Means, Standard Deviations, and Correlations of the Study Variables

		M	*SD*	1	2	3	4	5	6	7	8	9	10
1	Entrepreneurial intentions	2.80	1.30	0.71									
2	Age	32.23	5.75	-0.07	--								
3	Novelty research	2.78	1.02	0.13	0.01	--							
4	Previous startup attempt	0.15	0.36	0.38	0.12	0.03	--						
5	Entrepreneurial identity aspirations	2.38	1.52	0.73	-0.04	0.24	0.36	--					
6	Promotion focused	6.39	1.22	0.08	-0.22	0.01	0.12	0.19	0.82				
7	Commercial culture	2.62	0.85	0.25	-0.07	0.12	0.15	0.31	-0.03	0.87			
8	Parents owned business	0.28	0.45	0.09	-0.15	-0.10	-0.04	0.06	-0.08	-0.02	--		
9	IPR engagement	3.09	1.59	0.37	-0.05	0.34	0.15	0.37	0.05	0.37	0.03	0.89	
10	Industry financed research	17.34	32.50	0.11	-0.01	0.07	0.02	0.18	0.06	0.24	-0.07	0.23	--

Notes. $|r_s| \geq .12$ *are significant at the .05 level (2-tailed);* $|r_s| \geq .18$ *are significant at the .01 level (2-tailed).*

Cronbach's Alpha at the diagonals

Table 2

Regression Analyses on Entrepreneurial Intentions

	Model 1			Model 2			Model 3		
	B		S.E.	B		S.E.	B		S.E.
Control Variables									
(Constant)	1.86	***	0.41	2.35	***	0.64	0.26		1.28
Age	-0.01		0.01	-0.01		0.01	-0.01		0.01
Novelty research	-0.05		0.06	-0.10		0.07	-0.10		0.06
Previous startup attempt	0.53	**	0.19	0.54	**	0.19	0.52	**	0.18
Entrepreneurial identity aspirations	0.59	***	0.05	0.57	***	0.05	0.57	***	0.05
Independent Variables									
Promotion focus				-0.08		0.05	0.22		0.18
Parents owned business				0.07		0.14	-2.01	**	0.70
Commercial culture				-0.03		0.08	0.59		0.38
Industry financed research				0.00		0.00	-0.03	*	0.01
IPR engagement				0.12	*	0.05	0.58	**	0.22
Interaction Terms									
Promotion x parents owned business							0.32	**	0.11
Promotion x commercial culture							-0.09		0.06
Promotion x industry finance research							0.00	*	0.00
Promotion x IPR engagement							-0.07	*	0.03
R^2	0.56			0.58			0.62		
change in R^2				0.02			0.04	**	
adjusted R^2	0.55			0.56			0.59		
ANOVA *F*	59.45	***		28.12	***		22.52	***	

N=191

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

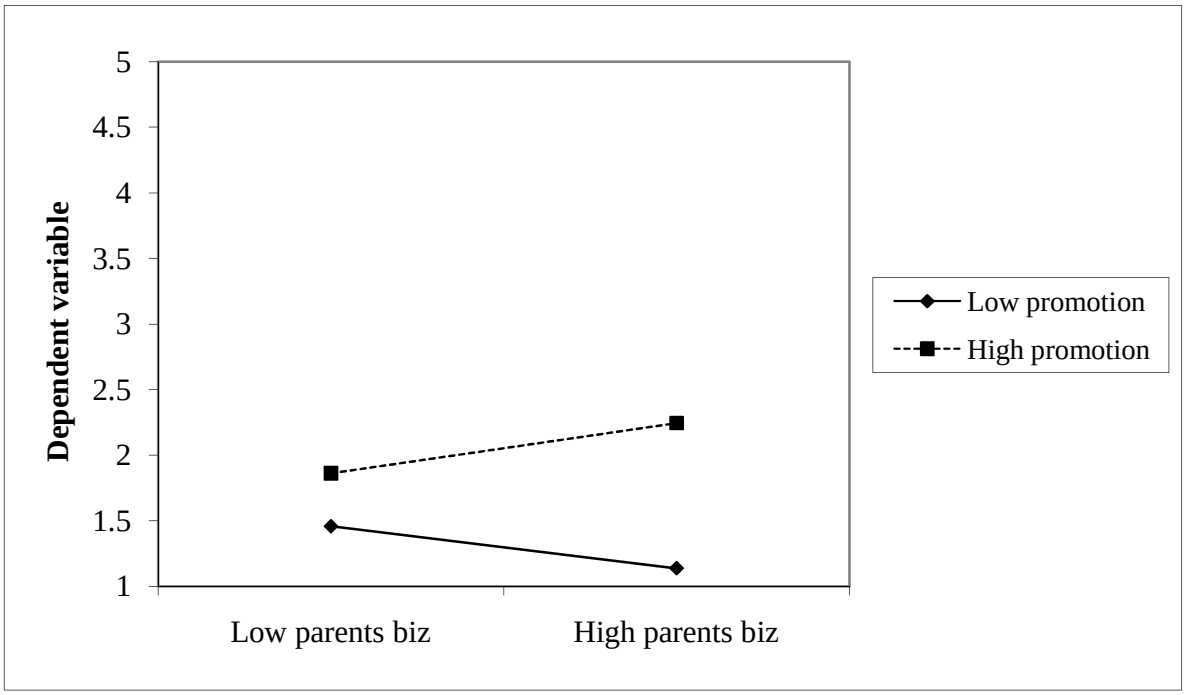

Figure 2.

Interaction effect of high vs. low promotion focus and parents owned business predicting entrepreneurial intentions.

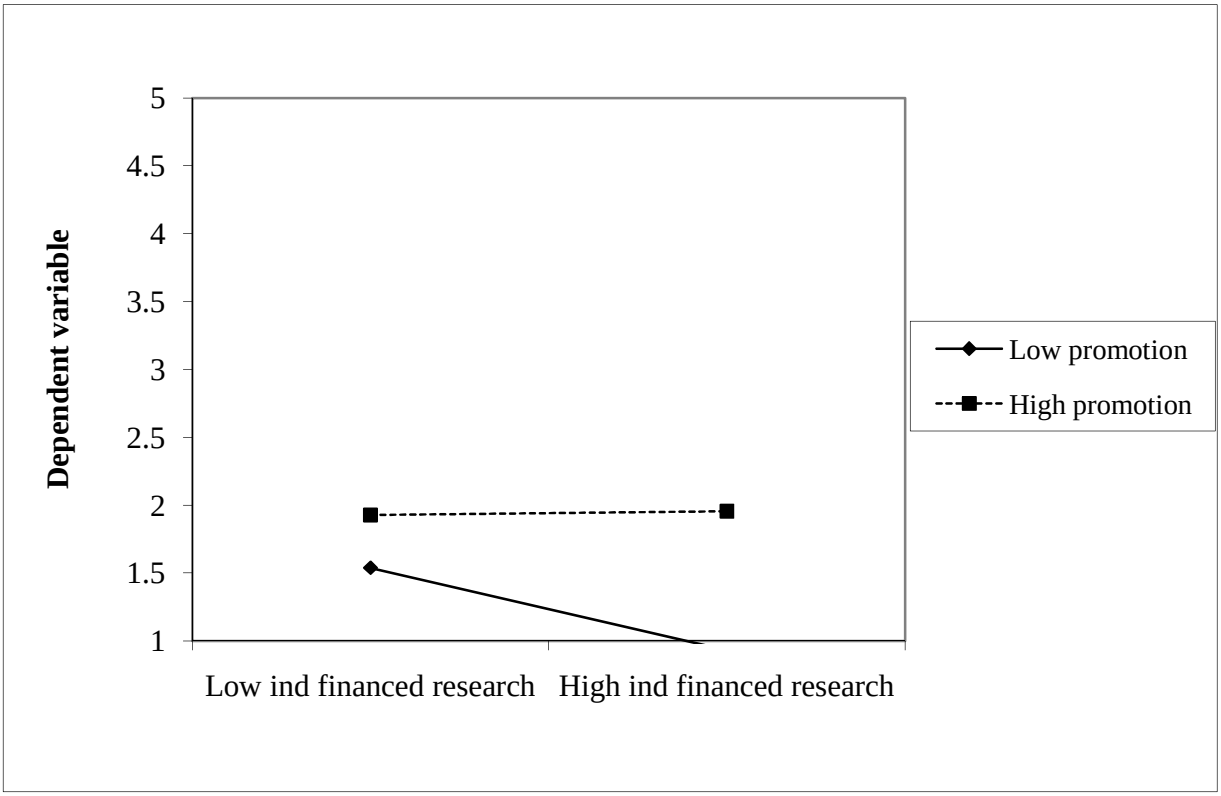

Figure 3.

Interaction effect of high vs. low promotion focus and percentage of industry financed research predicting entrepreneurial intentions.

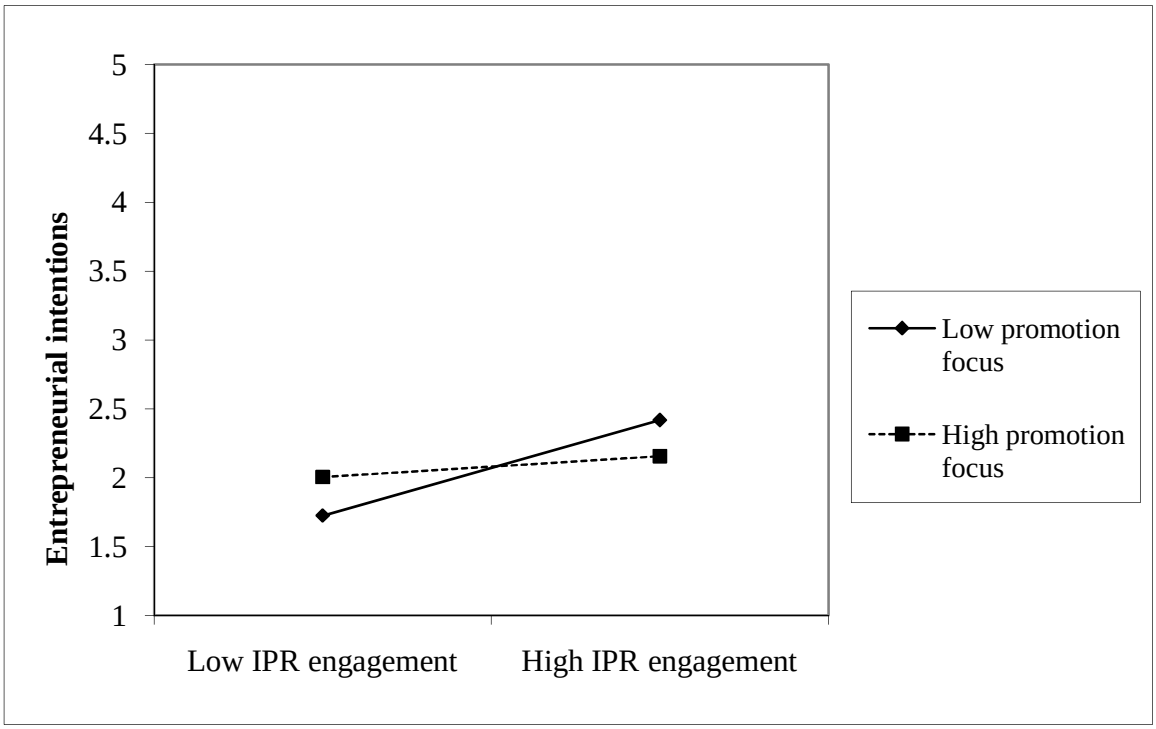

Figure 4.

Interaction effect of promotion focus and IPR engagement.